

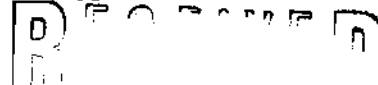
EXHIBIT A

Notice: EPA published a clarification of its interpretation of the scope of “a project” for purposes of project aggregation subsequent to the date of this document. See 83 FR 57324 (Nov. 15, 2018).



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 17 1993



OFFICE OF
AIR AND RADIATION

JUN 23 1993

AIR

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MEMORANDUM

SUBJECT: Applicability of New Source Review Circumvention
Guidance to 3M - Maplewood, Minnesota

FROM: John B. Rasnic, Director *John B Rasnic*
Stationary Source Compliance Division
Office of Air Quality Planning and Standards

TO: George T. Czerniak, Chief
Air Enforcement Branch
Region V

This is in response to your memorandum dated March 16, 1992, requesting guidance on New Source Review (NSR) permitting for the Minnesota Mining and Manufacturing (3M) Center located in Maplewood, Minnesota. Specifically, you requested guidance on the applicability of the circumvention guidance to this source and other sources in similar situations. We also received from your staff more information about the modifications at 3M and we suggested that you issue a §114 request to the source for more information. In early November, we received a copy of the response to the §114 request dated October 30, 1992. We hope this memorandum provides sufficient guidance on permitting this source and other sources in similar situations.

Background

In your memorandum of March 16, 1992, you notified us that the 3M Center in Maplewood, Minnesota received four synthetic minor permits for modifications between October 1991 and March 1992. The permits for the four modifications combined allow emission increases of 33.6 tons per year (tpy) of particulates, 39.8 tpy of sulfur dioxide, 39.4 tpy of nitrogen dioxide, 22.0 tpy of carbon monoxide, and 119.2 tpy of volatile organic compounds. You learned during the Region's discussions with Minnesota that in 18 months, the source received 12 minor permits, and applied for several other minor permits. As a result, you indicated to the Minnesota Pollution Control Agency (MPCA) that 3M may be circumventing the Prevention of Significant Deterioration (PSD) regulations through these small projects. The MPCA, however, felt that these modifications were justified as separate modifications based on each 3M division pursuing its own research schedule.

EPA5PMN000486



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Although it is somewhat unclear, the response to the §114 request arguably supports 3M's justification. Yet in light of criteria for identifying circumvention situations, as further explained below, the Stationary Source Compliance Division (SSCD) believes the source may not have been permitted properly for its modifications.

EPA Policy and Authority

EPA stated in the June 28, 1989 Federal Register notice on the definition of federally enforceable (54 FR 27274) and in its June 13, 1989 guidance on "Limiting Potential to Emit in New Source Permitting" that it is not only improper but also in violation of the Clean Air Act to construct a source or major modification with a minor source permit when there is intent to operate as a major source or major modification. Permits with conditions that do not reflect a source's planned mode of operation are sham permits, are void ab initio, and cannot shield a source from the requirement to undergo preconstruction review. 40 CFR §52.21(r)(4) requires application of NSR requirements to a source that asks for a relaxation of permit limits which would make the source major. EPA stated that it will require application of §52.21(r)(4) even where a source legitimately changes a project after finding it cannot comply with the operating restrictions which were taken in good faith.

Generally in "sham" permitting, a source attempts to expedite construction by securing minor source status through permits containing operational restrictions from which the source intends to free itself shortly after completion of construction and commencement of operation. Such attempts are treated as unlawful circumvention of the preconstruction review requirements. Similarly, attempts to expedite construction by securing several minor source permits and avoiding major modification requirements should be treated as circumvention. A memorandum dated September 18, 1989 from John Calcagni to William Hathaway stated this position (see Memorandum 4.42 in the NSR Guidance Notebook).

EPA stated in the 1989 Federal Register notice that it is not possible to set forth, in detail, the circumstances in which EPA considers an owner or operator to have evaded preconstruction review through minor permits, and thus subject itself to enforcement sanctions under §§113 and 167 from the beginning of construction. However, EPA will look to objective indicia to identify circumvention situations. For example, EPA provided examples of objective criteria in the June 13, 1989 guidance on limiting potential to emit. EPA also stated some criteria in the Federal Register notice which include: the filing of an application for a federal PSD permit at or near the same time as a state minor source permit; the economic realities surrounding a transaction; and projected levels of operation as portrayed to

lending institutions and other records of projected demand and output. EPA stated that where it appears obvious that a proposed source or modification, by its physical and operational design characteristics, could not economically be run at minor source levels for an appreciable length of time, EPA will consider minor source limits taken by the source unrealistic and sham.

Specific Criteria

Similar to the 1989 guidance, this memorandum provides criteria to permitting and enforcement authorities to apply when making determinations whether a source is circumventing major NSR through the minor modification process.

1. Filing of more than one minor source or minor modification application associated with emissions increases at a single plant within a short time period.

If a source files more than one minor source permit application simultaneously or within a short time period of each other, this may constitute strong evidence of an intent to circumvent the requirements of preconstruction review. Authorities should scrutinize applications that relate to the same process or units that the source files either before initial operation of the unit or after less than a year of operation. The September 18, 1989 memorandum from John Calcagni to William Hathaway states that two or more related minor changes over a short time period should be studied for possible circumvention.

2. Application of funding.

Applications for commercial loans or, for public utilities, bond issues, should be scrutinized to see if the source has treated the projects as one modification for financial purposes. If the project would not be funded or if it would not be economically viable if operated on an extended basis (at least a year) without the other projects, this should be considered evidence of circumvention.

3. Reports of consumer demand and projected production levels.

Stockholder reports, reports to the Securities and Exchange Commission, utility board reports, or business permit applications should be reviewed for projected operation or production levels. If reported levels are necessary to meet projected consumer demand but are higher than permitted levels, this is additional evidence of circumvention.

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4. Statements of authorized representatives of the source regarding plans for operation.

Statements by representatives of the source to EPA or to State or local permitting agencies about the source's plans for operation can be evidence to show intent to circumvent preconstruction review requirements.

5. EPA's own analysis of the economic realities of the projects considered together.

EPA may determine that it is reasonable to expect that company management would coordinate the planning and execution of projects considering their intrinsic relationship with each other (physical proximity, stages of production process, etc.) and their impact on economic viability of the plant (scheduling down time in light of production targets, economies of scale, etc.).

Analysis of 3M-Maplewood

Although 3M applied for and received several minor source permits within 18 months, in response to the §114 request, 3M stated that independent divisions at the plant made the funding decisions for each independent project and that each project is independently viable. Thus, they suggest, the projects are not part of an attempt to circumvent preconstruction review. 3M and Minnesota have indicated that the divisions' actions should be reviewed separately and should not be treated as parts of a whole. However, the law plainly treats the Maplewood plant as one major emitting facility for NSR purposes. The NSR regulations do not provide special treatment because it is a research and development plant. Further, given the nature of this source, under normal conditions, a certain level of production or research development of new products can be expected. Although the NSR program generally allows sources to modify below significance levels without aggregating other contemporaneous net increases, sources cannot use the minor modification process to circumvent major modification requirements.

Where a source is permitted for several minor modifications that may in good faith be intended to be separate but result in the source's aggregate increases to be major even considering decreases over a short time period (e.g., one year or 18 months), the modifications may require major new source review. Such modifications could require NSR if they are viewed as being consistent with the source's overall production goals or plans for a short planning period. In other words, 3M should not benefit from the absence of a plant-wide production plan. Given the nature of the plant's work, 3M may be able to reasonably anticipate that modifications will occur within a relatively short period of time.

EPA5PMN000489

Reports on consumer demand and projected production or emission levels may provide evidence that this plant is expected to modify regularly in response to such demands or research needs. Some minimum level of research activity and commensurate emissions, source-wide, perhaps could be expected from year to year, as would be expected to keep the 3M plant productive or operable. These emissions and thereby modifications cannot be presumed to be independent given the plant's overall basic purpose to support a variety of research and development activities. Therefore, even though each research project may have been individually conceived and separately funded, it is appropriate to look at the overall expected research activity in assessing NSR applicability and enforcement.

Without regard to whether 3M intended to circumvent NSR requirements, this source and the State should discuss alternative permitting that could minimize the uncertainty of intent. Although we cannot require aggregation of all de minimis net increases, we believe that net increases should be aggregated for each "planning period" of the plant. One way to treat this source is to set a plant-wide emissions level, that can be raised only by going through major NSR. Recently, we worked with you and the MPCA to develop a plantwide emissions cap permit for a 3M facility in St. Paul. Although there are a number of concerns that must be addressed in such an approach, we believe that the source and the State would benefit from the certainty that such an approach provides.

If you have any questions regarding this matter, please contact Clara Poffenberger at (703) 308-8709.

cc: Karen Schapiro, OE
Greg Foote, OGC
Bill Lamason, AQMD
Air Division Directors
NSR contacts

EPA5PMN000490

EXHIBIT B

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 14 1983

SUBJECT: Guidance On Enforcement of Prevention of Significant Deterioration
Requirements Under the Clean Air Act

FROM: Michael S. Alushin
Associate Enforcement Counsel for Air

Edward E. Reich, Director
Stationary Source Compliance Division

TO: Regional Counsels Regions I-X

Directors, Air Management Divisions Regions I, V and IX

Directors, Air and Waste Management Divisions Regions II-IV, VI-VIII, and X

This guidance discusses enforcement of Part C of Title I of the Clean Air Act, dealing with the prevention of significant deterioration (PSD) of the ambient air quality. The guidance explains the use of Section 167 of the Clean Air Act as an enforcement tool and provides assistance in choosing between Section 167 and the alternatives available for enforcing against PSD violations. Violations of Part C include construction or operation of a PSD source (as defined under the Act and the PSD regulations) without a permit, construction or operation with an invalid permit, and construction or operation in a manner not consistent with a validly issued permit.

We believe that Section 167 of the Act provides with a significant enforcement mechanism in addition to Section 113, the Agency's main enforcement tool, but it does not preclude resort to any remedies available under Sections 113 or 120. Section 167 should be used in situations where a source is constructing or operating without a valid permit or in violation of a valid permit and EPA's main interest is a quick imposition of injunctive relief to stop the violation. Where time is not of the essence and/or the Agency wishes to collect penalties in addition to exacting injunctive relief, Sections 113 or 120 provide more appropriate remedies.

Thus, depending upon the circumstances of a particular case, EPA may commence one or more of the following actions against a source that is in violation of PSD requirements:

- (a) Issue an order or seek injunctive relief under Section 167 to prevent the source from constructing or operating in violation of the PSD requirements;
- (b) Issue an order to comply under Section 113(a);
- (c) Seek civil remedies under Section 113(b);
- (d) Seek criminal penalties under Section 113(c);
- (e) Assess and collect noncompliance penalties under Section 120.

I. Analysis of Section 167

Section 167 of the Clean Air Act provides:

The Administrator shall, and a State may, take such measures, including issuance of an order, or seeking injunctive relief, as necessary to prevent the construction of a major emitting facility which does not conform to the requirements of this part, or which is proposed to be constructed in any area included in the list promulgated pursuant to paragraph (1)(D) or (E) of subsection (d) of Section 107 of this Act and which is not subject to an implementation plan which meets the requirements of this part.

42 U.S.C. Section 7477(1978)

Depending upon whether or not EPA has approved a State's Part C (PSD) State Implementation Plan (SIP) provisions under Section 110(a) (2) of the Clean Air Act or delegated the PSD program to the State, Section 167 creates two separate and distinct enforcement obligations for EPA. This is consistent with EPA's policy of allowing the States primacy where they have the main responsibility for a program. In those States that have not been delegated the PSD program or do not have approved SIP PSD provisions as required by Section 161 (PSD requirements for SIPS), EPA has the authority to regulate the construction of all major emitting sources that are subject to PSD review under the Act. Any person wishing to construct such a source in one of those States will be required by Section 165 (preconstruction requirements) to obtain a PSD permit from EPA. If the proposed source would violate the provisions of the PSD regulations, EPA must deny the permit. If EPA issues a permit, the Agency will be

responsible for initiating appropriate proceedings should the source subsequently violate any permit provisions. Likewise, the Agency is responsible for taking enforcement action against a source which commences construction without first obtaining a PSD permit.

Once its PSD SIP provisions have been approved or delegated, pursuant to Section 110(a)(2) and 40 CFR 51.24, the State, rather than EPA, assumes primary responsibility for administering the PSD program. The Agency does not completely relinquish its obligations, however. Rather, it assumes an oversight function. PSD permits issued by the State remain federally enforceable. 40 CFR Sections 52.02(d), 52.21(r), and 52.23. If the State takes appropriate enforcement action, it is unnecessary for EPA to initiate enforcement proceedings. If the State fails to take appropriate action, however, Section 167 provides that EPA must take measures adequate to prevent the construction of the noncomplying source. EPA can take such action at any time the Agency deems it necessary. The Agency is not forestalled by any action initiated by the State from simultaneously or subsequently taking action against a source that already had commenced construction or operation. Thus, EPA retains PSD enforcement authority and, where appropriate, is expected to initiate PSD enforcement proceedings before and after the PSD SIP revisions have been approved. [SEE FOOTNOTE 1].

Additionally, Section 167 requires EPA to take action directly against a source found being constructed or operating pursuant to a PSD permit that conflicts with the requirements of the Clean Air Act, implementing regulations, or approved SIP requirements. This provision gives the Administrator authority similar to that possessed under Section 113(a)(5) and (b)(5) to prevent illegal construction or operation of new sources in nonattainment areas.

[FOOTNOTE 1] Senator Muskie noted this continuing Federal enforcement obligation. He stated: "[o]nce the State adopts a permit process in compliance with this provision, the Environmental Protection Agency role is to seek injunctive or other judicial relief to assure compliance with the law." 123 Cong. Rec. S 9169 (daily ed. June 8, 1977) (remarks of Senator Muskie). Senator Muskie's reference to "injunctive or other judicial relief", should not be construed as precluding resort to an administrative order mechanism. Such an interpretation would conflict with the clear wording of Section 167. Rather, we believe that Senator Muskie's reference to "other judicial relief" provides clear support for the proposition that EPA may resort to the civil and criminal penalties provisions of Section 113(b) and (c).

Under Delegation Number 7-38, the Administrator has delegated authority to issue Section 167 administrative orders to the Regional Administrators and to the Assistant Administrator for Air and Radiation. The Regional Administrators will, in most instances, be the parties to issue Section 167 orders and, pursuant to Delegation No 7-38, must consult with the Associate Enforcement Counsel for Air and the Director of the Stationary Source Compliance Division before issuing such orders. The Assistant Administrator for Air and Radiation may issue Section 167 orders in multi-Regional cases or cases of national significance. In addition, the Assistant Administrator for Air and Radiation must consult with the Associate Enforcement Counsel for Air and must notify any affected Regional Administrators or their designees before issuing such orders.

II. Enforcement Actions Under Section 167 and Section 113(b)

A. Construction Without a PSD Permit Construction Not Consistent with a Validly Issued Permit

1. Pre-Operation Remedies

Section 167 will provide a particularly effective enforcement tool against an owner or operator that has commenced construction without having obtained a PSD permit or is constructing in a manner not consistent with a validly issued permit. In this situation, EPA should take action to halt construction of the source immediately. This may be accomplished most quickly under Section 167 by means of an administrative order or by obtaining judicially imposed injunctive relief.

When using Section 167, EPA should normally first issue an administrative order. The Agency should then file a civil action if a violating source does not immediately comply with the order. In cases where EPA has good reason to believe that the order would not be obeyed, however, we should file a civil action for injunctive relief immediately, without first issuing an order.

In appropriate instances, EPA may issue an order or file a complaint under Section 167 while proceeding concurrently, through Sections 113 or 120 actions, to collect civil and/or noncompliance penalties. Section 167 gives the Administrator the authority to take immediate action without being constricted by the procedural limitations set forth in Section 113. In all cases where possible, however, EPA should issue the source a notice of violation (NOV), with a copy being sent to the appropriate State agency. The NOV does not have to be issued concurrently with a Section 167 order, but

the Section 167 order should be followed up as soon as practical with the NOV. This notice should explain the full range of possible EPA enforcement actions. Even if circumstances require a Section 167 court filing before meeting NOV procedural requirements, prompt issuance of the NOV will allow EPA to take action under Section 113 at a later date if the Agency decides to do so.

In many instances, EPA learns that a source is constructing without a PSD permit or in violation of a validly issued permit early enough in the source's construction schedule to allow the agency time to act solely under Section 113. In these cases, the Agency may choose to commence a civil action under Section 113 for injunctive relief and/or monetary penalties instead of acting under Section 167 where remedies are limited to injunctive relief.

Civil penalties are available against a source for violation even prior to the time it has commenced operation. One type of case occurs when a source is being constructed in violation of the terms of its PSD permit. For example, if the owner delays in meeting a schedule to install control equipment or seeks to install equipment that will not meet the emission limits in the PSD permit, the Agency should take action to require the necessary injunctive relief and to recover monetary penalties. Penalties are appropriate even if no pollutants actually have been emitted because the PSD permit's issued pursuant to the SIP, and thus a requirement of the SIP has been violated. EPA should seek penalties for each day that the source is in violation of PSD permit requirements, commencing on the date on which the source began to install the non-conforming equipment, or August 7, 1977, whichever is later, and continuing until the source satisfies the compliance schedule specified in a judgment, or in a consent decree. [See Footnote 2]

Another type of case arises when a source is being constructed without a permit. Here, also, injunctive relief and penalties are appropriate. The penalty period begins with the date that construction began. "Construction" for the purpose of this determination is defined

[FOOTNOTE 2] Even if the source has derived no economic benefit by installing the nonconforming equipment, EPA still should seek penalties under Section 113 (b). The Penalty Policy provides for other factors which guide the choice of penalty figures. In addition, EPA has promulgated a specific guideline for permit violation penalty settlements. That guideline is contained in Appendix I to this guidance. The guideline was issued on February 1, 1981, by Jeffrey Miller, the Assistant Administrator for Enforcement. Appendix I updates the 1981 guideline to reflect organizational changes, and to elaborate upon some of the examples.

as activity beyond that permitted under the policy enunciated in the December 18, 1978 memorandum from Ed Reich to the Regional Offices entitled, "Interpretation of 'Constructed' as it Applies to Activities Undertaken Prior to Issuance of a PSD Permit." (Copy attached as Appendix II.) The penalty period ends when the permit is granted or is scheduled by EPA to be granted. Even if the source is put on a compliance schedule in a consent decree before then it should not be allowed to enjoy the economic advantage of its violation of PSD requirement.

It is important to note that even if construction is halted, the violation continues. Naturally, though, priority should be given to cases where injunctive action is required. Equally important, the Agency should not delay issuance of PSD permits for sources of which illegal construction has begun. In such a case, the penalty period is dependent on the speed of EPA's own action. For this reason, the Permit Penalty Policy states that the Agency may consider mitigation of the calculated civil penalty if a source ceases construction within a reasonable time after being notified of the violation and does not resume construction until a valid permit is issued.

2. Post-Operation Remedies

Civil actions under Section 113(b) will constitute the primary enforcement mechanism against sources that have already commenced operation without obtaining a PSD permit or in violation of a PSD permit. However, in cases where expeditious action is necessary orders issued pursuant to Section 167 are available to achieve immediate cessation of operation. They should only be used for operating sources which have failed to get a permit or are committing a violation so egregious that they must be shut down immediately (e.g., failure to install the control equipment or start-up prior to installation of control equipment or where operation causes an increment to be exceeded). Even in these instances, the action under Section 167 should be accompanied by a Section 113 action to collect penalties.

When using Section 167, EPA should normally first issue an administrative order. The Agency should then file a civil action if a violating source does not immediately comply with the order. In cases where EPA has good reason to believe that the order would not be obeyed, however, we should file a civil action for injunctive relief immediately, without first issuing an order.

We believe that a PSD source which is not known to be in violation can be granted up to 180 days after start-up in which to demonstrate compliance with all applicable emission limitation. This provides an opportunity for the owner or operator to make necessary modifications or correct minor equipment defects that are not apparent prior to start-up. The expectation is that the source will be in

compliance as soon as possible, and the decision as to how much time is necessary for fine tuning is to be made on a case by case basis. (The period of 180 days is analogous to the time allowed a source to demonstrate compliance after start-up under the New Source Performance Standard regulations, 40 C.F.R. Section 60.8.) During the 180-day period, a source should be required, to the extent practicable, to maintain and operate the source including the associated air pollution control equipment in a manner consistent with good air pollution control practice.

B. Construction With an Invalid Permit

EPA will also be able to utilize the provisions of Section 167 to prevent a source from constructing with a State-issued permit that EPA feels is invalid. There are basically two types of situations involving construction with an invalid permit. In the most common situation, the source can be expected to obtain a valid permit quickly. In other circumstances, however, it cannot be expected that a valid permit can issue soon. Before deciding on a course of action to be taken with a source constructing pursuant to an invalid permit, an EPA Regional Office needs to make a probability assessment as to the likelihood that a source will be able to obtain a valid permit quickly. For the purposes of allowing construction pursuant to an invalid permit, the period of thirty (30) days (the period analogous to that allowed under a Section 113(a) order) should be considered to be "quickly

In the situation where EPA believes a valid permit will issue quickly, the procedures to be followed should be similar to those used under Section 113(a) (5) to prevent the construction of new sources in nonattainment areas. Sources should be issued an order, specifying precisely the nature of the defect in the permit, and given 30 days in which to obtain a valid permit while they proceed with construction. Issuance of an immediate cease construction order, while available, usually would be an unnecessary sanction. A source that has obtained a PSD permit even though invalid, has presumably undergone some preconstruction review. Moreover, since it is the State, rather than the source itself, that is primarily at fault, immediate sanctions might be inappropriate.

In some situations, however, such as those where EPA believes that a source cannot be operated without violating an increment or where construction will foreclose EPA's options in terms of what BACT requirements will apply to a source, an immediate cease construction order under Section 167 should be issued and construction should not be allowed to commence or continue until a valid permit is issued.

In cases against sources constructing pursuant to an invalid permit, the error is presumed to have been the State's. Therefore even though construction may be halted, no penalty is appropriate unless the source is somehow at fault or the source does not cooperate after the discovery of the violation. For no-penalty actions, Section 167 is an effective enforcement tool.

C. Consent Decrees

In civil actions filed under both Section 167 and Section 113, against preoperational as well as post-operational sources, a likely outcome of the actions will be consent decrees. Allowing a violating source to continue construction or commence operation under the provisions of a consent decree lies within the discretion of the court, though the court's decision can be affected, of course, by the recommendation of EPA and the Department of Justice. The terms EPA should seek in actions under both Section 167 and Section 113 will vary according to the nature of the violation and the time that will be required to correct it.

There are two types of situations in which consent decrees would be appropriate. The first occurs when the source's violation causes or contributes to levels of pollution that exceed those allowed under Section 163 of the Act (which establishes the PSD increments). The other situation arises when the source's violation does not cause or contribute to increased levels of pollution beyond those allowed by Section 163.

When the pollution increments established by Section 163 would be or are being exceeded, EPA should immediately seek injunctive relief to prevent the source from starting up or continuing in violation of its emission limitations. EPA should determine the nature of the violation and the amount of time that will be needed to correct it. A source should not be permitted to commence or continue operation until it is in compliance through enforceable emission limitations. To allow commencement or continuation of operation out of compliance would defeat the intent of the Act by sanctioning levels of pollution in the PSD area greater than those established by Congress as the maximum allowable limits.

If the source is exceeding or will exceed its own emission limitation but the increment set forth in Section 163 is not being or will not be exceeded, EPA has more flexibility in devising a consent decree. While it need not adhere to a strict rule of no start-up until a source is in compliance, the Agency still must take all necessary action to ensure that corrections are made as quickly as possible and must not allow a source to commence operation unless start-up is pursuant to a consent decree.

The actual terms of a consent decree will vary from case to case. The only provisions that must be contained in every decree are a schedule that requires compliance as expeditiously as practicable, monitoring and reporting procedures, and a stipulate contempt fine provision. These fines should be established at a level sufficiently high to ensure compliance with the terms of the decree. (More detailed guidance on provisions to be include in consent decrees is contained in the October 19, 1983 memorandum from Courtney Price, GM-16.)

III. Additional Enforcement Remedies

A. Criminal Penalties Under Section 113(c)

Section 113(c) is available, where appropriate, against all types of PSD violations, both pre- and post-operation.

Section 113(c) authorizes the Administrator to commence a criminal action to seek monetary penalties and/or imprisonment for knowing violations of applicable regulations and EPA orders. The key requirement is that the Administrator must be able to demonstrate that the violation was "knowing."

A distinction should be drawn between a source that refuses to comply with applicable requirements and one that merely has failed to comply. Refusal to meet any increments of progress of the final compliance date of an administrative order or to meet consent decree or permit requirements should be considered for criminal referral to DOJ. If the source merely is late in complying, however, criminal penalties would not generally be appropriate. Additionally, it is our belief that resort to criminal penalties does not preclude the initiation of concurrent or subsequent civil proceedings for monetary penalties and/or injunctive relief. Questions concerning the possibility of criminal action should be referred to Peter Beeson, Associate Enforcement Counsel for Criminal Enforcement (FTS 382- 4543).

B. Noncompliance Penalties Under Section 120

By the terms of Section 120, noncompliance penalties can be assessed whenever a source is in violation of an emission limitation, emission standard, or compliance schedule under an applicable SIP. These penalties are based upon the economic benefit the source has derived from noncompliance. Section 120 penalties can be assessed regardless of whether civil and/or criminal sanctions available under Section 113 are also sought. More discussion of the use of noncompliance penalties appears in regulations published July 28, 1980 (45 FR 50086).

If you have a question about this guidance, please call Judy Katz of the Air Enforcement Division (382-2843) if it is a legal question or Rich Biondi of the Stationary Source Compliance Division (382-2826) if it is a technical question.

EXHIBIT C



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

April 30, 2018

Mr. Ken Cammarato, Vice President and Legal Counsel
ROXUL USA, Inc.
71 Edmond Road, Suite 6
Kearneysville, WV 25430

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

Dear Mr. Cammarato:

Your application for a permit as required by Section 3 of 45CSR14 - "Permits For Construction and Major Modification of Major Stationary Sources for the Prevention of Significant Deterioration of Air Quality" has been approved. The enclosed permit R14-0037 is hereby issued pursuant to Subsection 3.3 of 45CSR14. Please be aware of the notification requirements in the permit which pertain to commencement of construction, modification, or relocation activities; startup of operations; and suspension of operations.

Additionally, 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. In accordance with 45CSR30, the permittee shall submit a certified emissions statement and pay fees on an annual basis in accordance with the submittal requirements of the Division of Air Quality. A receipt for the appropriate fee shall be maintained on the premises for which the receipt has been issued, and shall be made immediately available for inspection by the Secretary or his/her duly authorized representative.

Any person whose interest may be affected, including, but not necessarily limited to, the applicant and any person who participated in the public comment process, by a permit issued, modified or denied by the Secretary may appeal such action of the Secretary to the Air Quality Board pursuant to article one [§§22B-1-1 et seq.], Chapter 22B of the Code of West Virginia. West Virginia Code §§22-5-14. Should you have any questions or comments, please contact me at (304) 926-0499, extension 1219.

Sincerely,

Joe Kessler, PE
Engineer

Enclosures

c: ken.cammarato@roxul.com
Mette.Drejstel@rockwool.com
grant.morgan@erm.com

West Virginia Department of Environmental Protection

*Austin Caperton
Cabinet Secretary*

Permit to Construct



R14-0037

This permit is issued in accordance with the West Virginia Air Pollution Control Act (West Virginia Code §§ 22-5-1 et seq.), 45 C.S.R. 13 — Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits and Procedures for Evaluation, and 45 C.S.R. 14 - Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration. The permittee identified at the facility listed below is authorized to construct the stationary sources of air pollutants identified herein in accordance with all terms and conditions of this permit.

Issued to:
ROXUL USA, Inc.
RAN Facility
037-00108

A handwritten signature in blue ink, appearing to read "William F. Durham".

*William F. Durham
Director, Division of Air Quality*

Issued: April 30, 2018

Facility Location: Ranson, Jefferson County, West Virginia
Mailing Address: 71 Edmond Road, Suite 6
Kearneysville, WV 25430
Facility Description: Mineral Wool Manufacturing Facility
SIC/NAICS Code: 3296/327993
UTM Coordinates: Easting: 252.06 km Northing: 4,362.62 km Zone: 18
Latitude/Longitude: 39.37754, -77.87844
Permit Type: Major Source Construction
Desc. of Change: Construction of a new mineral wool manufacturing facility defined as a major stationary source and subject to Prevention of Significant Deterioration (PSD) permitting requirements.

Any person whose interest may be affected, including, but not necessarily limited to, the applicant and any person who participated in the public comment process, by a permit issued, modified or denied by the Secretary may appeal such action of the Secretary to the Air Quality Board pursuant to article one [§§ 22B-1-1 et seq.], Chapter 22B of the Code of West Virginia. West Virginia Code §22-5-14.

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.

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1.0 Emission Units

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity ⁽¹⁾	Control Device ⁽²⁾
Raw Material Handling					
IMF11	IMF11	Conveyor Transfer Point	2018	1,800 scfm (1,137 Nm ³ /hr)	IMF11-FF
B215	B215	Raw Material Loading Hopper	2018	716 ton/day (650 tonne/day)	PE
IMF12	IMF12	Conveyor Transfer Point	2018	1,800 scfm (1,137 Nm ³ /hr)	IMF12-FF
IMF14	IMF14	Conveyor Transfer Point	2018	1,800 scfm (1,137 Nm ³ /hr)	IMF14-FF
IMF15	IMF15	Conveyor Transfer Point	2018	1,800 scfm (1,137 Nm ³ /hr)	IMF15-FF
IMF16	IMF16	Conveyor Transfer Point	2018	1,800 scfm (1,137 Nm ³ /hr)	IMF16-FF
IMF21	IMF21	Charging Building Vacuum Cleaning Filter	2018	316 scfm (500 Nm ³ /hr)	IMF21-FF
RM_REJ	RM_REJ	Raw Material Reject Bin	2018	TBD	PE
S_REJ	S_REJ	Sieve Reject Bin	2018	TBD	PE
B170	B170	Melting Furnace Portable Crusher & Storage	2018	<150 TPH (<136 tonne/hr)	None
B210	B210	Raw Material Storage - Loading	2018	716 ton/day (650 tonne/day)	PE
IMF25	IMF25	Coal Feed Tank	2018	758 scfm (1,200 Nm ³ /hr)	IMF25-FF
RMS	RMS	Raw Material Open Storage & Delivery	2018	5,382 ft ² (500m ²)	PE
IMF17	IMF17	Charging Building Vent 1	2018	n/a	None
IMF18	IMF18	Charging Building Vent 2	2018	n/a	None
Coal Milling					
IMF03A	IMF03A	Coal Storage Silo A	2018	758 scfm (1,200 Nm ³ /hr)	IMF03A-FF
IMF03B	IMF03B	Coal Storage Silo B	2018	758 scfm (1,200 Nm ³ /hr)	IMF03B-FF
IMF03C	IMF03C	Coal Storage Silo C	2018	758 scfm (1,200 Nm ³ /hr)	IMF03C-FF

1.0 Emission Units

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity⁽¹⁾	Control Device⁽²⁾
IMF04	IMF04	Conveyor Transfer Point	2018	1,800 scfm (1,137 Nm ³ /hr)	IMF04-FF
IMF05	IMF05	Coal Milling Burner & Baghouse	2018	2,873 scfm (4,547 Nm ³ /hr)	IMF05-BH
IMF06	IMF06	Coal Milling De-Dusting Baghouse	2018	6,317 scfm (10,000 Nm ³ /hr)	IMF06-BH
IMF13	IMF13	Conveyor Transfer Point	2018	1,800 scfm (1,137 Nm ³ /hr)	IMF13-FF
B235	B235	Coal Milling Building	2018	93 ton/day (84 tonne/day)	None
B230	B230	Coal Unloading	2018	93 ton/day (84 tonne/day)	PE
B231	B231	Coal Unloading Hopper	2018	93 ton/day (84 tonne/day)	PE
Mineral Wool Line					
IMF01	IMF01	Melting Furnace	2018	21,414 scfm (33,900 Nm ³ /hr)	IMF01-BH De-NO _x De-SO _x
IMF02	IMF02	Furnace Cooling Tower	2018	1,321 gpm (300 m ³ /hr)	Drift Eliminator
IMF07A	IMF07A	Filter Fines Day Silo	2018	1,250 scfm (790 Nm ³ /hr)	IMF07A-FF
IMF07B	IMF07B	Secondary Energy Materials Silo	2018	1,250 scfm (790 Nm ³ /hr)	IMF07B-FF
IMF08	IMF08	Sorbent Silo	2018	758 scfm (1,200 Nm ³ /hr)	IMF08-FF
IMF09	IMF09	Spent Sorbent Silo	2018	758 scfm (1,200 Nm ³ /hr)	IMF09-FF
IMF10	IMF10	Filter Fines Receiving Silo	2018	758 scfm (1,200 Nm ³ /hr)	IMF10-FF
IMF24	IMF24	Preheat Burner	2018	5.1 mmBtu/hr (1,500 kW)	None
CO	HE01	Curing Oven	2018	18,950 scfm (30,000 Nm ³ /hr)	WESP (HE01) CO-AB
CO-HD	HE01	Curing Oven Hoods	2018	25,267 scfm (40,000 Nm ³ /hr)	WESP (HE01)

1.0 Emission Units

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity ⁽¹⁾	Control Device ⁽²⁾
GUT-EX	HE01	Gutter Exhaust	2018	15,792 scfm (25,000 Nm ³ /hr)	WESP (HE01)
SPN	HE01	Spinning Chamber	2018	258,986 scfm (410,000 Nm ³ /hr)	WESP (HE01)
CS	HE01	Cooling Section	2018	50,534 scfm (80,000 Nm ³ /hr)	WESP (HE01)
HE02	HE02	Gutter Cooling Tower	2018	308 gpm (70 m ³ /hr)	Drift Eliminator
CM12	CM12	Fleece Application Vent 1	2018	408 lb/hr (185 kg/hr)	None
CM13	CM13	Fleece Application Vent 2	2018		None
CE01	CE01	De-dusting Baghouse	2018	44,217 scfm (70,000 Nm ³ /hr)	CE01-BH
CE02	CE02	Vacuum Cleaning Baghouse	2018	12,633 scfm (20,000 Nm ³ /hr)	CE02-BH
DI	DI	Dry Ice Cleaning	2018	165.3 lbs/hour (75 kg/hr)	None
P_MARK	P_MARK	Product Marking	2018	0.40 mmBtu/hr (88 kW)	None
Recycling					
CM08	CM08	Recycle Plant Building Vent 3	2018	1,579 scfm (2,500 Nm ³ /hr)	CM08-FF
CM09	CM09	Recycle Plant Building Vent 4	2018	1,579 scfm (2,500 Nm ³ /hr)	CM09-FF
CM10	CM10	Recycle Plant Building Vent 1	2018	18,950 scfm (30,000 Nm ³ /hr)	CM10-FF
CM11	CM11	Recycle Plant Building Vent 2	2018	18,950 scfm (30,000 Nm ³ /hr)	CM11-FF
Rockfon Line					
RFNE1	RFNE1	IR Zone	2018	1,895 scfm (3,000 Nm ³ /hr)	None
RFNE2	RFNE2	Hot Press	2018	1,895 scfm (3,000 Nm ³ /hr)	None
RFNE3	RFNE3	High Oven A	2018	2.73 mmBtu/hr, 5,053 scfm (800 kW, 8,000 Nm ³ /hr)	None

1.0 Emission Units

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity ⁽¹⁾	Control Device ⁽²⁾
RFNE4	RFNE4	Drying Oven 1	2018	2.05 mmBtu/hr, 3.158 scfm (600 kW, 5,000 Nm ³ /hr)	RFNE4-FF
RFNE5	RFNE5	Spraying Cabin	2018	6,317 scfm (10,000 Nm ³ /hr)	RFNE5-FF
RFNE6	RFNE6	Drying Oven 2 & 3	2018	4.78 mmBtu/hr, 7,580 scfm (1,400 kW, 12,000 Nm ³ /hr)	RFNE6-FF
RFNE7	RFNE7	Cooling Zone	2018	15,792 scfm (25,000 Nm ³ /hr)	None
RFNE8	RFNE8	Rockfon De-dusting Baghouse	2018	74,419 scfm (117,812 Nm ³ /hr)	RFNE8-BH
RFNE9	RFNE9	High Oven B	2018	2.73 mmBtu/hr, 5,053 scfm (800 kW, 8,000 Nm ³ /hr)	None
Miscellaneous Emission Units					
CM03	CM03	Natural Gas Boiler 1	2018	5.1 mmBtu/hr (1,500 kW)	None
CM04	CM04	Natural Gas Boiler 2	2018	5.1 mmBtu/hr (1,500 kW)	None
EFP1	EFP1	Emergency Fire Pump Engine	2018	197 hp (147 kw)	None
RFN10	RFN10	Rockfon Building Heater	2018	5.1 mmBtu/hr (1,500 kW)	None
Storage Tanks					
TK-DF	TK-DF	Diesel Fuel Tank	2018	2,642 gallons (10 m ³)	None
TK-UO	TK-UO	Used Oil Tank	2018	581 gallons (2.2 m ³)	None
TK-TO1	TK-TO1	Thermal Oil Expansion Tank - Rockfon	2018	212 gallons (0.8 m ³)	None
TK-TO2	TK-TO2	Thermal Oil Drain Tank - Rockfon	2018	159 gallons (0.6 m ³)	None
TK-TO3	TK-TO3	Thermal Oil Tank - IMF	2018	2,642 gallons (10 m ³)	None

1.0 Emission Units

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity ⁽¹⁾	Control Device ⁽²⁾
TK-TO4	TK-TO4	Thermal Oil Expansion Tank - IMF	2018	1,321 gallons (5 m ³)	None
TK-DO	TK-DO	De-dust Oil Storage Tank	2018	15,850 gallons (60 m ³)	None
TK-RS1	TK-RS1	Resin Storage Tank	2018	15,850 gallons (60 m ³)	None
TK-RS2	TK-RS2	Resin Storage Tank	2018	15,850 gallons (60 m ³)	None
TK-RS3	TK-RS3	Resin Storage Tank	2018	15,850 gallons (60 m ³)	None
TK-RS4	TK-RS4	Resin Storage Tank	2018	15,850 gallons (60 m ³)	None
TK-RS5	TK-RS5	Resin Storage Tank	2018	15,850 gallons (60 m ³)	None
TK-RS6	TK-RS6	Resin Storage Tank	2018	15,850 gallons (60 m ³)	None
TK-RS7	TK-RS7	Resin Storage Tank	2018	15,850 gallons (60 m ³)	None
TK-CA	TK-CA	Coupling Agent Storage Tank	2018	264 gallons (1 m ³)	None
TK-AD	TK-AD	Additive Storage Tank	2018	53 gallons (0.2 m ³)	None
TK-BM	TK-BM	Binder Mix Tank	2018	2,642 gallons (10m ³)	None
TK-BC	TK-BC	Binder Circulation Tank	2018	4,227 gallons (16 m ³)	None
TK-BD	TK-BD	Binder Day Tank	2018	793 gallons (3 m ³)	None
TK-BS1	TK-BS1	Binder Storage Container	2018	264 gallons (1 m ³)	None
TK-BS2	TK-BS2	Binder Storage Container	2018	264 gallons (1 m ³)	None
TK0-BS3	TK-BS3	Binder Storage Container	2018	264 gallons (1 m ³)	None
TK-DOD	TK-DOD	De-dust Oil Day Tank	2018	264 gallons (1 m ³)	None

1.0 Emission Units

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity ⁽¹⁾	Control Device ⁽²⁾
TK-PD	TK-PD	Paint Dilution Storage Tank	2018	793 gallons (3 m ³)	None
TK-PDD	TK-PDD	Paint Dilution Day Tank	2018	397 gallons (1.5 m ³)	None

- (1) Where air flow rates are listed, it represents the maximum design capacity of the mechanical flow - if applicable - through the listed particulate matter control device or uncontrolled vent .
- (2) AB = Afterburner; BH = Baghouse; FF = Fabric Filter; PE = Partial Enclosure; WESP = Wet Electrostatic Precipitator.

2.0. General Conditions

2.1. Definitions

- 2.1.1. All references to the "West Virginia Air Pollution Control Act" or the "Air Pollution Control Act" mean those provisions contained in W.Va. Code §§ 22-5-1 to 22-5-18.
- 2.1.2. The "Clean Air Act" means those provisions contained in 42 U.S.C. §§ 7401 to 7671q, and regulations promulgated thereunder.
- 2.1.3. "Secretary" means the Secretary of the Department of Environmental Protection or such other person to whom the Secretary has delegated authority or duties pursuant to W.Va. Code §§ 22-1-6 or 22-1-8 (45 CSR § 30-2.12.). The Director of the Division of Air Quality is the Secretary's designated representative for the purposes of this permit.

2.2. Acronyms

CAAA	Clean Air Act Amendments	NSPS	New Source Performance Standards
CBI	Confidential Business Information	PM	Particulate Matter
CEM	Continuous Emission Monitor	PM_{2.5}	Particulate Matter less than 2.5µm in diameter
CES	Certified Emission Statement	PM₁₀	Particulate Matter less than 10µm in diameter
C.F.R. or CFR	Code of Federal Regulations	Ppb	Pounds per Batch
CO	Carbon Monoxide	pph	Pounds per Hour
C.S.R. or CSR	Codes of State Rules	ppm	Parts per Million
DAQ	Division of Air Quality	Ppmv or ppmv	Parts per million by volume
DEP	Department of Environmental Protection	PSD	Prevention of Significant Deterioration
dscm	Dry Standard Cubic Meter	psi	Pounds per Square Inch
FOIA	Freedom of Information Act	SIC	Standard Industrial Classification
HAP	Hazardous Air Pollutant	SIP	State Implementation Plan
HON	Hazardous Organic NESHAP	SO₂	Sulfur Dioxide
HP	Horsepower	TAP	Toxic Air Pollutant
lbs/hr	Pounds per Hour	TPY	Tons per Year
LDAR	Leak Detection and Repair	TRS	Total Reduced Sulfur
M	Thousand	TSP	Total Suspended Particulate
MACT	Maximum Achievable Control Technology	USEPA	United States Environmental Protection Agency
MDHI	Maximum Design Heat Input	UTM	Universal Transverse Mercator
MM	Million	VEE	Visual Emissions Evaluation
MMBtu/hr or mmbtu/hr	Million British Thermal Units per Hour	VOC	Volatile Organic Compounds
MMCF/hr or mmcf/hr	Million Cubic Feet per Hour	VOL	Volatile Organic Liquids
NA	Not Applicable		
NAAQS	National Ambient Air Quality Standards		
NESHAPS	National Emissions Standards for Hazardous Air Pollutants		
NO_x	Nitrogen Oxides		

2.3. Authority

This permit is issued in accordance with West Virginia Air Pollution Control Law W.Va. Code §§22-5-1 et seq. and the following Legislative Rules promulgated thereunder:

- 2.3.1. 45CSR13 – *Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits and Procedures for Evaluation; and*
- 2.3.2. 45CSR14 – *Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration.*

2.4. Term and Renewal

- 2.4.1. This permit shall remain valid, continuous and in effect unless it is revised, suspended, revoked or otherwise changed under an applicable provision of 45CSR13 or any applicable legislative rule.

2.5. Duty to Comply

- 2.5.1. The permitted facility shall be constructed and operated in accordance with the plans and specifications filed in Permit Applications R14-0037 and any modifications, administrative updates, or amendments thereto. The Secretary may suspend or revoke a permit if the plans and specifications upon which the approval was based are not adhered to;
[45CSR§§13-5.11 and 13-10.3]
- 2.5.2. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the West Virginia Code and the Clean Air Act and is grounds for enforcement action by the Secretary or USEPA;
- 2.5.3. Violations of any of the conditions contained in this permit, or incorporated herein by reference, may subject the permittee to civil and/or criminal penalties for each violation and further action or remedies as provided by West Virginia Code 22-5-6 and 22-5-7;
- 2.5.4. Approval of this permit does not relieve the permittee herein of the responsibility to apply for and obtain all other permits, licenses and/or approvals from other agencies; i.e., local, state and federal, which may have jurisdiction over the construction and/or operation of the source(s) and/or facility herein permitted.

2.6. Duty to Provide Information

The permittee shall furnish to the Secretary within a reasonable time any information the Secretary may request in writing to determine whether cause exists for administratively updating, modifying, revoking or terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the Secretary copies of records to be kept by the permittee. For information claimed to be confidential, the permittee shall furnish such records to the Secretary along with a claim of confidentiality in accordance with 45CSR31. If confidential information is to be sent to USEPA, the permittee shall directly provide such information to USEPA along with a claim of confidentiality in accordance with 40 C.F.R. Part 2.

2.7. Duty to Supplement and Correct Information

Upon becoming aware of a failure to submit any relevant facts or a submittal of incorrect information in any permit application, the permittee shall promptly submit to the Secretary such supplemental facts or corrected information.

2.8. Administrative Update

The permittee may request an administrative update to this permit as defined in and according to the procedures specified in 45CSR13.

[45CSR§13-4]

2.9. Permit Modification

The permittee may request a minor modification to this permit as defined in and according to the procedures specified in 45CSR13.

[45CSR§13-5.4.]

2.10. Major Permit Modification

The permittee may request a major modification as defined in and according to the procedures specified in 45CSR14 or 45CSR19, as appropriate.

[45CSR§13-5.1]

2.11. Inspection and Entry

The permittee shall allow any authorized representative of the Secretary, upon the presentation of credentials and other documents as may be required by law, to perform the following:

- a. At all reasonable times (including all times in which the facility is in operation) enter upon the permittee's premises where a source is located or emissions related activity is conducted, or where records must be kept under the conditions of this permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- c. Inspect at reasonable times (including all times in which the facility is in operation) any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit;
- d. Sample or monitor at reasonable times substances or parameters to determine compliance with the permit or applicable requirements or ascertain the amounts and types of air pollutants discharged.

2.12. Emergency

- 2.12.1. An "emergency" means any situation arising from sudden and reasonable unforeseeable events beyond the control of the source, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission

limitation under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by improperly designed equipment, lack of preventative maintenance, careless or improper operation, or operator error.

- 2.12.2. Effect of any emergency. An emergency constitutes an affirmative defense to an action brought for noncompliance with such technology-based emission limitations if the conditions of Section 2.12.3 are met.
- 2.12.3. The affirmative defense of emergency shall be demonstrated through properly signed, contemporaneous operating logs, or other relevant evidence that:
 - a. An emergency occurred and that the permittee can identify the cause(s) of the emergency;
 - b. The permitted facility was at the time being properly operated;
 - c. During the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards, or other requirements in the permit; and,
 - d. The permittee submitted notice of the emergency to the Secretary within one (1) working day of the time when emission limitations were exceeded due to the emergency and made a request for variance, and as applicable rules provide. This notice must contain a detailed description of the emergency, any steps taken to mitigate emission, and corrective actions taken.
- 2.12.4. In any enforcement proceeding, the permittee seeking to establish the occurrence of an emergency has the burden of proof.
- 2.12.5. The provisions of this section are in addition to any emergency or upset provision contained in any applicable requirement.

2.13. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a permittee in an enforcement action that it should have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. However, nothing in this paragraph shall be construed as precluding consideration of a need to halt or reduce activity as a mitigating factor in determining penalties for noncompliance if the health, safety, or environmental impacts of halting or reducing operations would be more serious than the impacts of continued operations.

2.14. Suspension of Activities

In the event the permittee should deem it necessary to suspend, for a period in excess of sixty (60) consecutive calendar days, the operations authorized by this permit, the permittee shall notify the Secretary, in writing, within two (2) calendar weeks of the passing of the sixtieth (60) day of the suspension period.

2.15. Property Rights

This permit does not convey any property rights of any sort or any exclusive privilege.

2.16. Severability

The provisions of this permit are severable and should any provision(s) be declared by a court of competent jurisdiction to be invalid or unenforceable, all other provisions shall remain in full force and effect.

2.17. Transferability

This permit is transferable in accordance with the requirements outlined in Section 10.1 of 45CSR13. [45CSR§13-10.1]

2.18. Notification Requirements

The permittee shall notify the Secretary, in writing, no later than thirty (30) calendar days after the actual startup of the operations authorized under this permit.

2.19. Credible Evidence

Nothing in this permit shall alter or affect the ability of any person to establish compliance with, or a violation of, any applicable requirement through the use of credible evidence to the extent authorized by law. Nothing in this permit shall be construed to waive any defense otherwise available to the permittee including, but not limited to, any challenge to the credible evidence rule in the context of any future proceeding.

3.0. Facility-Wide Requirements

3.1. Limitations and Standards

- 3.1.1. **Open burning.** The open burning of refuse by any person, firm, corporation, association or public agency is prohibited except as noted in 45CSR§6-3.1.
[45CSR§6-3.1.]
- 3.1.2. **Open burning exemptions.** The exemptions listed in 45CSR§6-3.1 are subject to the following stipulation: Upon notification by the Secretary, no person shall cause, suffer, allow or permit any form of open burning during existing or predicted periods of atmospheric stagnation. Notification shall be made by such means as the Secretary may deem necessary and feasible.
[45CSR§6-3.2.]
- 3.1.3. **Asbestos.** The permittee is responsible for thoroughly inspecting the facility, or part of the facility, prior to commencement of demolition or renovation for the presence of asbestos and complying with 40 C.F.R. § 61.145, 40 C.F.R. § 61.148, and 40 C.F.R. § 61.150. The permittee, owner, or operator must notify the Secretary at least ten (10) working days prior to the commencement of any asbestos removal on the forms prescribed by the Secretary if the permittee is subject to the notification requirements of 40 C.F.R. § 61.145(b)(3)(i). The USEPA, the Division of Waste Management and the Bureau for Public Health - Environmental Health require a copy of this notice to be sent to them.
[40CFR§61.145(b) and 45CSR§34]
- 3.1.4. **Odor.** No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.
[45CSR§4-3.1 State-Enforceable only.]
- 3.1.5. **Permanent shutdown.** A source which has not operated at least 500 hours in one 12-month period within the previous five (5) year time period may be considered permanently shutdown, unless such source can provide to the Secretary, with reasonable specificity, information to the contrary. All permits may be modified or revoked and/or reapplication or application for new permits may be required for any source determined to be permanently shutdown.
[45CSR§13-10.5.]
- 3.1.6. **Standby plan for reducing emissions.** When requested by the Secretary, the permittee shall prepare standby plans for reducing the emissions of air pollutants in accordance with the objectives set forth in Tables I, II, and III of 45 C.S.R. 11.
[45CSR§11-5.2.]

3.2. Monitoring Requirements

- 3.2.1. **Emission Limit Averaging Time.** Unless otherwise specified, compliance with all annual limits shall be based on a rolling twelve month total. A rolling twelve month total shall be the sum of the measured parameter of the previous twelve calendar months. Unless otherwise specified, compliance with all hourly emission limits shall be based on the applicable NAAQS averaging times or, where applicable, as given in any approved performance test method. However, nothing under 3.2.1. requires that continuous performance testing take place for the entire averaging period time frame (e.g., performance testing to show compliance with a PM₁₀ emission limit is not necessarily required for 24 consecutive hours). The required length of time of a performance test will be determined by the appropriate test method and compliance procedures as approved under a protocol submitted pursuant to 3.3.1(c).

3.3. Testing Requirements

- 3.3.1. **Stack testing.** As per provisions set forth in this permit or as otherwise required by the Secretary, in accordance with the West Virginia Code, underlying regulations, permits and orders, the permittee shall conduct test(s) to determine compliance with the emission limitations set forth in this permit and/or established or set forth in underlying documents. The Secretary, or his duly authorized representative, may at his option witness or conduct such test(s). Should the Secretary exercise his option to conduct such test(s), the operator shall provide all necessary sampling connections and sampling ports to be located in such manner as the Secretary may require, power for test equipment and the required safety equipment, such as scaffolding, railings and ladders, to comply with generally accepted good safety practices. Such tests shall be conducted in accordance with the methods and procedures set forth in this permit or as otherwise approved or specified by the Secretary in accordance with the following:
- a. The Secretary may on a source-specific basis approve or specify additional testing or alternative testing to the test methods specified in the permit for demonstrating compliance with 40 C.F.R. Parts 60, 61, and 63 in accordance with the Secretary's delegated authority and any established equivalency determination methods which are applicable. If a testing method is specified or approved which effectively replaces a test method specified in the permit, the permit may be revised in accordance with 45CSR§13-4 or 45CSR§13-5.4 as applicable.
 - b. The Secretary may on a source-specific basis approve or specify additional testing or alternative testing to the test methods specified in the permit for demonstrating compliance with applicable requirements which do not involve federal delegation. In specifying or approving such alternative testing to the test methods, the Secretary, to the extent possible, shall utilize the same equivalency criteria as would be used in approving such changes under Section 3.3.1.a. of this permit. If a testing method is specified or approved which effectively replaces a test method specified in the permit, the permit may be revised in accordance with 45CSR§13-4 or -5.4 as applicable.
 - c. All periodic tests to determine mass emission limits from or air pollutant concentrations in discharge stacks and such other tests as specified in this permit shall be conducted in accordance with an approved test protocol. Unless previously approved, such protocols shall be submitted to the Secretary in writing at least thirty (30) days prior to any testing and shall contain the information set forth by the Secretary. In addition, the permittee shall notify the Secretary at least fifteen (15) days prior to any testing so the Secretary may have the opportunity to observe such tests. This notification shall include the actual date and time during which the test will be conducted and, if appropriate, verification that the tests will fully conform to a referenced protocol previously approved by the Secretary.
 - d. The permittee shall submit a report of 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. The report shall include the following: the certification described in paragraph 3.5.1.; a statement of compliance status, also signed by a responsible official; and, a summary of conditions which form the basis for the compliance status evaluation. The summary of conditions shall include the following:
 1. The permit or rule evaluated, with the citation number and language;
 2. The result of the test for each permit or rule condition; and,
 3. A statement of compliance or noncompliance with each permit or rule condition.

[WV Code § 22-5-4(a)(14-15) and 45CSR13]

3.4. Recordkeeping Requirements

- 3.4.1. **Retention of records.** The permittee shall maintain records of all information (including monitoring data, support information, reports and notifications) required by this permit recorded in a form suitable and readily available for expeditious inspection and review. Support information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation. The files shall be maintained for at least five (5) years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. At a minimum, the most recent two (2) years of data shall be maintained on site. The remaining three (3) years of data may be maintained off site, but must remain accessible within a reasonable time. Where appropriate, the permittee may maintain records electronically (on a computer, on computer floppy disks, CDs, DVDs, or magnetic tape disks), on microfilm, or on microfiche.
- 3.4.2. **Odors.** For the purposes of 45CSR4, the permittee shall maintain a record of all odor complaints received, any investigation performed in response to such a complaint, and any responsive action(s) taken.
[45CSR§4. State-Enforceable only.]

3.5. Reporting Requirements

- 3.5.1. **Responsible official.** Any application form, report, or compliance certification required by this permit to be submitted to the DAQ and/or USEPA shall contain a certification by the responsible official that states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate and complete.
- 3.5.2. **Confidential information.** A permittee may request confidential treatment for the submission of reporting required by this permit pursuant to the limitations and procedures of W.Va. Code § 22-5-10 and 45CSR31.
- 3.5.3. **Correspondence.** All notices, requests, demands, submissions and other communications required or permitted to be made to the Secretary of DEP and/or USEPA shall be made in writing and shall be deemed to have been duly given when delivered by hand, or mailed first class or by private carrier with postage prepaid to the address(es), or submitted in electronic format by email as set forth below or to such other person or address as the Secretary of the Department of Environmental Protection may designate:

Table 3.5.3.: Correspondence Addresses

If to the DAQ:	If to the US EPA:
Director WVDEP Division of Air Quality 601 57th Street, SE Charleston, WV 25304-2345 DAQ Compliance and Enforcement ¹ : DEP AirQualityReports@wv.gov	Associate Director Office of Air Enforcement and Compliance Assistance - (3AP20) U. S. Environmental Protection Agency Region III 1650 Arch Street Philadelphia, PA 19103-2029

¹ For all self-monitoring reports (MACT, GACT, NSPS, etc.), stack tests and protocols, notice of Compliance Status Reports, Initial Notifications, etc.

3.5.4. Operating Fee.

- 3.5.4.1. In accordance with 45CSR30 – Operating Permit Program, the permittee shall submit a Certified Emissions Statement (CES) and pay fees on an annual basis in accordance with the submittal requirements of the Division of Air Quality. A receipt for the appropriate fee shall be maintained on the premises for which the receipt has been issued, and shall be made immediately available for inspection by the Secretary or his/her duly authorized representative.
 - 3.5.4.2. In accordance with 45CSR30 – Operating Permit Program, enclosed with this permit is a Certified Emissions Statement (CES) Invoice, from the date of initial startup through the following June 30. Said invoice and the appropriate fee shall be submitted to this office no later than 30 days prior to the date of initial startup. For any startup date other than July 1, the permittee shall pay a fee or prorated fee in accordance with the Section 4.5 of 45CSR22. A copy of this schedule may be found attached to the Certified Emissions Statement (CES) Invoice.
- 3.5.5. **Emission inventory.** At such time(s) as the Secretary may designate, the permittee herein shall prepare and submit an emission inventory for the previous year, addressing the emissions from the facility and/or process(es) authorized herein, in accordance with the emission inventory submittal requirements of the Division of Air Quality. After the initial submittal, the Secretary may, based upon the type and quantity of the pollutants emitted, establish a frequency other than on an annual basis.

4.0. Source-Specific Requirements

4.1. Limitations and Standards

4.1.1. Only those emission units/sources as identified in Table 1.0, with the exception of any *de minimis* sources as identified under Table 45-13B of 45CSR13, are authorized at the permitted facility by this permit. In accordance with the information filed in Permit Application R14-0037, the emission units/sources identified under Table 1.0 of this permit shall be installed, maintained, and operated so as to minimize any fugitive escape of pollutants, shall not exceed the listed maximum design capacities, shall use the specified control devices, and comply with any other information provided under Table 1.0.

4.1.2. Material Handling Operations

The handling of raw materials used in the production of mineral wool (including but not limited to igneous rocks, slags, dolomite/limestone, and mineral additives), coal milling material handling operations, recycling operations, and all other operations involved in the handling or processing of friable materials with a potential of producing particulate matter emissions, shall be in accordance with the following requirements:

- a. The permittee shall not exceed the specified maximum design capacities of the following operations:

Table 4.1.2(a): Maximum Design Capacities

Parameter	Limit	Units
Raw Materials ⁽¹⁾	716 ⁽²⁾ (650)	Ton/Day (Tonne/Day)
Lump Coal/Pet Coke	93 ⁽³⁾ (84)	Ton/Day (Tonne/Day)
Portable Melt Crushing	<150 (<136)	TPH (Tonne/Hour)

- (1) Rock, Slag, and Minerals
- (2) As based on the Charging Building (B220) Conveyer Belt.
- (3) As based on the Coal Mill Feed Conveyer Belt.

- b. The permittee shall not exceed the specified maximum annual throughputs or hours of operation of the following operations:

Table 4.1.2(b): Maximum Annual Throughputs

Parameter	Limit	Units
Portable Melt Crushing	540	Hours of Operation

- c. The permittee shall not exceed the maximum emission limits for the specified emission points given in the following tables:

(1) British Units

Table 4.1.2(c)(1): Material Handling Operations Stack Emission Limits in British Units

Emission Point ID	Source Description	Filter Outlet (gr/dscf) ⁽¹⁾	Pollutant ⁽²⁾	PPH ⁽³⁾	TPY
IMF03A	Coal Storage Silo A	0.001	PM _{2.5}	6.60e-03	0.03
		0.002	PM/PM ₁₀	0.013	0.06
IMF03B	Coal Storage Silo B	0.001	PM _{2.5}	6.60e-03	0.03
		0.002	PM/PM ₁₀	0.013	0.06
IMF03C	Coal Storage Silo C	0.001	PM _{2.5}	6.60e-03	0.03
		0.002	PM/PM ₁₀	0.013	0.06
IMF04	Conveyer TP (B231 to B235)	0.001	PM _{2.5}	0.010	0.04
		0.002	PM/PM ₁₀	0.019	0.09
IMF06	Coal Milling Building (B235) De-Dusting Baghouse ⁽⁴⁾	0.002	PM _{2.5}	0.110	0.48
		0.004	PM/PM ₁₀	0.221	0.97
IMF07A	Filter Fines Day Silo	0.001	PM _{2.5}	0.007	0.03
		0.002	PM/PM ₁₀	0.014	0.06
IMF07B	Secondary Energy Materials Silo	0.001	PM _{2.5}	0.007	0.03
		0.002	PM/PM ₁₀	0.014	0.06
IMF08	Sorbent Silo	0.001	PM _{2.5}	6.60e-03	0.03
		0.002	PM/PM ₁₀	0.013	0.06
IMF09	Spent Sorbent Silo	0.001	PM _{2.5}	6.60e-03	0.03
		0.002	PM/PM ₁₀	0.013	0.06
IMF10	Filter Fines Receiving Silo	0.001	PM _{2.5}	6.60e-03	0.03
		0.002	PM/PM ₁₀	0.013	0.06
IMF11	Conveyer TP (B215 to B220)	0.001	PM _{2.5}	0.010	0.04
		0.002	PM/PM ₁₀	0.020	0.09
IMF12	Conveyer TP (B210 to B220)	0.001	PM _{2.5}	0.010	0.04
		0.002	PM/PM ₁₀	0.020	0.09
IMF13	Bin-Conveyer TP (B231 to Conveyer)	0.001	PM _{2.5}	0.010	0.04
		0.002	PM/PM ₁₀	0.020	0.09

Emission Point ID	Source Description	Filter Outlet (gr/dscf) ⁽¹⁾	Pollutant ⁽²⁾	PPH ⁽³⁾	TPY
IMF14	Conveyer TP (B220 No. 1)	0.001	PM _{2.5}	0.010	0.04
		0.002	PM/PM ₁₀	0.020	0.09
IMF15	Conveyer TP (B220 No. 2)	0.001	PM _{2.5}	0.010	0.04
		0.002	PM/PM ₁₀	0.020	0.09
IMF16	Conveyer TP (B220 to B300)	0.001	PM _{2.5}	0.010	0.04
		0.002	PM/PM ₁₀	0.020	0.09
IMF17	Charging Building Vent 1	n/a ⁽⁵⁾	PM _{2.5}	0.010	0.04
			PM/PM ₁₀	0.019	0.08
IMF18	Charging Building Vent 2	n/a ⁽⁵⁾	PM _{2.5}	0.010	0.04
			PM/PM ₁₀	0.019	0.08
IMF21	Charging Building Vacuum Cleaning	0.001	PM _{2.5}	0.003	0.01
		0.002	PM/PM ₁₀	0.006	0.02
IMF25	Coal Feed Tank	0.001	PM _{2.5}	0.007	0.03
		0.002	PM/PM ₁₀	0.013	0.06
B235	Coal Milling Building	n/a ⁽⁵⁾	PM _{2.5}	0.005	0.02
			PM/PM ₁₀	0.010	0.04
CE01	De-Dusting Baghouse	0.0020	PM ₁₀ /PM _{2.5}	0.772	3.38
		0.0041	PM	1.543	6.76
		n/a	Mineral Fiber	0.772	3.38
CE02	Vacuum Cleaning Baghouse	0.0020	PM ₁₀ /PM _{2.5}	0.220	0.97
		0.0041	PM	0.441	1.93
		n/a	Mineral Fiber	0.220	0.97
CM08	Recycle Building Vent 3	0.002	PM _{2.5}	0.028	0.12
		0.004	PM/PM ₁₀	0.055	0.24
CM09	Recycle Building Vent 4	0.002	PM _{2.5}	0.028	0.12
		0.004	PM/PM ₁₀	0.055	0.24

Emission Point ID	Source Description	Filter Outlet (gr/dscf) ⁽¹⁾	Pollutant ⁽²⁾	PPH ⁽³⁾	TPY
CM10	Recycle Building Vent 1	0.002	PM _{2.5}	0.331	1.45
		0.004	PM/PM ₁₀	0.661	2.90
CM11	Recycle Building Vent 2	0.002	PM _{2.5}	0.331	1.45
		0.004	PM/PM ₁₀	0.661	2.90

- (1) gr/dscf = grains/dry standard cubic feet. Where applicable, the filter is the **BACT** technology and the outlet loading is PM/PM₁₀ **BACT** limit for the specified emission points. Where a limit is not specified, **BACT** is the PPH limit.
- (2) Particulate Matter limits are filterable only. With the exception of CE01 and CE02, PM/PM₁₀ limits are the same.
- (3) Hourly emission limits are based on a 24-hour average.
- (4) This baghouse is optional and not required but if installed will be subject to the given emission limits.
- (5) This is an uncontrolled building opening.

(2) **Metric Units**

Table 4.1.2(c)(2): Material Handling Operations Stack Emission Limits in Metric Units

Emission Point ID	Source Description	Filter Outlet (mg/Nm ³) ⁽¹⁾	Pollutant ⁽²⁾	kg/hr ⁽³⁾	tonne/yr
IMF03A	Coal Storage Silo 1	2.5	PM _{2.5}	0.003	0.03
		5	PM/PM ₁₀	0.006	0.05
IMF03B	Coal Storage Silo 2	2.5	PM _{2.5}	0.003	0.03
		5	PM/PM ₁₀	0.006	0.05
IMF03C	Coal Storage Silo 3	2.5	PM _{2.5}	0.003	0.03
		5	PM/PM ₁₀	0.006	0.05
IMF04	Conveyer TP (B231 to B235)	2.5	PM _{2.5}	0.005	0.04
		5	PM/PM ₁₀	0.010	0.08
IMF06	Coal Milling Building (B235) De-Dusting Baghouse ⁽⁴⁾	5	PM _{2.5}	0.050	0.44
		10	PM/PM ₁₀	0.100	0.88
IMF07A	Filter Fines Day Silo	2.5	PM _{2.5}	0.003	0.03
		5	PM/PM ₁₀	0.006	0.05
IMF07B	Secondary Energy Materials Silo	2.5	PM _{2.5}	0.003	0.03
		5	PM/PM ₁₀	0.006	0.05

Emission Point ID	Source Description	Filter Outlet (mg/Nm ³) ⁽¹⁾	Pollutant ⁽²⁾	kg/hr ⁽³⁾	tonne/yr
IMF08	Sorbent Silo	2.5	PM _{2.5}	0.003	0.03
		5	PM/PM ₁₀	0.006	0.05
IMF09	Spent Sorbent Silo	2.5	PM _{2.5}	0.003	0.03
		5	PM/PM ₁₀	0.006	0.05
IMF10	Filter Fines Receiving Silo	2.5	PM _{2.5}	0.003	0.03
		5	PM/PM ₁₀	0.006	0.05
IMF11	Conveyer TP (B215 to B220)	2.5	PM _{2.5}	0.005	0.04
		5	PM/PM ₁₀	0.010	0.08
IMF12	Conveyer TP (B210 to B220)	2.5	PM _{2.5}	0.005	0.04
		5	PM/PM ₁₀	0.010	0.08
IMF13	Bin-Conveyer TP (B231 to Conveyer)	2.5	PM _{2.5}	0.005	0.04
		5	PM/PM ₁₀	0.010	0.08
IMF14	Conveyer TP (B220 No. 1)	2.5	PM _{2.5}	0.005	0.04
		5	PM/PM ₁₀	0.010	0.08
IMF15	Conveyer TP (B220 No. 2)	2.5	PM _{2.5}	0.005	0.04
		5	PM/PM ₁₀	0.010	0.08
IMF16	Conveyer TP (B220 to B300)	2.5	PM _{2.5}	0.005	0.04
		5	PM/PM ₁₀	0.010	0.08
IMF17	Charging Building Vent 1	n/a ⁽⁵⁾	PM _{2.5}	0.004	0.04
			PM/PM ₁₀	0.010	0.08
IMF18	Charging Building Vent 2	n/a ⁽⁵⁾	PM _{2.5}	0.004	0.04
			PM/PM ₁₀	0.010	0.08
IMF21	Charging Building Vacuum Cleaning	2.5	PM _{2.5}	0.001	0.01
		5	PM/PM ₁₀	0.003	0.02
IMF25	Coal Feed Tank	2.5	PM _{2.5}	0.003	0.03
		5	PM/PM ₁₀	0.006	0.05
B235	Coal Milling Building	n/a ⁽⁵⁾	PM _{2.5}	0.005	0.02
			PM/PM ₁₀	0.009	0.04

Emission Point ID	Source Description	Filter Outlet (mg/Nm ³) ⁽¹⁾	Pollutant ⁽²⁾	kg/hr ⁽³⁾	tonne/yr
CE01	De-Dusting Baghouse	5	PM ₁₀ /PM _{2.5}	0.350	3.07
		10	PM	0.700	6.13
		n/a	Mineral Fiber	0.350	3.07
CE02	Vacuum Cleaning Baghouse	5	PM ₁₀ /PM _{2.5}	0.100	0.88
		10	PM	0.200	1.75
		n/a	Mineral Fiber	0.100	0.88
CM08	Recycle Building Vent 3	5	PM _{2.5}	0.013	0.11
		10	PM/PM ₁₀	0.030	0.22
CM09	Recycle Building Vent 4	5	PM _{2.5}	0.013	0.11
		10	PM/PM ₁₀	0.030	0.22
CM10	Recycle Building Vent 1	5	PM _{2.5}	0.150	1.31
		10	PM/PM ₁₀	0.300	2.63
CM11	Recycle Building Vent 2	5	PM _{2.5}	0.150	1.31
		10	PM/PM ₁₀	0.300	2.63

- (1) mg/Nm³ = milligrams/cubic meter. Where applicable, the filter is the **BACT** technology and the outlet loading is PM/PM₁₀ **BACT** limit for the specified emission points. Where a limit is not specified, **BACT** is the kg/hr limit.
- (2) Particulate Matter limits are filterable only. With the exception of CE01 and CE02, PM/PM₁₀ limits are the same.
- (3) Hourly emission limits are based on a 24-hour average.
- (4) This baghouse is optional and not required but if installed will be subject to the given emission limits.
- (5) This is an uncontrolled building opening.

d. The permittee shall not exceed the maximum emission limits and shall utilize the control methods for the specified fugitive emission sources given in the following tables:

(1) **British Units**

Table 4.1.2(d)(1): Material Handling Operations Fugitive Emission Limits in British Units

Emission Unit ID	Source Description	Control Technology	Pollutant ⁽¹⁾	PPH ⁽²⁾	TPY
B215	Drop into Raw Material Loading Hopper	3-sided enclosure w/cover	PM _{2.5}	9.20e-04	4.03e-03
			PM ₁₀	6.85e-03	3.00e-02
			PM	1.37e-02	6.00e-02

Emission Unit ID	Source Description	Control Technology	Pollutant ⁽¹⁾	PPH ⁽²⁾	TPY
RMS	Drop onto Raw Material Stockpile	3-sided enclosure	PM _{2.5}	2.47e-04	1.08e-03
			PM ₁₀	1.63e-03	7.14e-03
			PM	4.57e-03	2.00e-02
	Stockpile Erosion		PM _{2.5}	1.55e-03	1.00e-02
			PM ₁₀	1.00e-02	4.25e-02
			PM	2.07e-02	9.05e-02
RM_REJ	Drop into Raw Material Reject Collection Bin	4-sided rubber drop guard	PM _{2.5}	1.84e-05	8.05e-05
			PM ₁₀	1.21e-04	5.32e-04
			PM	2.57e-04	1.12e-03
S_REJ	Drop into Sieve Reject Collection Bin	4-sided rubber drop guard	PM _{2.5}	1.84e-05	8.05e-05
			PM ₁₀	1.21e-04	5.32e-04
			PM	2.57e-04	1.12e-03
B170	Drop from Portable Crusher into Pit Waste Storage Pile	3-sided enclosure	PM _{2.5}	1.18e-02	3.18e-03
			PM ₁₀	7.41e-02	2.10e-02
			PM	1.48e-01	4.00e-02
	Stockpile Erosion		PM _{2.5}	1.00e-02	2.44e-02
			PM ₁₀	3.50e-02	1.53e-01
			PM	7.44e-02	3.30e-01
B210	Drop into B210	3-sided enclosure w/cover	PM _{2.5}	1.49e-02	4.03e-03
			PM ₁₀	1.11e-01	3.00e-02
			PM	2.22e-01	6.00e-02
	Truck or FEL Drop into B210	None	PM _{2.5}	7.41e-02	2.00e-02
			PM ₁₀	4.07e-01	1.10e-01
			PM	8.15e-01	2.25e-01
B230	Truck Dump to Coal Bunker	3-sided enclosure w/cover	PM _{2.5}	2.03e-04	5.49e-05
			PM ₁₀	1.34e-03	3.63e-04
			PM	2.84e-03	7.67e-04

Emission Unit ID	Source Description	Control Technology	Pollutant ⁽¹⁾	PPH ⁽²⁾	TPY
B231	Drop into Coal Unloading Hopper	3-sided enclosure w/cover	PM _{2.5}	2.03e-04	5.49e-05
			PM ₁₀	1.34e-03	3.63e-04
			PM	2.84e-03	7.67e-04

(1) Particulate Matter limits are filterable only.

(2) Hourly emission limits are based on a 24-hour average and are the **BACT** limits for the listed fugitive emission sources.

(2) Metric Units

Table 4.1.2(d)(2): Material Handling Operations Fugitive Emission Limits in Metric Units

Emission Unit ID	Source Description	Control Technology	Pollutant ⁽¹⁾	kg/hr ⁽²⁾	tonne/yr
B215	Drop into Raw Material Loading Hopper	3-sided enclosure w/cover	PM _{2.5}	1.67e-03	3.65e-03
			PM ₁₀	1.10e-02	2.41e-02
			PM	5.82e-03	5.10e-02
RMS	Drop onto Raw Material Stockpile	3-sided enclosure	PM _{2.5}	1.12e-04	9.81e-04
			PM ₁₀	7.40e-04	6.48e-03
			PM	1.56e-03	1.37e-02
	Stockpile Erosion		PM _{2.5}	7.03e-04	1.00e-02
			PM ₁₀	4.40e-03	4.00e-02
			PM	1.00e-02	8.21e-02
RM_REJ	Drop into Raw Material Reject Collection Bin	4-sided rubber drop guard	PM _{2.5}	8.57e-06	7.51e-05
			PM ₁₀	5.51e-05	4.83e-04
			PM	1.16e-04	1.02e-03
S_REJ	Drop into Sieve Reject Collection Bin	4-sided rubber drop guard	PM _{2.5}	8.34e-06	7.31e-05
			PM ₁₀	5.51e-05	4.83e-04
			PM	1.16e-04	1.02e-03
B170	Drop from Portable Crusher into Pit Waste Storage Pile	3-sided enclosure	PM _{2.5}	3.29e-04	2.88e-03
			PM ₁₀	2.28e-03	2.00e-02
			PM	4.60e-03	4.03e-02
	Stockpile Erosion		PM _{2.5}	2.53e-03	2.22e-02
			PM ₁₀	2.00e-02	1.40e-01
			PM	3.07e-02	3.00e-01

Emission Unit ID	Source Description	Control Technology	Pollutant ⁽¹⁾	kg/hr ⁽²⁾	tonne/yr
B210	Drop into B210	3-sided enclosure w/cover	PM _{2.5}	4.17e-04	3.65e-03
			PM ₁₀	2.75e-03	2.41e-02
			PM	5.82e-03	5.10e-02
	Truck or FEL Drop into B210	None	PM _{2.5}	1.67e-03	1.46e-02
			PM ₁₀	1.14e-02	1.00e-01
			PM	2.33e-02	2.04e-01
B230	Truck Dump to Coal Bunker	3-sided roofed enclosure w/ closeable bay door	PM _{2.5}	5.68e-06	4.98e-05
			PM ₁₀	3.76e-05	3.29e-04
			PM	7.95e-05	6.96e-04
B231	Drop into Covered Coal Unloading Hopper	3-sided enclosure w/cover	PM _{2.5}	5.68e-06	4.98e-05
			PM ₁₀	3.76e-05	3.29e-04
			PM	7.95e-05	6.96e-04

(1) Particulate Matter limits are filterable only.

(2) Hourly emission limits are based on a 24-hour average and are the BACT limits for the listed fugitive emission sources.

e. **Melting Furnace Portable Crusher**

Emissions from the Melting Furnace Portable Crusher (not including associated storage pile or pit waste drop) shall not exceed the limits given in the following table:

Table 4.1.2(e): Melting Furnace Portable Crusher Emission Limits

Pollutant ⁽¹⁾	PPH ⁽²⁾ (kg/hr)	TPY (tonne/yr)
PM _{2.5}	0.12 (0.05)	0.03 (0.03)
PM ₁₀	0.36 (0.16)	0.10 (0.09)
PM	0.81 (0.37)	0.22 (0.20)

(1) Particulate Matter limits are filterable only.

(2) [Reserved]

- f. In addition to the particulate matter controls as required in the Emission Units Table 1.0, the raw material mixer and crusher located in the Charging Building (B220) and the coal conveyer transfer point located inside the Coal Milling Building (B235) shall be equipped with fabric filters to control particulate matter emissions from these sources. The maximum outlet grain loading concentration for each of these fabric filters shall not exceed 0.002 gr/dscf (5 mg/Nm³) of filterable PM/PM₁₀ and 0.001 gr/dscf (2.5 mg/Nm³) filterable PM_{2.5}.

g. Outdoor Material Storage Areas

All outdoor raw material, coal, pit waste, or recycled material storage shall be in accordance with the following:

- (1) The permittee is authorized to operate one (1) raw material stockpile (RMS) that shall not exceed a base of 5,382 ft² (500 m²) and shall utilize 3-sided enclosures to minimize the potential fugitive emissions of particulate matter from wind erosion and pile activity;
- (2) The permittee is authorized to operate Building 210 and 211 for raw material storage. These buildings shall utilize 3-sided enclosures and a roof to minimize the potential fugitive emissions of particulate matter from wind erosion and pile activity;
- (3) The permittee is authorized to operate one (1) coal bunker (B230) that shall utilize a 3-sided enclosure, a roof, and a closeable bay door (or equivalent design) to minimize the potential fugitive emissions of particulate matter from wind erosion and pile activity;
- (4) The permittee is authorized to operate one (1) recycled material stockpile. The material in this storage area is limited to the slag-like material tapped from the Melting Furnace that is of such a physical nature so as to limit any significant generation of fugitive matter from wind erosion and pile activity;
- (5) The permittee is authorized to operate one (1) pit waste (crushed recycled material) storage area (B170) that shall not exceed a base of 19,375 ft² (1,800 m²) and shall utilize a 3-sided enclosure to minimize the potential fugitive emissions of particulate matter from wind erosion and pile activity;
- (6) For all storage piles, the permittee shall manage on-pile activity so as to minimize the release of emissions; and
- (7) All storage area enclosures shall be reasonably maintained and any significant holes shall be repaired immediately.

h. Haulroads and Mobile Work Areas

Fugitive particulate emissions resulting from use of haulroads and mobile work areas shall be minimized by the following:

- (1) The permittee shall pave, and maintain such pavement, on all haulroads and mobile work areas (including a reasonable shoulder area) within the plant boundary;
- (2) The permittee shall maintain access to a vacuum sweeper truck in good operating condition, and shall utilize same as needed to remove excess dirt and dust from all haulroads and mobile work areas. The haulroads and mobile work areas shall be flushed with water immediately prior to each vacuum sweeping (flushing may be part of vacuum sweeper truck); and
- (3) The permittee shall collect, in a timely fashion, material spilled on haulroads that could become airborne if it dried or were subject to vehicle traffic.

i. 45CSR7

The handling of raw materials used in the production of mineral wool and coal milling material handling operations shall comply with all applicable requirements of 45CSR7 including, but not limited to, the following:

- (1) No person shall cause, suffer, allow or permit emission of smoke and/or particulate matter into the open air from any process source operation which is greater than twenty (20) percent opacity, except as noted in subsections 3.2, 3.3, 3.4, 3.5, 3.6, and 3.7.
[45CSR§7-3.1]
- (2) The provisions of subsection 3.1 shall not apply to smoke and/or particulate matter emitted from any process source operation which is less than forty (40) percent opacity for any period or periods aggregating no more than five (5) minutes in any sixty (60) minute period.
[45CSR§7-3.2]
- (3) No person shall cause, suffer, allow or permit particulate matter to be vented into the open air from any type source operation or duplicate source operation, or from all air pollution control equipment installed on any type source operation or duplicate source operation in excess of the quantity specified under the appropriate source operation type in Table 45-7A found at the end of this rule.
[45CSR§7-4.1]
- (4) No person shall cause, suffer, allow or permit any manufacturing process or storage structure generating fugitive particulate matter to operate that is not equipped with a system, which may include, but not be limited to, process equipment design, control equipment design or operation and maintenance procedures, to minimize the emissions of fugitive particulate matter. To minimize means such system shall be installed, maintained and operated to ensure the lowest fugitive particulate matter emissions reasonably achievable.
[45CSR§7-5.1]

j. 40 CFR 60, Subpart OOO

The non-metallic mineral handling operations (see Table 4-1 of Permit Application R14-0037 for a complete list of affected sources) prior to the furnace building (B300) are subject to the applicable limitations and standards under 40 CFR 60, Subpart OOO including, but not limited to, the following:

- (1) Affected facilities must meet the stack emission limits and compliance requirements in Table 2 of Subpart OOO within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup as required under §60.8. The requirements in Table 2 of Subpart OOO apply for affected facilities with capture systems used to capture and transport particulate matter to a control device.
[40 CFR §60.672(a)]
- (2) Affected facilities must meet the fugitive emission limits and compliance requirements in Table 3 of Subpart OOO within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup as required under §60.11. The requirements in Table 3 of Subpart OOO apply for fugitive emissions from affected facilities without capture systems and for fugitive emissions escaping capture systems.
[40 CFR §60.672(b)]
- (3) Truck dumping of nonmetallic minerals into any screening operation, feed hopper, or crusher is exempt from the requirements of this section.
[40 CFR §60.672(d)]

- (4) If any transfer point on a conveyor belt or any other affected facility is enclosed in a building, then each enclosed affected facility must comply with the emission limits in 40 CFR §60.672(a) and (b), or the building enclosing the affected facility or facilities must comply with the following emission limits:
- (1) Fugitive emissions from the building openings (except for vents as defined in §60.671) must not exceed 7 percent opacity; and
 - (2) Vents (as defined in §60.671) in the building must meet the applicable stack emission limits and compliance requirements in Table 2 of Subpart OOO.
[40 CFR §60.672(e)]
- (5) Any baghouse that controls emissions from only an individual, enclosed storage bin is exempt from the applicable stack PM concentration limit (and associated performance testing) in Table 2 of Subpart OOO but must meet the applicable stack opacity limit and compliance requirements in Table 2 of Subpart OOO. This exemption from the stack PM concentration limit does not apply for multiple storage bins with combined stack emissions.
[40 CFR §60.672(f)]

4.1.3. **Coal Mill Burner and Fluidized Bed Dryer**

The Coal Mill Burner and Fluidized Bed Dryer, identified as IMF05, shall meet the following requirements:

- a. The Coal Mill Burner shall not exceed an MDHI of 6.00 mmBtu/hr (1,757 kW) shall only be fired by pipeline-quality natural gas (PNG);
- b. The Fluidized Bed Dryer shall have a design capacity not to exceed 200 tons per day;
- c. The combined exhaust from the Coal Mill Burner and Fluidized Bed Dryer shall be vented to first a separator and then to a baghouse (IMF05-BH) for control of filterable particulate matter;
- d. The combined exhaust of the Coal Mill Burner and Fluidized Bed Dryer shall not exceed the emission limits, and shall utilize the specified BACT Technology, as given in the following table:

Table 4.1.3(d): Coal Mill Burner and Fluidized Bed Dryer Emission Limits

Pollutant	BACT Limit	BACT Technology	PPH (kg/hr)	TPY (tonne/yr)
CO	n/a	n/a	0.49 (0.22)	2.15 (1.95)
NO _x	60 ppmvd @ 3% O ₂	LNB, Temperature Control ⁽¹⁾	0.42 (0.19)	1.86 (1.68)
PM _{2.5} ⁽²⁾	PPH	Baghouse	0.26 (0.12)	1.06 (0.96)
PM ₁₀ ⁽²⁾			0.32 (0.14)	1.33 (1.20)

Pollutant	BACT Limit	BACT Technology	PPH (kg/hr)	TPY (tonne/yr)
PM ⁽³⁾	0.005 gr/dscf (12.3 mg/Nm ³)	Baghouse	0.12 (0.06)	0.54 (0.49)
SO ₂	PPH	Use of Natural Gas	3.51e-03 (1.59e-03)	0.02 (0.01)
VOCs		Good Combustion Practices ⁽⁴⁾	0.41 (0.19)	1.65 (1.50)
CO _{2e}	TPY	Use of Natural Gas, Good Combustion Practices ⁽⁴⁾	--	3,080 ⁽⁵⁾ (2,793)

- (1) Drying in the Fluidized Bed Dryer shall take place at a temperature of less than 180 degrees Fahrenheit so as to prevent any combustion of the coal.
- (2) Includes condensables.
- (3) Filterable only.
- (4) 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.
- (5) As based on emission factors from 40 CFR 98, Table A-1.

e. **45CSR7**

The Coal Mill Burner and Fluidized Bed Dryer shall comply with all applicable requirements of 45CSR7 including, but not limited to, the following:

- (1) No person shall cause, suffer, allow or permit emission of smoke and/or particulate matter into the open air from any process source operation which is greater than twenty (20) percent opacity, except as noted in subsections 3.2, 3.3, 3.4, 3.5, 3.6, and 3.7.
[45CSR§7-3.1]
- (2) The provisions of subsection 3.1 shall not apply to smoke and/or particulate matter emitted from any process source operation which is less than forty (40) percent opacity for any period or periods aggregating no more than five (5) minutes in any sixty (60) minute period.
[45CSR§7-3.2]
- (3) No person shall cause, suffer, allow or permit particulate matter to be vented into the open air from any type source operation or duplicate source operation, or from all air pollution control equipment installed on any type source operation or duplicate source operation in excess of the quantity specified under the appropriate source operation type in Table 45-7A found at the end of this rule.
[45CSR§7-4.1]

4.1.4. **Melting Furnace**

The Melting Furnace, identified as IMF01, shall meet the following requirements:

- a. The Melting Furnace shall not exceed the emission limits, and shall utilize the specified BACT Technology, as given in the following table:

Table 4.1.4(a): Melting Furnace Emission Limits

Pollutant	BACT Limit	BACT Technology	PPH (kg/hr)	TPY (tonne/yr)
CO	n/a	n/a	11.21 ⁽¹⁾ (5.09)	49.10 (44.54)
NO _x	PPH	Integrated SNCR, Oxy-Fired Burners ⁽²⁾	37.37 ⁽¹⁾ (16.95)	163.67 (148.48)
PM _{2.5} ⁽³⁾		Baghouse	7.47 (3.39)	32.73 (29.70)
PM ₁₀ ⁽³⁾			8.22 (3.73)	36.01 (32.67)
PM ⁽⁴⁾			0.013 gr/dscf 31 mg/Nm ³	2.32 (1.05)
SO ₂	PPH	Sorbent Injection in the Baghouse	33.63 ⁽¹⁾ (15.26)	147.31 (133.63)
VOCs		Good Combustion Practices ⁽⁵⁾	11.66 (5.29)	51.08 (46.34)
H ₂ SO ₄		Sorbent Injection in the Baghouse	3.74 (1.70)	16.37 (14.85)
Mineral Fiber	n/a	n/a	2.32 (1.05)	10.15 (9.21)
HF			0.37 (0.17)	1.62 (1.47)
HCl			0.29 (0.13)	1.29 (1.17)
COS			0.37 (0.17)	1.64 (1.48)
Total HAPs			3.43 (1.56)	15.04 (13.64)
CO ₂ e			TPY	Energy Efficiency ⁽⁶⁾

- (1) Compliance based on a 30-day rolling average.
- (2) Integrated SNCR system utilizes ammonia injection to promote a de-NO_x reaction to occur. The oxy-fuel burners are specially designed to fire with O₂ instead of ambient air.
- (3) Includes condensables.
- (4) Filterable only.
- (5) Good combustion practices include, but are not limited to the following: (1) maintaining a proper oxidizing atmosphere to control VOC emissions through proper combustion tuning, temperature, and air/fuel mixing and (2) 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.
- (6) Energy Efficiency measures listed in Table D-9-2 (pp. 554) of the permit application.

b. **45CSR7**

The Melting Furnace shall comply with all applicable requirements of 45CSR7 including, but not limited to, the following:

- (1) No person shall cause, suffer, allow or permit emission of smoke and/or particulate matter into the open air from any process source operation which is greater than twenty (20) percent opacity, except as noted in subsections 3.2, 3.3, 3.4, 3.5, 3.6, and 3.7.

[45CSR§7-3.1]

- (2) The provisions of subsection 3.1 shall not apply to smoke and/or particulate matter emitted from any process source operation which is less than forty (40) percent opacity for any period or periods aggregating no more than five (5) minutes in any sixty (60) minute period.

[45CSR§7-3.2]

- (3) No person shall cause, suffer, allow or permit particulate matter to be vented into the open air from any type source operation or duplicate source operation, or from all air pollution control equipment installed on any type source operation or duplicate source operation in excess of the quantity specified under the appropriate source operation type in Table 45-7A found at the end of this rule.

[45CSR§7-4.1]

- (4) Mineral acids shall not be released from any type source operation or duplicate source operation or from all air pollution control equipment installed on any type source operation or duplicate source operation in excess of the quantity given in Table 45-7B found at the end of this rule.

[45CSR§7-4.2]

c. **45CSR10**

The Melting Furnace shall comply with all applicable requirements of 45CSR10 including, but not limited to, the following:

- (1) No person shall cause, suffer, allow or permit the emission into the open air from any source operation an in-stack sulfur dioxide concentration exceeding 2,000 parts per million by volume from existing source operations, except as provided in subdivisions 4.1.a through 4.1.e.

[45CSR§10-3.1]

d. **40 CFR 63, Subpart DDD**

The Melting Furnace shall comply with all applicable requirements of 40 CFR 63, Subpart DDD including, but not limited to, the following:

- (1) **§63.1178 For cupolas, what standards must I meet?**

- (i) You must control emissions from each cupola as specified in Table 2 to this subpart.

[40 CFR§63.1178(a)]

Table 2 to Subpart DDD of Part 63—Emissions Limits and Compliance Dates

If your source is a:	And you commenced construction:	Your emission limits are: ¹	And you must comply by: ²
2. Cupola	After May 8, 1997	0.10 lb PM per ton of melt	June 1, 1999
8. Open-top cupola	After November 25, 2011	3.2 lb of COS per ton melt	July 29, 2015 ⁴
10. Cupola using slag as a raw material	After November 25, 2011	0.015 lb of HF per ton melt 0.012 lb of HCl per ton melt.	July 29, 2015 ⁴

- (1) The numeric emissions limits do not apply during startup and shutdown.
- (2) Existing sources must demonstrate compliance by the compliance dates specified in this table. New sources have 180 days after the applicable compliance date to demonstrate compliance.
- (4) Or upon initial startup, whichever is later.

(ii) You must meet the following operating limits for each cupola:

[40 CFR§63.1178(b)]

(A) Begin within one hour after the alarm on a bag leak detection system sounds, and complete in a timely manner, corrective actions as specified in your operations, maintenance, and monitoring plan required by §63.1187 of this subpart.

[40 CFR§63.1178(b)(1)]

(B) When the alarm on a bag leak detection system sounds for more than five percent of the total operating time in a six-month reporting period, develop and implement a written quality improvement plan (QIP) consistent with the compliance assurance monitoring requirements of §64.8(b)-(d) of 40 CFR part 64.

[40 CFR§63.1178(b)(2)]

(C) Additionally, on or after the applicable compliance date for each new or reconstructed cupola, you must either:

[40 CFR§63.1178(b)(3)]

(I) Maintain the operating temperature of the incinerator so that the average operating temperature for each three-hour block period never falls below the average temperature established during the performance test, or

[40 CFR§63.1178(b)(3)(I)]

(II) Maintain the percent excess oxygen in the cupola at or above the level established during the performance test. You must determine the percent excess oxygen using the following equation:

[40 CFR§63.1178(b)(3)(II)]

$$\text{Percent excess oxygen} = ((\text{Oxygen available}/\text{Fuel demand for oxygen}) - 1) * 100$$

Where:

Percent excess oxygen = Percentage of excess oxygen present above the stoichiometric balance of 1.00, (%).

1.00 = Ratio of oxygen in a cupola combustion chamber divided by the stoichiometric quantity of oxygen required to obtain complete combustion of fuel.

Oxygen available = Quantity of oxygen introduced into the cupola combustion zone.

Fuel demand for oxygen = Required quantity of oxygen for stoichiometric combustion of the quantity of fuel present.

4.1.5. Gutter Exhaust, Spinning Chamber, Curing Oven Hoods, Curing Oven, and Cooling Section

The Gutter Exhaust (GUT-EX), Spinning Chamber (SPN), Curing Oven Hoods (CO-HD), Curing Oven (CO), and Cooling Section (CS) shall meet the following requirements:

- a. The Gutter Exhaust, Spinning Chamber, Curing Oven Hoods, Curing Oven, and Cooling Section shall not exceed the aggregate emission limits (as emitted from the Wet Electrostatic Precipitator (WESP) stack (HE01)), and each shall utilize the specified BACT Technology as given in the following table:

Table 4.1.5(a): Gutter Exhaust, Spinning Chamber, Curing Oven Hoods, Curing Oven, and Cooling Section Emission Limits

Pollutant	BACT Limit	BACT Technology	PPH (kg/hr)	TPY (tonne/yr)
CO	n/a	n/a	1.82 (0.82)	7.97 (7.23)
NO _x	PPH	LNB, Good Combustion Practices ⁽¹⁾	14.55 (6.60)	63.73 (57.82)
PM _{2.5} ⁽²⁾		WESP	19.22 (8.72)	84.20 (76.39)
PM ₁₀ ⁽²⁾			21.21 (9.62)	92.89 (84.27)
PM ⁽³⁾			21.21 (9.62)	92.89 (84.27)
SO ₂		Use of Natural Gas	0.01 (4.89e-03)	0.05 (0.04)
VOCs		Afterburner Good Combustion Practices Subpart DDD Compliance ⁽⁴⁾	78.02 (35.39)	341.71 (309.99)
Phenol		n/a	n/a ⁽⁵⁾	19.37 (8.79)
Formaldehyde	12.79 (5.80)			56.02 (50.81)
Methanol	23.70 (10.75)			103.80 (94.17)
Mineral Fiber	21.21 (9.62)			92.89 (84.27)
Total HAPs	77.07 (34.96)			337.56 (306.23)

Pollutant	BACT Limit	BACT Technology	PPH (kg/hr)	TPY (tonne/yr)
CO ₂ e	TPY	Use of Natural Gas, Good Combustion Practices ⁽¹⁾	--	35,644 (32,336)

- (1) Good combustion practices include, but are not limited to the following: Proper combustion tuning, temperature, and air/fuel mixing and 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.
- (2) Includes condensables.
- (3) Filterable only.
- (4) BACT Technology: Gutter Exhaust - Subpart DDD Compliance, Curing Oven - Afterburner/Good Combustion Practices, Spinning Chamber - Subpart DDD Compliance, Curing Oven Hoods - Subpart DDD Compliance.
- (5) While the Afterburner is required as a control on Phenol, Formaldehyde, and Methanol, as these pollutants are not subject to PSD, the Afterburner is not listed here as it is not a BACT technology for these pollutants.

b. 45CSR7

The Gutter Exhaust, Curing Oven Hoods, Curing Oven, and Spinning Chamber shall comply with all applicable requirements of 45CSR7 including, but not limited to, the following:

- (1) No person shall cause, suffer, allow or permit emission of smoke and/or particulate matter into the open air from any process source operation which is greater than twenty (20) percent opacity, except as noted in subsections 3.2, 3.3, 3.4, 3.5, 3.6, and 3.7.
[45CSR§7-3.1]
- (2) The provisions of subsection 3.1 shall not apply to smoke and/or particulate matter emitted from any process source operation which is less than forty (40) percent opacity for any period or periods aggregating no more than five (5) minutes in any sixty (60) minute period.
[45CSR§7-3.2]
- (3) No person shall cause, suffer, allow or permit particulate matter to be vented into the open air from any type source operation or duplicate source operation, or from all air pollution control equipment installed on any type source operation or duplicate source operation in excess of the quantity specified under the appropriate source operation type in Table 45-7A found at the end of this rule.
[45CSR§7-4.1]
- (4) Mineral acids shall not be released from any type source operation or duplicate source operation or from all air pollution control equipment installed on any type source operation or duplicate source operation in excess of the quantity given in Table 45-7B found at the end of this rule.
[45CSR§7-4.2]

c. 40 CFR 63, Subpart DDD

The Gutter Exhaust, Curing Oven Hoods, Curing Oven, and Spinning Chamber shall comply with all applicable requirements of 40 CFR 63, Subpart DDD including, but not limited to, the following:

(1) **§63.1179 For curing ovens or combined collection/curing operations, what standards must I meet?**

- (i) You must control emissions from each curing oven or combined collection/curing operations as specified in Table 2 to this subpart.
[43 CFR§60.1179(a)]

Table 2 to Subpart DDD of Part 63—Emissions Limits and Compliance Dates

If your source is a:	And you commenced construction:	Your emission limits are:¹	And you must comply by:²
24. Combined vertical collection/curing operation	After November 25, 2011	2.4 lb of formaldehyde per ton melt 0.92 lb of methanol per ton melt. 0.71 lb of phenol per ton melt.	July 29, 2015 ⁴

- (1) The numeric emissions limits do not apply during startup and shutdown.
- (2) Existing sources must demonstrate compliance by the compliance dates specified in this table. New sources have 180 days after the applicable compliance date to demonstrate compliance.
- (4) Or upon initial startup, whichever is later.

4.1.6. **Fleece Application**

The Fleece Application operations shall meet the following requirements:

- a. The maximum emissions of VOCs and HAPs from the Fleece Application operations each shall not exceed of 7.14 tons per month (6.48 tonnes/month) and a BACT limit (BACT limit is VOCs only) of 28.58 TPY (23.21 tonnes/year);
- b. The BACT Technology for the Fleece Application operations is the use of low-VOC coatings and the utilization of Good Work Practices. “Low-VOC coatings” shall mean the monthly average of all coating materials used during fleece application operations shall not exceed 0.016 lb-VOC/lb-coating (0.016 kg-VOC/kg-coating) material as-applied on a monthly average basis. “Good Work Practices” shall mean storing VOC-containing materials in closed tanks or containers, cleaning up spills, and minimizing cleaning with VOC-containing cleaners; and
- c. **40 CFR 63, Subpart JJJJ**
 The fleece application operations shall comply with all applicable requirements of 40 CFR 63, Subpart JJJJ including, but not limited to, the following:

What emission standards must I meet?

- (1) If you own or operate any affected source that is subject to the requirements of this subpart, you must comply with these requirements on and after the compliance dates as specified in §63.3330.
[40 CFR§63.3320(a)]
- (2) You must limit organic HAP emissions to the level specified in paragraph (b)(1), (2), (3), or (4) of this section.
[40 CFR§63.3320(b)]
 - (i) No more than 5 percent of the organic HAP applied for each month (95 percent reduction) at existing affected sources, and no more than 2 percent of the organic HAP applied for each month (98 percent reduction) at new affected sources; or
[40 CFR§63.3320(b)(1)]

- (ii) No more than 4 percent of the mass of coating materials applied for each month at existing affected sources, and no more than 1.6 percent of the mass of coating materials applied for each month at new affected sources; or
[40 CFR§63.3320(b)(2)]
 - (iii) No more than 20 percent of the mass of coating solids applied for each month at existing affected sources, and no more than 8 percent of the coating solids applied for each month at new affected sources.
[40 CFR§63.3320(b)(3)]
 - (iv) If you use an oxidizer to control organic HAP emissions, operate the oxidizer such that an outlet organic HAP concentration of no greater than 20 parts per million by volume (ppmv) by compound on a dry basis is achieved and the efficiency of the capture system is 100 percent.
[40 CFR§63.3320(b)(4)]
- (3) You must demonstrate compliance with this subpart by following the procedures in §63.3370.
[40 CFR§63.3320(c)]

4.1.7. **Rockfon Line**

The Rockfon Line shall meet the following requirements:

- a. The maximum aggregate VOC emissions from the application of glue and coatings in the Rockfon line shall not exceed 8.98 tons/month (8.15 tonne/month) and a **BACT** limit of 35.93 TPY (32.60 tonne/yr);
- b. The **BACT** Technology for the application of glue and coatings in the Rockfon Line is the use of low-VOC materials and the utilization of Good Work Practices. “Low-VOC materials” shall mean the use of glue is limited to containing (**BACT** Limit) of a maximum VOC content of 0.57 lb-VOC/gallon-glue (70 g-VOC/L-material) and the use of coatings are limited to containing (**BACT** Limit) a maximum VOC content of 0.67 lb-VOC/gallon-material (80 g-VOC/L-material). No HAP-containing glues or coatings shall be used in the Rockfon Line. “Good Work Practices” shall mean storing VOC-containing materials in closed tanks or containers, cleaning up spills, and minimizing cleaning with VOC-containing cleaners;
- c. The ovens used in the Rockfon line shall only combust PNG and each not exceed the aggregate MDHI (of all burners) specified in the following table:

Table 4.1.7(c): Rockfon Line Ovens Maximum MDHI

Oven ID	MDHI
RFN-E3	2.73 mmBtu/hr (800 kW)
RFN-E4	2.05 mmBtu/hr (600 kW)
RFN-E6	4.78 mmBtu/hr (1,400 kW)
RFN-E9	2.73 mmBtu/hr (800 kW)

- d. The Rockfon Line shall not exceed the emission limits (not including VOCs resulting from the use of glue and coatings as limited under 4.1.7(a)), and each shall utilize the specified **BACT** Technology as given in the following tables:

(1) **British Units**

Table 4.1.7(d)(1): Rockfon Line Emission Limits in British Units

Pollutant	BACT Limit	BACT Technology	PPH	TPY
RFN-E1: IR Zone				
PM_{2.5}⁽¹⁾	PPH	Low-Particulate Emitting Process	0.01	0.06
PM₁₀⁽¹⁾			0.02	0.08
PM⁽²⁾			0.01	0.04
Phenol	n/a	n/a	0.01	0.03
Formaldehyde			0.01	0.03
Mineral Fiber			0.01	0.04
Total HAPs			0.02	0.10
RFN-E2: Hot Press				
PM_{2.5}⁽¹⁾	PPH	Low-Particulate Emitting Process	0.01	0.06
PM₁₀⁽¹⁾			0.02	0.08
PM⁽²⁾			0.01	0.04
Phenol	n/a	n/a	0.01	0.03
Formaldehyde			0.01	0.03
Mineral Fiber			0.01	0.04
Total HAPs			0.02	0.10
RFN-E3: High Oven A				
CO	n/a	n/a	0.22	0.98
NO_x	0.10 lb/mmBtu	Good Combustion Practices ⁽³⁾	0.27	1.17
PM_{2.5}⁽¹⁾	PPH	Use of Natural Gas, Good Combustion Practices ⁽³⁾	0.09	0.38
PM₁₀⁽¹⁾			0.12	0.51
PM⁽²⁾			0.06	0.25
SO₂	PPH	Use of Natural Gas	0.01	0.01
VOCs		Good Combustion Practices ⁽³⁾	0.01	0.06

Pollutant	BACT Limit	BACT Technology	PPH	TPY
Phenol	n/a	n/a	0.02	0.08
Formaldehyde			0.02	0.08
Mineral Fiber			0.06	0.25
Total HAPs			0.10	0.43
CO ₂ e	TPY	Use of Natural Gas, Good Combustion Practices ⁽³⁾	--	1,400
RFN-E4: Drying Oven 1				
CO	n/a	n/a	0.17	0.73
NO _x	0.10 lb/mmBtu	Good Combustion Practices ⁽³⁾	0.20	0.87
PM _{2.5} ⁽¹⁾	PPH	Use of Natural Gas, Good Combustion Practices ⁽³⁾ , Fabric Filter (RFNE4-FF)	0.06	0.27
PM ₁₀ ⁽¹⁾			0.08	0.36
PM ⁽²⁾	0.0015 gr/dscf		0.04	0.18
SO ₂	PPH	Use of Natural Gas	0.01	0.01
VOCs		Good Combustion Practices ⁽³⁾	0.01	0.05
Phenol	n/a	n/a	0.01	0.05
Formaldehyde			0.02	0.10
Mineral Fiber			0.04	0.18
Total HAPs			0.08	0.34
CO ₂ e	TPY	Use of Natural Gas, Good Combustion Practices ⁽³⁾	--	1,050
RFN-E5: Spray Paint Cabin				
PM _{2.5} ⁽¹⁾	PPH	Fabric Filter (RFNE5-FF)	0.66	2.90
PM ₁₀ ⁽¹⁾			0.88	3.86
PM ⁽²⁾	0.0081 gr/dscf		0.44	1.93
Phenol	n/a	n/a	0.06	0.24
Formaldehyde			0.02	0.10
Mineral Fiber			0.44	1.93
Total HAPs			0.52	2.27

Pollutant	BACT Limit	BACT Technology	PPH	TPY
RFN-E6: Drying Oven 2/3				
CO	n/a	n/a	0.39	1.71
NO _x	0.10 lb/mmBtu	Good Combustion Practices ⁽³⁾	0.47	2.04
PM _{2.5} ⁽¹⁾	PPH	Use of Natural Gas, Good Combustion Practices ⁽³⁾ , Fabric Filter (RFNE6-FF)	0.09	0.41
PM ₁₀ ⁽¹⁾			0.13	0.55
PM ⁽²⁾	0.001 gr/dscf		0.06	0.28
SO ₂	PPH	Use of Natural Gas	0.01	0.01
VOCs		Good Combustion Practices ⁽³⁾	0.03	0.11
Phenol	n/a	n/a	0.03	0.12
Formaldehyde			0.05	0.23
Mineral Fiber			0.06	0.28
Total HAPs			0.15	0.66
CO ₂ e	TPY	Use of Natural Gas, Good Combustion Practices ⁽³⁾	--	2,450
RFN-E7: Cooling Zone				
PM _{2.5} ⁽¹⁾	PPH	Low-Emitting Process	0.14	0.63
PM ₁₀ ⁽¹⁾			0.19	0.84
PM ⁽²⁾			0.10	0.42
Phenol	n/a	n/a	0.06	0.24
Formaldehyde			0.06	0.24
Mineral Fiber			0.10	0.42
Total HAPs			0.21	0.91
RFN-E8: De-Dusting Baghouse				
PM _{2.5} ⁽²⁾	PPH	Fabric Filter (RFNE8-FF)	0.17	0.75
PM ₁₀ ⁽²⁾			0.34	1.49
PM ⁽²⁾	0.00053 gr/dscf		0.34	1.49
Mineral Fiber	n/a	n/a	0.34	1.49
Total HAPs			0.34	1.49

Pollutant	BACT Limit	BACT Technology	PPH	TPY
RFNE9: High Oven B				
CO	n/a	n/a	0.22	0.98
NO_x	0.10 lb/mmBtu	Good Combustion Practices ⁽³⁾	0.27	1.17
PM_{2.5}⁽¹⁾	PPH	Use of Natural Gas, Good Combustion Practices ⁽³⁾	0.09	0.38
PM₁₀⁽¹⁾			0.12	0.51
PM⁽²⁾			0.06	0.25
SO₂	PPH	Use of Natural Gas	0.01	0.01
VOCs		Good Combustion Practices ⁽³⁾	0.01	0.06
Phenol	n/a	n/a	0.02	0.08
Formaldehyde			0.02	0.08
Mineral Fiber			0.06	0.25
Total HAPs			0.10	0.43
CO₂e	TPY	Use of Natural Gas, Good Combustion Practices ⁽³⁾	--	1,400

(1) Includes Condensables.

(2) Filterable Only.

(3) 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.

(2) Metric Units

Table 4.1.7(d)(2): Rockfon Line Emission Limits in Metric Units

Pollutant	BACT Limit	BACT Technology	kg/hr	tonne/yr
RFN-E1: IR Zone				
PM_{2.5}⁽¹⁾	kg/hr	Low-Particulate Emitting Process	6.30e-03	0.06
PM₁₀⁽¹⁾			1.00e-02	0.07
PM⁽²⁾			4.20e-03	0.04
Phenol	n/a	n/a	3.00e-03	0.03
Formaldehyde			3.00e-03	0.03
Mineral Fiber			4.20e-03	0.04
Total HAPs			1.00e-02	0.09

Pollutant	BACT Limit	BACT Technology	kg/hr	tonne/yr
RFN-E2: Hot Press				
PM_{2.5}⁽¹⁾	kg/hr	Low-Particulate Emitting Process	6.30e-03	0.06
PM₁₀⁽¹⁾			1.00e-02	0.07
PM⁽²⁾			4.20e-03	0.04
Phenol	n/a	n/a	3.00e-03	0.03
Formaldehyde			3.00e-03	0.03
Mineral Fiber			4.20e-03	0.04
Total HAPs			1.02e-02	0.09
RFN-E3: High Oven A				
CO	n/a	n/a	0.10	0.89
NO_x	1,602 kg/mmsm ³	Good Combustion Practices ⁽³⁾	0.12	1.06
PM_{2.5}⁽¹⁾	kg/hr	Use of Natural Gas, Good Combustion Practices ⁽³⁾	0.04	0.35
PM₁₀⁽¹⁾			0.05	0.46
PM⁽²⁾			0.03	0.23
SO₂	kg/hr	Use of Natural Gas	0.01	0.01
VOCs		Good Combustion Practices ⁽³⁾	0.01	0.06
Phenol	n/a	n/a	0.01	0.07
Formaldehyde			0.01	0.07
Mineral Fiber			0.03	0.23
Total HAPs			0.04	0.39
CO₂e	tonne/yr	Use of Natural Gas, Good Combustion Practices ⁽³⁾	--	1,270
RFN-E4: Drying Oven 1				
CO	n/a	n/a	0.08	0.67
NO_x	1,602 kg/mmsm ³	Good Combustion Practices ⁽³⁾	0.09	0.79
PM_{2.5}⁽¹⁾	kg/hr	Use of Natural Gas, Good Combustion Practices ⁽³⁾ ,	0.03	0.24
PM₁₀⁽¹⁾			Fabric Filter (RFNE4-FF)	0.04
PM⁽²⁾	3.70 mg/Nm ³		0.02	0.16

Pollutant	BACT Limit	BACT Technology	kg/hr	tonne/yr
SO ₂	kg/hr	Use of Natural Gas	0.01	0.01
VOCs		Good Combustion Practices ⁽³⁾	0.01	0.04
Phenol	n/a	n/a	0.01	0.04
Formaldehyde			0.01	0.09
Mineral Fiber			0.02	0.16
Total HAPs			0.04	0.31
CO ₂ e	tonne/yr	Use of Natural Gas, Good Combustion Practices ⁽³⁾	—	953
RFN-E5: Spray Paint Cabin				
PM _{2.5} ⁽¹⁾	kg/hr	Fabric Filter (RFNE5-FF)	0.30	2.63
PM ₁₀ ⁽¹⁾			0.40	3.50
PM ⁽²⁾	20 mg/Nm ³		0.20	1.75
Phenol	n/a	n/a	0.03	0.22
Formaldehyde			0.01	0.09
Mineral Fiber			0.20	1.75
Total HAPs			0.23	2.06
RFN-E6: Drying Oven 2/3				
CO	n/a	n/a	0.18	1.55
NO _x	1,602 kg/mmsm ³	Good Combustion Practices ⁽³⁾	0.21	1.86
PM _{2.5} ⁽¹⁾	kg/hr	Use of Natural Gas, Good Combustion Practices ⁽³⁾ , Fabric Filter (RFNE6-FF)	0.04	0.38
PM ₁₀ ⁽¹⁾			0.06	0.50
PM ⁽²⁾	2.38 mg/Nm ³		0.03	0.25
SO ₂	kg/hr	Use of Natural Gas	0.01	0.01
VOCs		Good Combustion Practices ⁽³⁾	0.01	0.10
Phenol	n/a	n/a	0.01	0.11
Formaldehyde			0.02	0.21
Mineral Fiber			0.03	0.25
Total HAPs			0.07	0.60

Pollutant	BACT Limit	BACT Technology	kg/hr	tonne/yr
CO ₂ e	tonne/yr	Use of Natural Gas, Good Combustion Practices ⁽³⁾	--	2,223
RFN-E7: Cooling Zone				
PM _{2.5} ⁽¹⁾	kg/hr	Low-Emitting Process	0.07	0.57
PM ₁₀ ⁽¹⁾			0.09	0.77
PM ⁽²⁾			0.04	0.38
Phenol	n/a	n/a	0.03	0.22
Formaldehyde			0.03	0.22
Mineral Fiber			0.04	0.38
Total HAPs			0.09	0.82
RFN-E8: De-Dusting Baghouse				
PM _{2.5} ⁽²⁾	kg/hr	Fabric Filter (RFNE8-FF)	0.08	0.68
PM ₁₀ ⁽²⁾			0.15	1.35
PM ⁽²⁾	1.30 mg/Nm ³		0.15	1.35
Mineral Fiber	n/a	n/a	0.15	1.35
Total HAPs	n/a	n/a	0.15	1.35
RFNE9: High Oven B				
CO	n/a	n/a	0.10	0.89
NO _x	1,602 kg/mmsm ³	Good Combustion Practices ⁽³⁾	0.12	1.06
PM _{2.5} ⁽¹⁾	kg/hr	Use of Natural Gas, Good Combustion Practices ⁽³⁾	0.04	0.35
PM ₁₀ ⁽¹⁾			0.05	0.46
PM ⁽²⁾			0.03	0.23
SO ₂		Use of Natural Gas	0.01	0.01
VOCs		Good Combustion Practices ⁽³⁾	0.01	0.06
Phenol	n/a	n/a	0.01	0.07
Formaldehyde			0.01	0.07
Mineral Fiber			0.03	0.23
Total HAPs			0.04	0.39

Pollutant	BACT Limit	BACT Technology	kg/hr	tonne/yr
CO ₂ e	tonne/yr	Use of Natural Gas, Good Combustion Practices ⁽³⁾	--	1,270

- (1) Includes Condensables.
- (2) Filterable Only.
- (3) 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.

e. As the annual emission limits of RFN-E3, RFN-E4, RFN-E6, and RFN-E9 listed under Table 4.1.7(d) are based on 8,760 hours of operation, there is no annual limit on hours of operation or natural gas combusted on an annual basis for these units.

f. **45CSR7**

The Rockfon Line shall comply with all applicable requirements of 45CSR7 including, but not limited to, the following:

- (1) No person shall cause, suffer, allow or permit emission of smoke and/or particulate matter into the open air from any process source operation which is greater than twenty (20) percent opacity, except as noted in subsections 3.2, 3.3, 3.4, 3.5, 3.6, and 3.7.
[45CSR§7-3.1]
- (2) The provisions of subsection 3.1 shall not apply to smoke and/or particulate matter emitted from any process source operation which is less than forty (40) percent opacity for any period or periods aggregating no more than five (5) minutes in any sixty (60) minute period.
[45CSR§7-3.2]
- (3) No person shall cause, suffer, allow or permit particulate matter to be vented into the open air from any type source operation or duplicate source operation, or from all air pollution control equipment installed on any type source operation or duplicate source operation in excess of the quantity specified under the appropriate source operation type in Table 45-7A found at the end of this rule.
[45CSR§7-4.1]
- (4) Mineral acids shall not be released from any type source operation or duplicate source operation or from all air pollution control equipment installed on any type source operation or duplicate source operation in excess of the quantity given in Table 45-7B found at the end of this rule.
[45CSR§7-4.2]

4.1.8. **Fuel Burning Units**

The Fuel Burning Units, identified as IMF24, CM03, CM04, and RFN10, shall meet the following requirements:

- a. The units shall only combust PNG and each not exceed an aggregate MDHI (of all burners) of 5.1 mmBtu/hr (1,500 kW) for each permitted emission:
- b. The units shall not exceed the emission limits given in the following table:

Table 4.1.8(b): Per-Fuel Burning Unit Emission Limits

Pollutant	BACT Limit	BACT Technology	PPH (kg/hr)	TPY (tonne/yr)
CO	n/a	n/a	0.42 (0.19)	1.84 (1.67)
NO _x	30 ppm _{v,d} @ 3% O ₂	LNB, Good Combustion Practices ⁽¹⁾	0.18 (0.08)	0.79 (0.72)
NO _x (IMF24 Only)	60 ppm _{v,d} @ 3% O ₂	LNB, Good Combustion Practices ⁽¹⁾	0.36 (0.16)	1.58 (1.44)
PM _{2.5} ⁽²⁾	PPH	Use of Natural Gas, Good Combustion Practices ⁽¹⁾	0.04 (0.02)	0.17 (0.15)
PM ₁₀ ⁽²⁾			0.01 (4.30e-03)	0.04 (0.04)
PM ⁽³⁾				
SO ₂		Use of Natural Gas	3.00e-03 (1.36e-03)	0.01 (0.01)
VOCs		Good Combustion Practices ⁽¹⁾	0.03 (0.01)	0.12 (0.11)
CO ₂ e	TPY	Use of Natural Gas, Good Combustion Practices ⁽¹⁾	--	2,627 (2,384)

(1) LNB = Low-NO_x Burning Technology. 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.

(2) Includes Condensables.

(3) Filterable Only.

c. As all the annual emissions of the units listed under Table 4.1.8(b) are based on 8,760 hours of operation, there is no annual limit on hours of operation or natural gas combusted on an annual basis for those units; and

d. 45CSR2

No person shall cause, suffer, allow or permit emission of smoke and/or particulate matter into the open air from any fuel burning unit which is greater than ten (10) percent opacity based on a six minute block average.

[40CSR§2-3.1]

4.1.9. Storage Tanks

Use of the volatile organic liquid (VOL) storage tanks shall be in accordance with the following:

a. Tank size shall be limited as specified under Table 1.0 of this permit;

b. The aggregate emissions of VOCs from all storage shall not exceed a BACT Limit of 0.19 tons/year (0.17 tonnes/yr); and

- c. Material stored shall be as specified and the aggregate annual storage tank throughputs shall not exceed those given in the following table:

Table 4.1.9(c): Storage Tanks Throughput Limits

Tank ID	Material Stored	Gallons
TK-DF	Diesel	20,000
TK-UO	Used Motor and Gear Oil	15,000
TK-TO1	Thermal Oil	681
TK-TO2	Thermal Oil	681
TK-TO3	Thermal Oil	2,642
TK-TO4	Thermal Oil	2,642
TK-DO	De-Dust Oil	200,000
TK-RS1 through TK-RS7	Resin	8,400,000 ⁽¹⁾
TK-CA	Coupling Agent Solution	16,000
TK-AD	Binder Additive	65,000
TK-BM	Binder Solution ⁽²⁾	24,000,000
TK-BC	Binder Solution ⁽²⁾	24,000,000
TK-BD	Binder Solution ⁽²⁾	24,000,000
TK-BS1 through TK-BS3	Fleece Coating	1,479,999 ⁽¹⁾
TK-DOD	De-Dust Oil	200,000
TK-PD	Diluted Water-Based Paint	1,008,701
TK-PDD	Diluted Water-Based Paint	1,008,701

(1) This number represents the aggregate limit for all specified storage tanks.

(2) May refer to any type of Binder Solution that has an average vapor pressure less than 0.76 psia (5.24 kPa) at 60 degrees Fahrenheit (15.6°C).

- d. For **BACT** purposes, the permittee shall utilize good operating practices in the operation of the storage tanks. Good operating practices shall mean maintaining and operating the storage tanks according to manufacturers recommendations and regularly inspecting the tanks for areas of disrepair or failure that would allow the escape of VOC-containing vapors.

4.1.10. Emergency Fire Pump Engine

The Emergency Fire Pump Engine, identified as EFP1, shall meet the following requirements:

- a. The unit shall not exceed 197 horsepower (150 kW), shall be fired only with Ultra-Low Sulfur Diesel (with a maximum sulfur content not to exceed 0.0015%), and shall not operate in excess of 100 hours per year nor 0.5 hours in any 24-hour period during times not defined as emergencies;
- b. The maximum emissions from the Emergency Fire Pump Engine shall not exceed the limits given in the following table:

Table 4.1.10(b): Emergency Fire Pump Engine Emission Limits

Pollutant	BACT Limit	BACT Technology	PPH (kg/hr)	TPY (tonne/yr)
CO	n/a	n/a	1.13 (0.51)	0.28 (0.26)
NO _x	4.0 g/kw-hr	Subpart III Certification, Annual Hrs of Op Limit	1.30 (0.59)	0.32 (0.29)
PM _{2.5} ⁽¹⁾	PPH		0.08 (0.03)	0.02 (0.02)
PM ₁₀ ⁽¹⁾				
PM ⁽²⁾	0.20 g/kw-hr		0.06 (0.03)	0.02 (0.01)
SO ₂	PPH	ULSD Fuel Annual Hrs of Op ⁽³⁾ Limit	2.14e-03 (9.72e-04)	5.36e-04 (4.86e-04)
VOCs		Subpart III Certification, Annual Hrs of Op ⁽³⁾ Limit	0.19 (0.09)	0.05 (0.04)
CO ₂ e	TPY	Annual Hrs of Op ⁽³⁾ Limit	—	56 (51)

- (1) Includes Condensables.
- (2) Filterable Only.
- (3) Non-emergency hours of operation.

c. 40 CFR 60, Subpart III

The Emergency Fire Pump Engine shall meet all applicable requirements under 40 CFR 60, Subpart III including the following:

- (1) 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. [40 CFR §60.4205(c)]
- (2) As stated in §§60.4202(d) and 60.4205(c), you must comply with the following emission standards for stationary fire pump engines:

Table 4 to Subpart IIII of Part 60—Emission Standards for Stationary Fire Pump Engines

Maximum Engine Power	Model year(s)	NMHC + NOX	CO	PM
130≤KW<225 (175≤HP<300)	2009+ ⁽³⁾	4.0(3.0)	3.5(2.6)	0.20(0.15)

(3) In model years 2009-2011, manufacturers of fire pump stationary CI ICE in this engine power category with a rated speed of greater than 2,650 rpm may comply with the emission limitations for 2008 model year engines.

d. **40 CFR 63, Subpart ZZZZ**

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.

[40 CFR §63.6590(c)]

4.1.11. **Miscellaneous Operations/Processes**

a. **Dry Ice Cleaning**

The maximum input design capacity of the dry ice production unit (DI) shall not exceed 4.37 tons/day (3.97 tonne/day), and the emissions of CO₂ from the use dry ice cleaning shall not exceed (BACT limit) 363.76 PPH (165 kg/hr) or 1,594 TPY (1,446 tonne/year).

b. **Cooling Towers**

The Cooling Towers shall operate in accordance with the following requirements:

(1) The Cooling Tower shall use the control device specified under Section 1.0 at all times in operation and not exceed the specified maximum design and operational limits in the following table:

Table 4.1.11(b)(1): Cooling Tower Specifications

ID No.	Max Design Capacity Water Circulation Pump (gal/min)	Total Dissolved Solids (ppm)	Mist Eliminator Max Drift Rate (%) ⁽¹⁾
IMF02	1,321 (300 m ³ /hr)	1,500	0.001
HE02	308 (70 m ³ /hr)	1,500	0.001

(1) As based on manufacturer or vendor guarantee or applicable product literature.

(2) The maximum emissions from the Cooling Towers shall not exceed the limits given in the following table:

Table 4.1.11(b)(2): Cooling Tower Emission Limits⁽¹⁾

Pollutant	BACT Limit	BACT Technology	PPH (kg/hr)	TPY (tonne/yr)
IMF02				
PM _{2.5} ⁽¹⁾	PPH	High Efficiency Drift Eliminator (@ 0.001% Drift)	4.96e-03 (2.25e-03)	0.02 (0.02)
PM ₁₀ ⁽¹⁾			0.01 (4.50e-03)	0.04 (0.04)
PM ⁽²⁾				
HE02				
PM _{2.5} ⁽¹⁾	PPH	High Efficiency Drift Eliminator (@ 0.001% Drift)	1.16e-03 (5.25e-03)	0.01 (4.60e-03)
PM ₁₀ ⁽¹⁾			2.31e-03 (1.05e-03)	0.01 (9.19e-03)
PM				

c. Product Marking

The Product Marking Operations, identified as P_MARK, shall operate in accordance with the following requirements:

- (1) The MDHI of the burners used with the branding wheels used in Product Marking shall not exceed 0.40 mmBtu/hr (120 kW) and shall only be fired with PNG. Combustion exhaust from the burners shall not exceed the following emissions:

Table 4.1.11(c)(1): Product Marking Burners Combustion Exhaust Emission Limits

Pollutant	BACT Limit	BACT Technology	PPH (kg/hr)	TPY (tonne/yr)
CO	n/a	n/a	0.03 (0.01)	0.14 (0.13)
NO _x	PPH	Use of Natural Gas	0.04 (0.02)	0.17 (0.15)
PM _{2.5} ⁽¹⁾			2.96e-03 (1.34e-03)	0.01 (1.18e-03)
PM ₁₀ ⁽¹⁾				
PM ⁽²⁾			7.41e-04 (3.36e-04)	0.01 (2.94e-03)
SO ₂			2.34e-04 (1.06e-04)	1.02e-04 (9.29e-04)
VOCs			2.14e-03 (9.73e-04)	9.39e-03 (8.52e-03)
CO ₂ e	TPY		--	205 (186)

(1) Includes Condensables.

(2) Filterable Only.

- (2) As all the annual emissions listed under Table 4.1.11(c)(1) are based on 8,760 hours of operation, there is no annual limit on hours of operation or natural gas combusted on an annual basis for the unit; and
- (3) The **BACT** Technology for the use of ink and cleaners during Product Marking Operations is the utilization of Good Work Practices. "Good Work Practices" shall mean storing VOC-containing materials in closed tanks or containers, cleaning up spills, and minimizing cleaning with VOC-containing cleaners. VOC emissions from the use of ink and cleaners during Product Marking operations shall not exceed 2.37 tons/month (2.15 tonne/month) and a **BACT** limit of 9.49 TPY (8.61 tonne/yr) and no HAP-containing inks or cleaners shall be used during Product Marking Operations.

4.1.12. **Control Devices**

- a. **Operation and Maintenance of Air Pollution Control Equipment.** The permittee shall, to the extent practicable, install, maintain, and operate all pollution control equipment listed in Section 1.0 and associated monitoring equipment in a manner consistent with safety and good air pollution control practices for minimizing emissions, or comply with any more stringent limits set forth in this permit or as set forth by any State rule, Federal regulation, or alternative control plan approved by the Secretary.
[45CSR§13-5.11.]
- b. **Inherent SNCR De-NO_x System**
The permittee shall design and operate the Melting Furnace so as to promote the inherent removal of NO_x from the exhaust gas stream. The permittee shall maintain a proper temperature profile for NO_x removal and inject aqueous ammonia as necessary to facilitate the SNCR process. Compliance with 4.1.12(b) shall be determined by showing compliance with the NO_x emission limits given under Table 4.1.4(a) using the CEMS as required under 4.2.6.
- c. **Sorbent Injection**
The permittee shall utilize sorbent injection in conjunction with Baghouse IMF-01 so as to reduce the emissions of SO₂, H₂SO₄, HF, and HCl from the Melting Furnace. Compliance with 4.1.12(c) shall be determined by showing compliance with the SO₂ emission limits given under Table 4.1.4(a) using the CEMS as required under 4.2.6.
- d. **Baghouse IMF01-BH**
Use of Baghouse IMF01-BH shall be in accordance with the following requirements:
 - (1) The permittee shall monitor the differential pressure drop of IMF01-BH so as to ensure proper continuous operation of the baghouse. The monitoring system shall include an alarm to notify the control room if the differential pressure drop indicates abnormal performance of the unit. The appropriate alarm set-point(s) shall be determined as given under 4.1.12(g).
 - (2) **40 CFR 63, Subpart DDD**
How do I comply with the particulate matter standards for existing, new, and reconstructed cupolas? To comply with the PM standards, you must meet all of the following:
[40 CFR §63.1181]
 - (i) Install, adjust, maintain, and continuously operate a bag leak detection system for each fabric filter.
[40 CFR §63.1181(a)]

- (ii) Do a performance test as specified in §63.1188 of this subpart and show compliance with the PM emission limits while the bag leak detection system is installed, operational, and properly adjusted.
[40 CFR §63.1181(b)]
- (iii) Begin corrective actions specified in your operations, maintenance, and monitoring plan required by §63.1187 of this subpart within one hour after the alarm on a bag leak detection system sounds. Complete the corrective actions in a timely manner.
[40 CFR §63.1181(c)]
- (iv) Develop and implement a written QIP consistent with compliance assurance monitoring requirements of 40 CFR 64.8(b) through (d) when the alarm on a bag leak detection system sounds for more than five percent of the total operating time in a six-month reporting period.
[40 CFR §63.1181(d)]

e. **Wet Electrostatic Precipitator (WESP)**

The operation of the WESP shall be in accordance with the following requirements:

- (1) The permittee shall utilize a WESP, identified as HE01, so as to reduce the particulate matter emissions from the Gutter Exhaust, Spinning Chamber, Curing Oven Hoods, the Afterburner, and the Cooling Section at all times Melting, Spinning, Curing and Cooling operations are ongoing; and
- (2) The permittee shall monitor the secondary voltage and secondary amperage range of the WESP for optimum mitigation of particulate matter emissions from the sources listed under 4.1.12(e)(1). The monitoring system shall include an alarm to notify the control room if the secondary voltage or amperage indicates abnormal performance of the unit. The appropriate alarm set-point(s) shall be determined as given under 4.1.12(g).

f. **Curing Oven Afterburner**

The Curing Oven Afterburner, CO-AB, shall operate according to the following requirements:

- (1) The Curing Oven Afterburner shall not exceed a burner capacity of 6.83 mmBtu/hr (2,000 kW) and shall be in operation at all times when the Curing Oven is in operation and is venting VOC-containing vapors;
- (2) **45CSR6**
The Curing Oven Afterburner is subject to 45CSR6. The requirements of 45CSR6 include but are not limited to the following:

- (i) The permittee shall not cause, suffer, allow or permit particulate matter to be discharged from the flares into the open air in excess of the quantity determined by use of the following formula:

$$\text{Emissions (lb/hr)} = F \times \text{Incinerator Capacity (tons/hr)}$$

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

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

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

[45CSR§6-4.1]

(ii) No person shall cause, suffer, allow or permit emission of smoke into the atmosphere from any incinerator which is twenty (20%) percent opacity or greater.
[45CSR6 §4.3]

(iii) The provisions of paragraph (i) shall not apply to smoke which is less than forty (40%) percent opacity, for a period or periods aggregating no more than eight (8) minutes per start-up.
[45CSR6 §4.4]

(iv) No person shall cause or allow the emission of particles of unburned or partially burned refuse or ash from any incinerator which are large enough to be individually distinguished in the open air.
[45CSR6 §4.5]

(v) Incinerators, including all associated equipment and grounds, shall be designed, operated and maintained so as to prevent the emission of objectionable odors.
[45CSR6 §4.6]

(vi) Due to unavoidable malfunction of equipment, emissions exceeding those provided for in this rule may be permitted by the Director for periods not to exceed five (5) days upon specific application to the Director. Such application shall be made within twenty-four (24) hours of the malfunction. In cases of major equipment failure, additional time periods may be granted by the Director provided a corrective program has been submitted by the owner or operator and approved by the Director.
[45CSR6 §8.2]

(3) 40 CFR 63, Subpart DDD

(i) How do I comply with the formaldehyde, phenol, and methanol standards for existing, new, and reconstructed combined collection/curing operations? To comply with the formaldehyde, phenol, and methanol standards, you must meet all of the following:
[40 CFR §63.1183]

(A) Install, calibrate, maintain, and operate a device that continuously measures the operating temperature in the firebox of each thermal incinerator.
[40 CFR §63.1183(a)]

(B) Conduct a performance test as specified in §63.1188 while manufacturing the product that requires a binder formulation made with the resin containing the highest free-formaldehyde content specification range. Show compliance with the formaldehyde, phenol, and methanol emissions limits, specified in Table 2 to this subpart, while the device for measuring the control device operating parameter is installed, operational, and properly calibrated. Establish the average operating parameter based on the performance test as specified in §63.1185(a).
[40 CFR §63.1183(b)]

- (C) During the performance test that uses the binder formulation made with the resin containing the highest free-formaldehyde content specification range, record the free-formaldehyde content specification range of the resin used, and the formulation of the binder used, including the formaldehyde content and binder specification.
[40 CFR §63.1183(c)]
 - (D) Following the performance test, monitor and record the free-formaldehyde content of each resin lot and the formulation of each batch of binder used, including the formaldehyde, phenol, and methanol content.
[40 CFR §63.1183(d)]
 - (E) Maintain the free-formaldehyde content of each resin lot and the formaldehyde content of each binder formulation at or below the specification ranges established during the performance test.
[40 CFR §63.1183(e)]
 - (F) Following the performance test, measure and record the average operating temperature of the incinerator as specified in §63.1185(b) of this subpart.
[40 CFR §63.1183(f)]
 - (G) Maintain the operating temperature of the incinerator so that the average operating temperature for each three-hour block period never falls below the average temperature established during the performance test.
[40 CFR §63.1183(g)]
 - (H) Operate and maintain the incinerator as specified in your operations, maintenance, and monitoring plan required by §63.1187 of this subpart.
[40 CFR §63.1183(h)]
- g. Where statutory requirements (MACT, NSPS) do not specify such points, the determination of appropriate alarm set-points under this section shall be based on data obtained from performance testing, manufacturing recommendations, or operational experience. The permittee shall maintain on-site, and update as necessary, a certified report listing the set-points and the basis for their selection. Any changes to the set-points shall be accompanied by the date of the change and reason for the change. The permittee shall, to the extent reasonably possible, operate the control devices within the operating ranges at all times the associated emission units are in operation and venting emissions. If an alarm occurs, the permittee shall attempt to immediately correct the problem and follow the record-keeping procedures under 4.4.3.

4.1.13. Stack Parameters

The emission point stack parameters (Inner Diameter, Emission Point Elevation, and UTM Coordinates) of each source identified under the Emission Units Table 1.0 shall be in accordance with the specifications as given on the Emission Points Data Sheet in the most updated version of Permit Application R14-0037.

4.1.14. General Rule Applicability

The permittee shall meet all applicable requirements, including those not specified above, as given under 45CSR2, 45CSR6, 45CSR7, 45CSR10, 40 CFR 60, Subparts OOO and IIII, and 40 CFR 63, Subparts DDD, JJJJ, ZZZZ, and DDDDD. Any final revisions made to the above rules will, where applicable, supercede those specifically cited in this permit.

4.2. Monitoring, Compliance Demonstration, Recording and Reporting Requirements

4.2.1. Maximum Design Capacity Compliance

Compliance with the maximum design capacity limitations as given under 4.1. shall be based on a clear and visible boilerplate rating or on product literature, manufacturer’s data, or equivalent documentation that shows that the specific emission unit(s) or processing line in question is limited by design to a throughput or production rate that does not exceed the specified value under 4.1.

4.2.2. Maximum Design Heat Input Compliance

Compliance with the various combustion unit MDHI limitations as given under 4.1. shall be based on a clear and visible boilerplate rating or on product literature, manufacturer’s data, or equivalent documentation that shows that the specific emission unit(s) in question is limited by design to an MDHI that does not exceed the specified value under 4.1.

4.2.3. Material/Production Throughputs

To determine continuous compliance with maximum production, throughputs, and combustion limits given under in 4.1 of the permit, the permittee shall monitor and record the following:

Table 4.2.3: Facility Quantities Monitored/Recorded

Quantity Monitored/Recorded	Emission Unit(s)	Measured Units
Portable Melt Crushing	Portable Melt Crusher	Hours of Operation/year
Emergency Fire Pump Hours of Operation ⁽¹⁾	EFPI	Hours of Operation/Year
Storage Tank Throughputs	Various	Gallons/year

(1) Strictly for the purposes of compliance with 4.1.10(a), only non-emergency hours of operation are required to be monitored. Subpart IIII, however, requires monitoring of all hours of operation.

4.2.4. Baghouse/Filter Vents

To determine continuous compliance with the filter/baghouse emission limits given under Section 4.1 of the permit, the permittee shall maintain and operate the control devices according to the requirements given under 4.1.12(a). The permittee shall keep a record of all significant maintenance or repair performed on these control devices (changing out bags, replacing filter material, etc.).

4.2.5. Coal Fluidized Bed Dryer

To determine continuous compliance with the maximum temperature requirement given under Table 4.1.3(d) - footnote (1), the permittee shall install and maintain instrumentation in the Coal Fluidized Bed Dryer so as to monitor and record the temperature in the drying zone of the dryer.

4.2.6. Melting Furnace CEMS (IMF01)

Within 60 days after achieving the maximum design mineral wool production rate at which the facility will be operated, but not later than 180 days after initial startup, the permittee shall, to show continuous compliance with the CO, NO_x, and SO₂ emission limits as given under Table 4.1.4(a), install and operate a Continuous Emissions Monitoring System (CEMS) for monitoring the emissions of CO, NO_x, and SO₂ from IMF01. The CEMS shall be installed, maintained and operated according to the manufacturers design, specifications, and recommendations, of which a protocol shall be developed by the permittee and approved by the Director prior to operation. The CEMS shall meet

the applicable performance specifications required by 40 Part 60, Appendix B, the applicable quality assurance procedures required in 40 CFR Part 60, Appendix F, and the requirements of 40 CFR 60.13. In lieu of the requirements of 40 CFR Part 60, Appendix F, 5.1.1, 5.1.3, and 5.1.4, the permittee may conduct either a Relative Accuracy Audit (RAA) or a Relative Accuracy Test Audit (RATA) on the CEMS at least once every three (3) years. The permittee shall conduct Cylinder Gas Audits (CGA) each calendar quarter during which a RAA or a RATA is not performed. Data recorded by the CEMS shall be kept for a period not less than three (3) years and shall be made available to the Director or his/her representative upon request.

4.2.7. Fleece Application Station

To determine continuous compliance with the VOC/HAP emission limits and the low-VOC requirement given under 4.1.6(a) and (b), the permittee shall monitor and record the following:

- a. The monthly and twelve-month rolling total of the amount (in tons) of VOCs/HAPs used in the fleece application process. The amount shall be based on actual material properties (VOC/HAP contents and material densities) and the amount of material used during the applicable time period. The permittee shall assume a 100% volatilization of all VOCs/HAPs used in the fleece application process with no control percentage applied unless granted approval in writing by the Director to use an alternative calculation methodology. The material properties shall be based on applicable vendor data, MSDS, or Certified Product Data Sheets; and
- b. The average monthly as-applied VOC/HAP content (in lb-VOC/lb-coating and lb-HAP/lb-coating) as based on the procedures under 40 CFR 63, Subpart JJJJ, Section §63.3370(a).

4.2.8. Rockfon Line Coatings/Glue Usage

To determine continuous compliance with the VOC emission limit and the low-VOC BACT requirements given under 4.1.7(a) and (b), the permittee shall monitor and record the monthly and twelve-month rolling total of the amount (in tons) of VOCs used in the Rockfon coating and gluing process. The amount shall be based on actual material properties (VOC contents and material densities) and the amount of material used during the applicable time period. The permittee shall assume a 100% volatilization of all VOCs used in the Rockfon coating and gluing process with no control percentage applied unless granted approval in writing by the Director to use an alternative calculation methodology. The material properties shall be based on applicable vendor data, MSDS, or Certified Product Data Sheets.

4.2.9. Ultra Low Sulfur Fuel

For the purposes of demonstrating continuing compliance with the maximum sulfur content limit under 4.1.10(a), the permittee shall, at a minimum of once per calendar year, obtain from the fuel oil supplier a certification of the sulfur content of the fuel combusted in the Emergency Fire Pump Engine. An alternative means of determining compliance with 4.2.10. will be subject to prior approval from the Director.

4.2.10. Cooling Tower

For the purposes of demonstrating initial and continuing compliance with the operational limits set forth in Table 4.1.11(b)(1), the permittee shall, for both cooling towers, within 180 days of startup, take an initial grab sample of the cooling tower circulating water and analyze such to determine the total solids content of the cooling tower circulating water. Thereafter, the permittee shall test for solids content on an annual basis (with no more than 14 months between tests).

4.2.11. Product Marking

To determine continuous compliance with the Product Marking (P_MARK) VOC emission limits and given under 4.1.11(c)(3), the permittee shall monitor and record the monthly and twelve-month rolling total of the amount (in tons) of VOCs used in the Product Marking process. The amount shall be based on actual material properties (VOC contents and material densities) and the amount of material used during the applicable time period. The permittee shall assume a 100% volatilization of all VOCs used in the Product Marking process with no control percentage applied unless granted approval in writing by the Director to use an alternative calculation methodology. The material properties shall be based on applicable vendor data, MSDS, or Certified Product Data Sheets.

4.2.12. Control Device Monitoring

The permittee shall install, maintain, and operate instrumentation to continuously monitor and record the control device parameters as required under 4.1.12 of this permit including, at a minimum, the following:

Table 4.2.12: Control Device Parameters Monitored/Recorded

Control Device	Control Device ID	Parameter(s)
Melting Furnace Baghouse	IMF01-BH	Pressure Drop
WESP	WESP	Secondary Voltage Secondary Amperage
Curing Oven Afterburner	CO-AB	Firebox Temperature ⁽¹⁾

(1) Pursuant to 40 CFR 63, Subpart DDD, §63.1182.

4.2.13. Visible Emissions Compliance Demonstrations

Visible emissions Monitoring, Compliance Demonstration, Recording and Reporting shall be in accordance with the following requirements:

a. 45CSR2

Upon request by the Secretary, compliance with the visible emission requirements of 3.1 [of 45CSR2] shall be determined in accordance with 40 CFR Part 60, Appendix A, Method 9 or by using measurements from continuous opacity monitoring systems approved by the Secretary. The Secretary may require the installation, calibration, maintenance and operation of continuous opacity monitoring systems and may establish policies for the evaluation of continuous opacity monitoring results and the determination of compliance with the visible emission requirements of 3.1 [of 45CSR2]. Continuous opacity monitors shall not be required on fuel burning units which employ wet scrubbing systems for emission control;
[40CSR§2-3.2]

b. 45CSR6

Compliance with the afterburner opacity requirements given under 4.1.12(f)(2)(i) and (ii) shall be based on the compliance demonstrations required for emission point HE01 as given under 4.2.14(c) and (e);

c. 45CSR7

At such reasonable time(s) as the Secretary may designate, compliance with the visible emission requirements of 4.1.2(i), 4.1.3(e), 4.1.4(b), 4.1.5(b), and 4.1.7(f) shall be determined in accordance with the procedures outlined under 45CSR7A;

d. **40 CFR 60, Subpart OOO**

The permittee shall meet all applicable visible emissions Monitoring, Compliance Demonstration, Recording and Reporting requirements as given under 40 CFR 60, Subpart OOO, Sections §60.674 through §60.676;

e. **IMF01, HE01, CE01, and IMF05.**

Emission Points IMF01, HE01, CE01, and IMF05 are subject to the following visible emissions monitoring and compliance demonstration requirements:

(1) In order to determine compliance with the opacity limits of 4.1.3(e), 4.1.4(b), 4.1.5(b), and 4.1.7(f) of this permit, the permittee shall conduct visible emission checks and/or opacity monitoring and recordkeeping for Emission Points IMF01, HE01, CE01, and IMF05 in accordance with the following:

(i) The visible emission check shall determine the presence or absence of visible emissions. At a minimum, the observer must be trained and knowledgeable regarding the effects of background contrast, ambient lighting, observer position relative to lighting, wind, and the presence of uncombined water (condensing water vapor) on the visibility of emissions. This training may be obtained from written materials found in the References 1 and 2 from 40CFR Part 60, Appendix A, Method 22 or from the lecture portion of the 40CFR Part 60, Appendix A, Method 9 certification course;

(ii) Visible emission checks shall be conducted at least once per calendar month with a maximum of forty-five (45) days between consecutive readings. These checks shall be performed for a sufficient time interval, but no less than one (1) minute, to determine if any visible emissions are present. Each observation must be recorded as either visible emissions observed or no visible emissions observed. Visible emission checks shall be performed during periods of normal facility operation and appropriate weather conditions;

(iii) If visible emissions are present at a source(s) the permittee shall perform Method 9 readings to confirm that visible emissions are within the limits of 4.1.10 of this permit. Said Method 9 readings shall be taken as soon as practicable, but within seventy-two (72) hours of the Method 22 emission check; and

(iv) If, one year of monthly Method 22 readings show that there are no visible emissions, then the frequency of observations can be reduced to quarterly. If, during quarterly checks, visible emissions are observed, then the frequency of observations shall be returned to monthly.

f. For the purpose of demonstrating compliance with the visible emissions and opacity requirements, the permittee shall maintain records of the visible emission opacity tests and checks. The permittee shall maintain records of all monitoring data required by 4.2.14 documenting the date and time of each visible emission check, the emission point or equipment/ source identification number, the name or means of identification of the observer, the results of the check(s), whether the visible emissions are normal for the process, and, if applicable, all corrective measures taken or planned. The permittee shall also record the general weather conditions (i.e. sunny, approximately 80°F, 6-10 mph NE wind) during the visual emission check(s). Should a visible emission observation be required to be performed per the requirements specified in Method 9, the data records of each observation shall be maintained per the requirements of Method 9. For an emission unit out of service during the evaluation, the record of observation may note "out of service" (O/S) or equivalent; and

- g. 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.

4.2.14. Baghouse/Fabric Filter Compliance Demonstrations

Unless specifically requested under 4.3.1. or listed in Table 4.3.2., compliance with all baghouse and fabric filter mass emission limits that have BACT outlet grain loading limits shall be based on vendor information or vendor guarantees that show the maximum outlet grain loading emissions from the baghouse/fabric filter is in compliance with the specific limit.

4.2.15. Emission Point Map

The permittee shall prepare and maintain an emission point map of the facility. This map shall consist of a diagram of the location and identification of all emission points at the facility that vent to ambient air. A legend shall be prepared with the map that identifies the emission point type and source(s) contributing to that emission point. This map shall be prepared within 180 days of startup and thereafter be updated as necessary to reflect current facility operations. The map(s) shall be retained on-site and be made available to the Director or his/her duly authorized representative upon request.

4.2.16. Resin Tracking/N₂O Calculation

To determine compliance with the annual CO₂e limit given under Table 4.1.5(a), the permittee shall monitor and record the information given under 4.2.16(a) and (b). The permittee shall then use this information to calculate N₂O emissions (based on an emission factor of 28.05 lb-N₂O/ton-resin solids [14 kg-N₂O/tonne-resin solids]) from the Melting Furnace, and along with established emission CO₂ factors, to determine the annual CO₂e emissions.

- a. Annual amount (based on a rolling twelve month time period) of purchased resin (as solids) based on invoices. The amount may be corrected for binder not used or that is discarded and not applied in the production process; and
- b. Solid content in Phenolic Resin (PUF) based on vendor data or operator analysis.

4.3. Performance Testing Requirements

- 4.3.1. At such reasonable time(s) as the Secretary may designate, in accordance with the provisions of 3.3 of this permit, the permittee shall conduct or have conducted test(s) to determine compliance with the emission limitations established in this permit and/or applicable regulations.

4.3.2. Emissions Point Performance Testing

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, the permittee shall conduct, or have conducted, in accordance with a protocol submitted pursuant to 3.3.1(c), performance tests on the emission units (as emitted from the listed emission points) to show compliance with the specified pollutants as given in the following table:

Table 4.3.2.: 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 ₂ e.	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 ₂ e.	PPH ⁽²⁾
Rockfon Line	RFNE8	PM _{2.5} ⁽¹⁾ , PM ₁₀ ⁽¹⁾ , PM ⁽¹⁾	PPH gr/dscf (PM only)
ROckfon 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) Results from the required performance testing used to show compliance with the MACT standards (in lb/ton-melt) may be converted and used for compliance with the PPH limits. Compliance with the MACT standards does not necessarily mean compliance with the limits under Table 4.1.4(a).

4.3.3 With respect to the performance testing required above under Section 4.3.2, the permittee shall, after the initial performance test, periodically conduct additional performance testing on the specified sources according to the following schedule:

Table 4.3.3.: Performance Testing Schedule

Test	Test Results	Retesting Frequency
Initial Baseline	<50% of weight emission standard	Once/3 years
Initial Baseline	between 50% and 80 % of weight emission standard	Once/2 years
Initial Baseline	>80% of weight emission standard	Annual
Annual	after three successive tests indicate mass emission rates <50% of weight emission standard	Once/3 years
Annual	after two successive tests indicate mass emission rates <80 % of weight emission standard	Once/2 years
Annual	any tests indicates a mass emission rate >80% of weight emission standard	Annual
Once/2 years	After two successive tests indicate mass emission rates <50% of weight emission standard	Once/3 years
Once/2 years	any tests indicates a mass emission rate <80 % of weight emission standard	Once/2 years
Once/2 years	any tests indicates a mass emission rate >80% of weight emission standard	Annual
Once/3 years	any tests indicates a mass emission rate <50% of weight emission standard	Once/3 years

Test	Test Results	Retesting Frequency
Once/3 years	any test indicates mass emission rates between 50% and 80 % of weight emission standard	Once/2 years
Once/3 years	any test indicates a mass emission rate >80% of weight emission standard	Annual

- 4.3.4. Performance testing for pollutants monitored by CEMS (CO, NO_x, and SO₂ emitted from the Melting Furnace) are not subject to the performance testing schedule given under Table 4.3.4 and any performance testing shall, unless at such other reasonable time(s) as the Secretary may designate, be conducted on a schedule consistent with the required RATA testing.
- 4.3.5. The permittee shall use the test methods specified in Table 4.3.6. unless granted approval in writing by the Director to use an alternative test method in a protocol submitted pursuant to 3.3.1(c).

Table 4.3.5: Performance Test Methods

Pollutant	Test Method ⁽¹⁾
CO	Method 10
NO _x	Method 7E
PM _{2.5} (filterable only)	Method 201A
PM ₁₀ /PM (filterable only)	Method 5
PM _{2.5} /PM ₁₀ (condensable)	Method 202
SO ₂	Method 6C
VOCs	Method 18/25A
COS	Method 15
HF/HCl	Method 26A
Formaldehyde Phenol/ Methanol	Method 318
H ₂ SO ₄	Method 8

(1) All test methods refer to those given under 40 CFR 60, Appendix A

- 4.3.6. **40 CFR 60, Subpart OOO**
 The permittee shall meet all applicable Performance Testing requirements as given under 40 CFR 60, Subpart A, Section §60.8 and Subpart OOO, Section §60.675.
- 4.3.7. **40 CFR 63, Subpart DDD**
 The permittee shall meet all applicable Performance Testing requirements as given under 40 CFR 63,

Subpart DDD, Sections §63.1188 through §63.1190.

4.4. Additional Recordkeeping Requirements

4.4.1. **Record of Monitoring.** The permittee shall keep records of monitoring information that include the following:

- a. The date, place as defined in this permit and time of sampling or measurements;
- b. The date(s) analyses were performed;
- c. The company or entity that performed the analyses;
- d. The analytical techniques or methods used;
- e. The results of the analyses; and
- f. The operating conditions existing at the time of sampling or measurement.

4.4.2. **Record of Maintenance of Air Pollution Control Equipment.** For all pollution control equipment listed in Section 1.0, the permittee shall maintain accurate records of all required pollution control equipment inspection and/or preventative maintenance procedures.

4.4.3. **Record of Malfunctions of Air Pollution Control Equipment.** For all air pollution control equipment listed in Section 1.0, the permittee shall maintain records of the occurrence and duration of any malfunction or operational shutdown of the air pollution control equipment during which excess emissions occur. For each such case, the following information shall be recorded:

- a. The equipment involved.
- b. Steps taken to minimize emissions during the event.
- c. The duration of the event.
- d. The estimated increase in emissions during the event.

For each such case associated with an equipment malfunction, the additional information shall also be recorded:

- e. The cause of the malfunction.
- f. Steps taken to correct the malfunction.
- g. Any changes or modifications to equipment or procedures that would help prevent future recurrences of the malfunction.

4.5. Additional Reporting Requirements

- 4.5.1. The permittee shall submit the following information to the DAQ according to the specified schedules:
- a. The permittee shall submit reports of 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; and
 - b. The permittee shall submit to the Director on or before March 15, a certification of compliance with all requirements of this permit for the previous calendar year ending on December 31. If, during the previous annual period, the permittee had been out of compliance with any part of this permit, it shall be noted along with the following information: 1) the source/equipment/process that was non-compliant and the specific requirement of this permit that was not met, 2) the date the permitted discovered that the source/ equipment/process was out of compliance, 3) the date the Director was notified, 4) the corrective measures to get the source/equipment/process back into compliance, and 5) the date the source began to operate in compliance. The submission of any non-compliance report shall give no enforcement action immunity to episodes of non-compliance contained therein.

CERTIFICATION OF DATA ACCURACY

I, the undersigned, hereby certify that, based on information and belief formed after reasonable inquiry, all information contained in the attached _____, representing the period beginning _____ and ending _____, and any supporting documents appended hereto, is true, accurate, and complete.

Signature¹ _____ Date _____
(please use blue ink) Responsible Official or Authorized Representative

Name and Title _____ Title _____
(please print or type) Name

Telephone No. _____ Fax No. _____

¹ This form shall be signed by a "Responsible Official." "Responsible Official" means one of the following:

- a. For a corporation: The president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit and either:
 - (I) the facilities employ more than 250 persons or have a gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), or
 - (ii) the delegation of authority to such representative is approved in advance by the Director;
- b. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;
- c. For a municipality, State, Federal, or other public entity: either a principal executive officer or ranking elected official. For the purposes of this part, a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., a Regional Administrator of USEPA); or
- d. The designated representative delegated with such authority and approved in advance by the Director.

EXHIBIT D



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 E



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,

A handwritten signature in blue ink that reads 'Laura M. Crowder'.

Laura M. Crowder
Director, Division of Air Quality

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

Pursuant to §45-14-17.7, the Division of Air Quality presents the

FINAL DETERMINATION

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: April 30, 2018

Promoting a healthy environment.

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
DAQ Ad Date: March 28, 2018
Newspaper: *Spirit of Jefferson*

On March 28, 2018, the West Virginia Division of Air Quality (DAQ) went to public notice in the above noted newspaper with a preliminary determination to issue the Prevention of Significant Deterioration (PSD) permit R14-0037 to ROXUL USA, Inc. (ROXUL) for the proposed construction of a new mineral wool manufacturing facility at the "Jefferson Orchards" site in Ranson, Jefferson County, WV. On this date, pursuant to §45-13-8.7 and §45-14-13.3, a copy of the preliminary determination, draft permit, and public notice was forwarded to USEPA Region III, 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 was made available for public review at the DAQ Headquarters in Charleston and on DAQ's website. Additionally, pursuant to §45-14-17.5, a copy of the public notice was 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). Comments on the preliminary determination and the draft permit were required to be submitted by 5:00 PM on April 27, 2018.

This document will summarize the comments received on the draft permit, any actions taken as a result of the comments, any substantive changes to the draft permit, and the final determination of the DAQ regarding R14-0037.

COMMENTS RECEIVED

On April 25, 2017, USEPA Region III submitted seven (7) comments on the both the air dispersion modeling report (three comments) and the preliminary determination/fact sheet (PD/FS)

R14-0037
ROXUL USA, Inc.
RAN Facility

and draft permit (four comments). Each of the comments shall be briefly summarized below and DAQ's response attached. For the full text of the received comments, please see the submitted comments in the file. No other comments were received from any entity concerning R14-0037.

USEPA Comments on Modeling Report

Comment 1: Modeled 1-Hour SO₂ Violations

USEPA provided comments and recommendations concerning the modeled exceedances of the 1-hour SO₂ NAAQS in the multi-source modeling performed as part of ROXUL's the air dispersion modeling analysis.

DAQ Response: "As indicated in your comments, the DAQ's modeling analysis demonstrates that ROXUL does not significantly contribute to any of the modeled 1-hour SO₂ NAAQS violations and, therefore, can proceed through the permitting process. However, the DAQ will review these predicted exceedances of the 1-hour SO₂ NAAQS and take any actions thereto (and taking into consideration your recommendations) that may be determined to be appropriate."

Comment 2: ROXUL Melting Furnace 30-Day SO₂ Emission Limit

USEPA provided comments concerning the use of a 30-Day Rolling Average SO₂ Emission Limit on the Melting Furnace and requested a discussion on the expected variability of the actual SO₂ emission rate from the unit.

DAQ Response: "As noted in your comments, the DAQ believes that the approach taken to validate the SO₂ 30-day rolling average compliance demonstration is reasonable and has similar precedent in other recent permitting actions/SIP demonstrations and is generally supported in guidance. As the emission of SO₂ is fuel-based and well controlled by the sorbent injection system, there is not expected to be significant variability in the SO₂ emissions. However, to mitigate the possibility of unrepresentative short-term exceedances, ROXUL requested (and validated, as noted above) the 30-day rolling average SO₂ compliance demonstration."

Comment 3: PM-2.5 Increment Modeling/Source Trigger Dates

USEPA provided comments concerning the conservative nature of the PM-2.5 Increment Modeling Analysis and requested a discussion of any minor source baseline triggering dates.

DAQ Response: WVDAQ's modeling analysis demonstrates that no modeled exceedances of the increments are predicted. Although the approach used may be conservative, the DAQ believes that the analysis method is appropriate and relevant for use in the permitting process for ROXUL. The use of this more conservative approach in this ROXUL modeling analysis will, however, not preclude from the DAQ accepting a less conservative methodology when deemed reasonable or appropriate on a case-by-case basis. Further, a discussion of what minor source baseline dates were triggered by the ROXUL permitting process was included in the PD/FS on page 40 and the relevant information is included again here for your reference.

Minor Source Baseline Triggering

Pollutant	Berkeley County	Jefferson County
NO ₂	Previously	ROXUL (12/21/17)
PM _{2.5}	Previously	ROXUL (12/21/17)
PM ₁₀	Previously	ROXUL (12/21/17)
SO ₂	ROXUL (12/21/17)	ROXUL (12/21/17)

USEPA Comments on PD/FS & Draft Permit

Comment 1: Phased Permitting

USEPA provided comments concerning the proposed future construction and use of an oxygen plant to provide pure oxygen to the melting furnace and the potential impact on NO_x emissions.

DAQ Response: "On page 25 of the permit application, ROXUL states that "[o]xygen will be dosed to the Melting Furnace to ensure oxygen enrichment. Initially, oxygen will be delivered to the site and stored in pressurized storage vessels; later an onsite oxygen plant is to be constructed." Therefore, prior to the possible construction of the Oxygen Plant, ROXUL will use tanked O₂ in the Melting Furnace. There should be no difference in the temperature of the melting process when using tanked or manufactured O₂."

Comment 2: BACT limit for NO_x, CO, and SO₂

USEPA requested a discussion of why the NO_x, CO, and SO₂ emission limits were each based on a 30-day rolling average.

DAQ Response: "First it is noted that the wool production process is not a batch process, as raw materials are continuously fed to the Melting Furnace at the same time that melt (and subsequently mineral wool) is produced. Additionally, CO is not a PSD pollutant (facility-wide PTE is < 100 TPY) and is permitted under the authority of WV Legislative Rule 45CSR13 (minor source permitting rule).

As discussed in the second comment on the modeling report, USEPA has agreed, with respect to SO₂, that the approach taken by ROXUL in conducting additional air dispersion modeling at a rate higher than the 30-day rolling average limit is a valid approach to mitigate the possibility of unrepresentative short-term exceedances. The DAQ believes that this approach is also valid for NO_x (which, due to potential higher variability, was modeled at up to a 75% higher rate than the 30-day average). Section 4.4.1 (page 38) of the ROXUL's Air Quality Assessment provides a discussion of the sensitivity analysis done in support of the 30-day rolling average limits.

Based on the results of the NO₂ sensitivity analysis, the lower emission rate of CO from the Melting Furnace, and the much higher NAAQS and SILs for CO, the DAQ has determined that a 30-day rolling average for CO is also reasonable, appropriate, and valid for this specific emission unit.

The DAQ believes that the modeled increases conservatively represent the anticipated actual variability of emissions from the Melting Furnace. However, the Melting Furnace will have CEMS

for NO_x, CO, and SO₂, which will allow for real-time monitoring of these pollutants. The DAQ reserves the right to revisit this issue with ROXUL if real-time emissions data indicates that these sensitivity analyses do not conservatively represent the anticipated actual variability of emissions."

Comment 3: BACT Determination

USEPA provided comments on DAQ's process of selecting the BACT emission limits and the use of a BACT summary table in the PD/FS.

DAQ Response: "The DAQ (the "Administrator") did set BACT emission limits pursuant to the applicable regulations as given under WV Legislative Rule 45CSR14 (see Draft Permit R14-0037) that were based on a reasonable top-down BACT Analysis as presented in permit application R14-0037. It is noted, that on page B.53 of the draft New Source Review Workshop Manual, it states that:

It is the responsibility of the permit agency to review the documentation and rationale presented [of the BACT determination] and; (1) ensure that the applicant has addressed all of the most effective control options that could be applied and; (2) determine that the applicant has adequately demonstrated that energy, environmental, or economic impacts justify any proposal to eliminate the more effective control options.

The DAQ did review ROXUL's BACT determination and provided its conclusion that (see page 37 of the PD/FS) "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."

Based on the DAQ's determination that ROXUL's BACT determination was appropriate and reasonable, it was deemed as not necessary to replicate in the PD/FS the very large analysis presented in the permit application but instead provide a summary (in Table 8) and refer to the application for a detailed discussion of the BACT."

Comment 4: Portable Crusher BACT limit

USEPA provided comments that the use of an annual hours of operation limit on the Portable Crusher was not an appropriate BACT control strategy.

Response: "While the DAQ doesn't necessarily agree that restrictions on hours of operation or throughput, on a case-by-case basis, are never appropriate or reasonable as part of a BACT control strategy (if noted that they are not intended to set a precedent and are applied on a case-by-case basis), pursuant to your comment, we will note in the final determination that the Portable Crusher hours of operation limit is not formally a BACT limit and that the emission limits given under 4.1.2(e) in the draft permit are not BACT limits."

CHANGES TO DRAFT PERMIT

The only substantive change made to the draft permit was a result of USEPA Comment 4 on the PD/FS and Draft Permit (see above). As a result of that change, footnote (2) of Table 4.1.2(e)

was removed. The effect of this is to no longer classify the Portable Crusher emission limits as BACT limits and will remove the annual hours of operation restriction as a part of the formal BACT control strategy.

No other changes were made to the permit as a result of any comments.

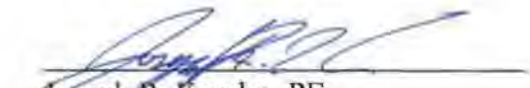
NOTIFICATIONS

Upon the Director's acceptance of this final determination, a copy of the final determination and final permit will be made available for review at DAQ Headquarters in Charleston and posted on DAQ's website at:

<http://dep.wv.gov/daq/Pages/NSRPermitsforReview.aspx>

FINAL DETERMINATION

It is the view of the writer that, after consideration of all comments received, all available information indicates ROXUL USA, Inc.'s proposed construction of a new mineral wool manufacturing facility in Ranson, Jefferson County, WV, will meet the emission limitations and conditions set forth in the permit and will comply with all currently applicable state and federal air quality management rules and standards. It is, therefore, the recommendation of the undersigned that the WVDAQ issue a final determination to issue the attached permit R14-0037.



Joseph R. Kessler, PE
Engineer

4-30-18

Date

R14-0037
ROXUL USA, Inc.
RAN Facility

EXHIBIT G



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

Promoting a healthy environment.

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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 ₂ SO 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.

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 ROXUL USA, Inc.
 RAN Facility

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).

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ROXUL USA, Inc.
RAN Facility

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 ft² 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:

R14-0037
ROXUL USA, Inc.
RAN Facility

- 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 (CO₂ 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 ft² 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 conveyor 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 ft² 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 ft² 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-NO_x 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 (SO₂), sulfuric acid (H₂SO₄) 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 be 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 CO₂ to a pelletizer unit which will form dry ice pellets (solid CO₂). 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 CO₂.

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 Rockfon 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

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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 Dreijstel 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

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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 matter 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 PM₁₀ 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 (CO₂e). 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 be 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 SO₂/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 CO₂ - defined as a GHG - occur during the production and use of dry ice (frozen CO₂ 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 CO₂. 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 (CO₂e), 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/ft³ was used in the calculations. Annual 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.

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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 (SO₂), and 40 CFR 98, Table A-1 (CO₂e). Ultra-Low Sulfur Diesel with a maximum sulfur content of 0.0015% was used in the calculation of SO₂. 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:

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Table 3: Applicable State and Federal Air Quality Rules

State Air Quality Rules	
<i>Emissions Standards</i>	
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
<i>Permitting Programs and Administrative Rules</i>	
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	
<i>New Source Performance Standards (NSPS) - 40 CFR 60</i>	
Subpart OOO	Standards of Performance for Nonmetallic Mineral Processing Plants
Subpart IIII	Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
<i>Maximum Achievable Control Technology (MACT) - 40 CFR 63</i>	
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:

$$\text{Emissions (lb/hr)} = F \times \text{Incinerator Capacity (tons/hr)}$$

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

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

<u>Incinerator Capacity</u>	<u>Factor F</u>
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: H₂SO₄ - 70 mg/m³, HCl - 420 mg/m³. The proposed emission rates of H₂SO₄ and HCl from the Melting Furnace are 50 and 3.9 mg/m³, 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 SO₂ emissions from “fuel burning units,” limiting in-stack SO₂ concentrations of “manufacturing processes,” and limiting hydrogen sulfide (H₂S) 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 H₂S.

However, the Melting Furnace stack, after control by the sorbent injection system, will be subject to the limitation on in-stack SO₂ 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-SO₂/hr, 21,413.73 acfm, 301.73 °F), the writer calculated a maximum in-stack SO₂ 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

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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}, PM₁₀, filterable particulate matter, SO₂, VOCs, GHGs, and H₂SO₄ (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 Chloride	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 m³ (19,813 gallons). However, storage tanks with a capacity greater than or equal to 151 m³ (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 m³ but less than 151 m³ 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 m³ (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

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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.

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

Subpart III 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 III] are applicable to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines (ICE).” Specifically, §60.4200(a)(2) states that Subpart III 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 III gives the following limits for ROXUL’s proposed fire pump engine:

Table 6: Subpart III 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].

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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;

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- 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_vd 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

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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 III. Compliance with Subpart III 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 DDDDD 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.

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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}, PM₁₀, PM, SO₂, VOCs, H₂SO₄, 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}, PM₁₀, (filterable) PM, SO₂, VOCs, H₂SO₄, 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.

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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
<u>Material Delivery, Handling, Storage, and Transfer Operations</u>			
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)
<u>Melting Furnace</u>			
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 ₂ SO ₄	Sorbent Injection	
	VOCs	Good Combustion Practices ⁽²⁾	
	GHGs	Energy Efficiency ⁽³⁾	

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Emission Unit/Line	Pollutant	Technology	Draft Permit Citation
<u>Gutter Exhaust, Spinning Chamber, Curing Oven Hoods, Curing Oven, and Cooling Section</u>			
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	
<u>Fleece Application</u>			
Fleece Application	VOCs	Low-VOC Coatings, Good Work Practices	4.1.6(a) and (b)
<u>Rockfon Line Operations</u>			
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.

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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}, PM₁₀, and SO₂. 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).

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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 NO₂, PM_{2.5}, PM₁₀, and SO₂.

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 NO₂, PM₁₀, PM_{2.5}, and SO₂ 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 NO₂, and is therefore assumed that the project also had maximum potential NO₂ 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 (PM₁₀, PM_{2.5}, and SO₂), 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 NO₂, PM_{2.5} and PM₁₀ 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 NO₂ and SO₂ 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 NO₂, PM₁₀, PM_{2.5}, and SO₂ 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 (PM₁₀ and PM_{2.5}), and Sulfur Dioxide (SO₂). 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 (H₂SO₄)

The compound of H₂SO₄ is regulated under 45CSR14 with a significance level that can trigger BACT for each source that contributes H₂SO₄ emissions. As discussed above, the potential H₂SO₄ emissions from the facility triggered a BACT analysis for the compound. H₂SO₄ is not represented in the IRIS database and is not listed as a HAP. Concerning the carcinogenicity 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 SO₂) 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

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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 ₂ e.	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 ₂ e.	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

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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 ₂ e	
		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 ₂ e	
		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 H



NON-CONFIDENTIAL



November 20, 2017

Direction William F. Durham
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, West Virginia, 25304

**RE: New Source Review
Prevention of Significant Determination (PSD) Application for Permit to Construct
Mineral Wool Production Facility – Ranson, West Virginia**

Dear Director Durham:

Roxul USA, Inc. (Roxul) submits this PSD permit application to the West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality (WVDAQ) to receive the authority to construct a new mineral wool production facility in Jefferson County, West Virginia.

If you have any questions concerning this permit application, please contact Mr. Grant Morgan of Environmental Resources Management Inc. (ERM) at (304) 757-4777 or by email at grant.morgan@erm.com.

Sincerely,

Ken Cammarato
VP, General Legal Counsel
Roxul USA Inc.

ID # 037-00108
Reg R14-0037
COMPANY Roxul
Facility RAN *JMG*

Enclosures

NON-CONFIDENTIAL

November 20, 2017

Mr. William F. Durham, Director
West Virginia Division of Air Quality
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Charleston, West Virginia 25304-2943

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Document Name: **Roxul PSD New Source Review Permit Application**

Reason for Submittal: **PSD Permit Application containing Confidential Business Information**

Dear Director Durham:

The attached document contains confidential information concerning Roxul USA Inc.'s proposed Ranson, West Virginia manufacturing facility, the disclosure of which would likely cause substantial harm to Roxul's competitive business position. The following lists the pages containing confidential information and a summary explanation and justification as to why disclosure would likely cause substantial harm to Roxul's competitive business position. In accordance with 45 CSR 31-1 et.seq., the confidential pages are included in the confidential document on colored paper, dated, and marked with the words "Claimed Confidential". Redacted copies of pages with confidential information are included within the Redacted documents.

- Process Description** – The disclosure of information claimed confidential within the process description would give competitors key insight into trade secrets related to the manufacture of mineral wool insulation. Pages: Pages 10, 12-16, 18, 20-22, 25
- Process Diagram** - The disclosure of information claimed confidential within the process diagram would give competitors key insight into trade secrets related to

the manufacture of mineral wool insulation.

- Raw Materials Safety Data Sheets** – The disclosure of raw materials, including material characteristics, used in the manufacture process would allow competitors to determine the product formula without conducting the industry-specific research, thus providing them an undue economic advantage. Disclosure of material vendors would also provide key insight into trade secrets related to Roxul's supply chain, providing competitors undue economic advantage. Pages: Given the amount of SDS's, Roxul has submitted a separate CD-ROM as a part of Appendix B, Attachment H. All content is claimed CBI.

- Process Weight Rate** - The disclosure of the process weight rate used in the manufacture process would allow competitors an ability to discern critical trade secrets related to the manufacture of mineral wool insulation without conducting industry-specific research, thus providing them an undue economic advantage. Pages: Page 43 – 46, 83 – 87, 496-497

- Detailed Equipment Sizing** – The disclosure of detailed equipment sizing information would allow competitors an ability to discern critical trade secrets related to the manufacture of mineral wool insulation without conducting industry-specific research, thus providing them an undue economic advantage. Pages: 83 - 87

- Process Parameters** - The disclosure of information claimed confidential related to process parameters would give competitors key insight into trade secrets related to the manufacture of mineral wool insulation. Pages: 83 – 87, 269-287, 290, 293, 296-297, 299, 302, 305, 308, 311

The above-noted sections of the referenced document, especially when considered in total and in context, are claimed confidential by Roxul and should not be disclosed to the public. The claim of confidentiality is based on the criteria found in 45 CSR 31 Section 4.1.

Roxul claims business confidentiality protection for the identified parts of this permit application noted above mainly because the information, if released, would allow reasonably competent engineers to determine the manner in which Roxul produces the products of its processes. The raw materials and equipment are available to current and potential competitors; therefore, disclosure of this information would allow these competitors to produce this product without either paying for the technology or conducting the research and development necessary to obtain the technology themselves. This would allow competitors an undue economic advantage since they could potentially produce the product at a lower cost. Some of the information is claimed confidential because if released could provide an unfair advantage to competitors allowing them to prepare marketing strategies based on information not available to companies in the market.

Page 3

Confidentiality is requested permanently until such time a responsible representative of Roxul declassifies the confidential information. Roxul continues to claim business confidentiality protection for this information. The claim has not expired by its term, or been waived or withdrawn. No statute specifically requires the disclosure of this information.

Roxul has taken, and continues to take, all reasonable measures to protect the confidentiality of this information through such measures as vendor licensee nondisclosure agreements, limited distribution lists, shredding of documents marked confidential prior to disposal, and appropriately marking and redacting copies. This information is not reasonably obtainable without Roxul's consent. Within the company, Roxul has distributed this information on a need-to-know basis only. In addition, Roxul expects its employees to prevent inadvertent dissemination of information. Special provisions for shredding business confidential documents have been made to allow for recycling. There are no plans to relax strict maintenance of business confidentiality for this technology.

Information revealing the technology in the referenced document is not reasonably obtainable by persons other than the Roxul employees and/or vendors who need to know and personnel in the West Virginia Division of Air Quality.

Confidential Information Cover Document
Roxul USA Inc.
11/20/2017

Page 4

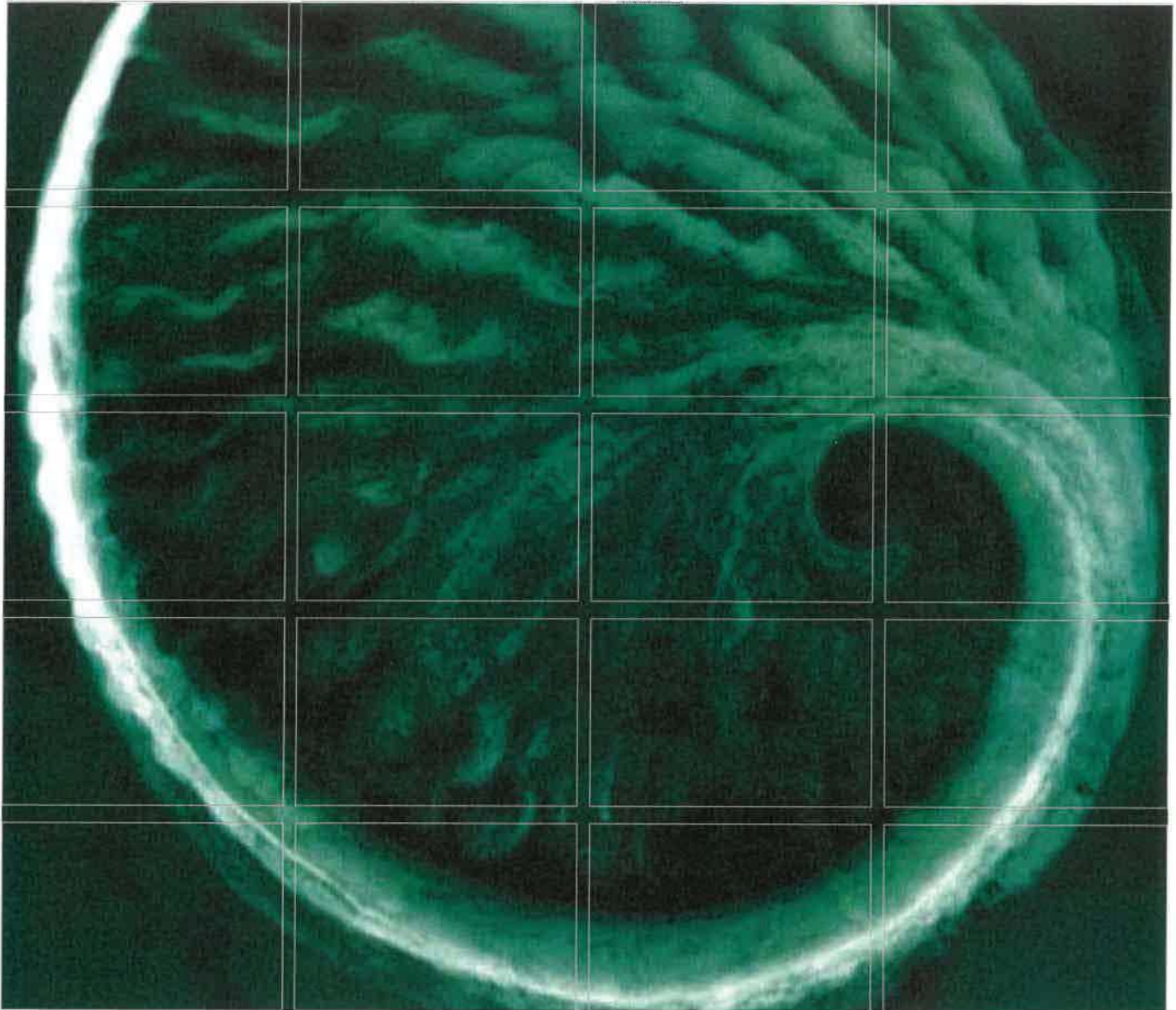
Roxul requests that the West Virginia Division of Air quality notify the company with regard to any third-party request for disclosure of its confidential information prior to any release of such information, so as to enable Roxul to have the opportunity to object to such release and/or defend its claim of confidentiality.

If you have any questions, please contact Grant Morgan, with Environmental Resources Management, Inc., at 304-757-4777 x 109.

Sincerely,



Ken Cammarato
Vice President and General Legal Counsel
Roxul USA, Inc.



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

**Roxul USA, Inc.
Jefferson County, West Virginia**

November 2017

www.erm.com

Roxul USA, Inc.

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

November 2017

Project No. 0408003
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1.0 INTRODUCTION

1.1 BACKGROUND

ROXUL USA Inc. dba Rockwool, (Roxul) submits this New Source Review (NSR) Prevention of Significant Deterioration (PSD) construction air permit application to the West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality (WVDAQ) to authorize the construction of a mineral wool insulation manufacturing facility in Jefferson County, West Virginia. The proposed facility will consist of a 460,000-square-foot manufacturing facility on an estimated 130 acres site in the city of Ranson in Jefferson County, West Virginia. The plant will produce mineral wool insulation for building insulation, customized solutions for industrial applications, acoustic ceilings and other applications.

1.2 APPLICATION OVERVIEW

The proposed project will require the construction of a new facility subject to the requirements of West Virginia 45 CSR 14 - *"Permits for Construction and Major Modification of Major Stationary Sources for the Prevention of Significant Deterioration of Air Quality"*. This permit application narrative is provided to add clarification and/or further detail to the permit application forms being provided to the WVDAQ for this project.

Concurrent with the submittal of this air quality application, other required environmental permits and approvals are being pursued with the appropriate regulatory agencies.

This section (Section 1) contains introductory information. Section 2 presents an overview of the proposed process and equipment. A Prevention of Significant Deterioration review is provided as Section 3. Section 4 provides a review of federal regulatory requirements. A review of state regulatory requirements is provided as Section 5.

Four (4) Appendices are included with this submittal. Appendix A contains the emission calculations for the proposed facility. Appendix B includes the WVDAQ emission forms. The air modeling protocols and modeling results are included as Appendix C of this submittal. Appendix D contains that Best Available Control Technology (BACT) review.

2.0 *PROCESS OVERVIEW*

Roxul is proposing to construct a manufacturing facility that will produce mineral wool insulation, and associated products, e.g., ceiling tile products.

For this application, the facility has been divided into the following process sources:

- Source L1 - Mineral Wool Line (including Recycle Plant),
- Source RFN1 - Rockfon Line, and
- Source COAL1 - Coal Milling.

Other facility wide operations include:

- Oxygen production,
- Natural gas heating,
- Emergency fire pump engine, and
- Storage tanks.

A description of the manufacturing process and associated emission points is provided in the sections below. In addition, more detailed process flow diagrams illustrating each source and operation are included in Appendix A.

2.1 *MINERAL WOOL LINE*

The Mineral Wool Line will produce mineral wool insulation for residential, commercial, and industrial uses and mineral wool for off-line production e.g. ceiling tiles (Rockfon). 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” is a natural product made partly from volcanic 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:

- 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 aludross¹.

¹ By-product of the smelting process in the creation of aluminum from bauxite.

The mineral wool fibers are made from melted stone raw materials at very high temperatures (>2,700°F /1480°C), binder, and de-dusting oil. The various raw materials used in the melting furnace are mixed in the correct ratio to achieve the required chemistry of the fibers.

The mineral wool manufacturing process consists of material handling/charging, melting, spinning, curing, cooling, cutting, and packing.

Raw materials will be delivered to the site via truck, and products will leave the site via truck.

2.1.1 *Raw Material Handling*

2.1.1.1 *Melt Raw Material Handling*

Melting raw materials will be delivered in bulk by truck and unloaded and transferred with a front-end loader into the enclosures (B210). The storage building is divided in to three-sided concrete enclosures covered under a roof. The middle of the building where the trucks unload is uncovered.

Raw materials may also be delivered to an outdoor stockpile with three-sided enclosures (RMS) and moved from here with a front end loader.

From each enclosure or from the stockpile 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 to the charging building (B220), where all subsequent melting raw material handling activities occur. A fraction of oversized material is directed to an indoor sieve and crusher, if required. Materials are then distributed to individual raw material bins. From here, they are dosed onto a belt scale conveyor to create a batch of charge material. The batch is conveyed into a bucket or similar vertical conveyor 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 indoors during mixing.

Belt conveyors transport the mixed charge to day bins in the furnace building (B300). Transition points on conveyors are equipped with local de-dusting units that vent indoor or outdoor depending on the location. Transition point vents located outdoor are shown on the emission layout (IMF11, IMF12, IMF14, IMF15, IMF16).

The charging building is equipped with 2 roof vents (IMF17, IMF18).

In the event that raw materials entering the charging building are found to be outside of specifications it is possible to collect these materials in two locations, either after the sieve or after the raw material bins. The material is directed into collection bins by conveyor, which is equipped with curtains for enclosure (S_REJ, RM_REJ).

Emissions from material handling consist of filterable PM/PM₁₀/PM_{2.5}.

Emission points from material handling include:

- Charging Building Material Handling Building Vents (IMF17, IMF18), and
- Five (5) Conveyor Transition Points,
 - Conveyor Transition Point (B215 to B220) (IMF11),
 - Conveyor Transition Point (B210 to B220) (IMF12),
 - Conveyor Transition Point (B220 No. 1) (IMF14),
 - Conveyor Transition Point (B220 No. 2) (IMF15), and
 - Conveyor Transition Point (B220 to B300) (IMF16).

Fugitive emissions from material handling consist of:

- Raw Material Storage (B210),
- Raw Material Outdoor Stockpile (RMS),
- Raw Material Loading Hopper (B215),
- Raw Material Reject Collection Bin (RM_REJ),
- Sieve Reject Collection Bin (S_REJ), and
- Paved Haul Roads.

2.1.1.2 *Energy Material Handling*

Coal burners and natural gas burners will provide energy to the Melting Furnace. Petroleum coke (pet coke) may also be used in place of coal. Natural gas is delivered to the site by pipeline.

Oxygen is delivered to the site by truck or produced onsite from the ambient air.

Coal in milled form 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 3 outdoor storage silos (B238) equipped with bin vent filters (IMF03).

The coal is transferred from the storage silos (B238) to furnace building (B300) where an indoor feed tank equipped with a vent to a particulate filter exhausting to the atmosphere (IMF25).

For substitution of coal or pet coke, secondary combustible materials may 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 (IMF07) in the furnace building.

Emissions from energy material handling consist of filterable PM/PM₁₀/PM_{2.5}.

Emission points are:

- Three (3) Coal Storage Silos (IMF03), and
- One (1) Coal Feed Tank (IMF25).

2.1.1.3

Coal Milling

Coal or pet coke for on-site milling will be delivered in lump size by truck and unloaded at the coal bunker enclosed at 3 sides and roofed (B230). From the coal bunker the coal is loaded by a front-end loader into the loading hopper (B231) enclosed on 3 sides and roofed. The coal loading hopper (B231) feeds material onto a series of enclosed conveyors that direct the material to a day bin inside the coal milling building (B235). The milling will be done by a combined vertical coal mill and fluidized bed dryer equipped with a natural gas-fired direct heating unit rated at 6.00 Million British Thermal Units (MMBtu/hr) (1,760 kilowatts (kW)) and a separator equipped with a dust filter. Heater and dust filter exhausts through a stack (IMF05).

After milling coal is pneumatically transported into the 3 outdoor storage silos (B238), which are the same silos used for delivered coal (IMF03).

A separate de-dusting filter will be installed for the coal milling building (IMF06).

Emissions from coal milling consist of filterable PM/PM₁₀/PM_{2.5}, Condensable Particulate Matter (CPM), nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), volatile organic compounds (VOC), and greenhouse gases (GHG) including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) from natural gas combustion. Filterable PM/PM₁₀/PM_{2.5} results from physical milling (sizing) of coal in the mill. CPM² and VOC may also be emitted from the milling process as the coal mill operates at 180 °F (82 °C).

Emission points from the Coal Milling operation consist of:

- Coal Conveyor Transition Point (B231 to B235) (IMF13),
- Coal Mill Burner & Baghouse (IMF05),
- Coal Milling De-dusting Baghouse (IMF06), and
- Coal Conveyor Transition Point (B231 to B235) (IMF04).

Fugitive emissions from the Coal Milling operation consist of:

² Emission due to water vapor as the water content in coal is approximately 15%.

- Coal Unloading (B230),
- Coal Loading Hopper (B231), and
- Coal Milling Building (B235).

2.1.2 *Melting Furnace Portable Crusher*

Any diverted melt or melt from tapping of the Melting Furnace will be crushed in the portable crusher and reused in the melting process. Diverted melt consists of large pieces of solid material.

The portable crusher operation will take place in the dedicated area (B170). The crusher will be brought onsite periodically during the year and will not operate continuously. Roxul is proposing to limit operation of the crusher to 12 hours per day up to 45 days or 540 hours per year. Crushed material will be stored in three-sided concrete enclosures.

The crushing operation and storage of the crushed material is source of fugitive dust (filterable PM/PM₁₀/PM_{2.5}).

2.1.3 *Melting*

During start-up, a natural gas-fired preheater burner 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 (IMF24). The indirect heat transfer will be done by a thermal oil system including an expansion tank which is used both for pre-heating transfer of energy and also to extract surplus heat for heat recovery. The natural gas preheat burner is rated at 5.1 MMBtu/hr (1,490 kW) heat input. The pre-heat burner will operate for approximately 2 hours (120 minutes) prior to the Melting Furnace startup³.

During melting furnace operation, temperatures in the melter reach approximately 3,000 °F (1,650 °C) and the resultant melt flows out of the furnace to the spinner. Gutter channels are used to direct melt from the furnace onto the

³ The last 15 minutes of this sequence will be with both pre-heat burner and coal burners in operation. Although the pre-heat burner will only operate for a limited duration, it will be permitted to operate 8,760 hours per year.

spinners. An exhaust is located above the gutters to remove heat from the area to lower the temperature in the working environment, which will be directed to the Wet Electrostatic Precipitator (WESP) (HE01).

Once the system is operating at a steady state, waste wool and filter fines from the process are recycled into the melter 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.

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.

Aqueous ammonia will be injected for the de- NO_x reaction to reduce NO_x emission.

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). Therefore, it can be said that the Melting Furnace has "integrated" Selective Non-Catalytic Reduction (SNCR) technology. 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 melter 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 in series is used for control of emissions of filterable PM/PM₁₀/PM_{2.5}, and is equipped with sorbent injection to control sulfur dioxide (SO₂), sulfuric acid (H₂SO₄) 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 (IMF07, IMF10) prior to reuse in the melter. The silos vent to a bin vent filter exhausting to the atmosphere.

Emissions from the Melting Furnace stack (IMF01) consist of filterable PM/PM₁₀/PM_{2.5}, CPM, NO_x, CO, SO₂, VOC, H₂SO₄ mist, HCl, HF, metal HAP, CO₂, CH₄, N₂O, and small amounts of organic HAP such as carbonyl sulfide (COS) and formaldehyde (HCHO).

As stated, de-sulfurization is applied for the control of sulfur oxides and acid gases. Sorbent material (e.g., hydrated lime as calcium hydroxide or similar) is delivered to the site by truck and loaded into an outdoor storage silo equipped with a bin vent filter. Sorbent is transported in a closed system and injected into the flue gas prior to the second baghouse as a filter media.

Spent sorbent is stored in a silo (IMF09) equipped with a bin vent filter until it is emptied into a vacuum truck for off-site disposal.

The Sorbent Silo emits filterable PM/PM₁₀/PM_{2.5} (IMF08) during unloading of new sorbent. The spent sorbent silo emits PM/PM₁₀/PM_{2.5} (IMF09) (with sulfur and acid gasses bound in the material) during the loading of spent sorbent.

2.1.4

Cooling Towers

The Melting Furnace is cooled with a water jacket. The Melting Furnace Cooling Tower will be used to reject heat from the furnace. The gutters, which are channels that direct melt to the spinning process, will be water cooled via a recirculating cooling tower.

Heat will be recovered from the cooling water systems and used for building and process heat. Surplus heat will be rejected from the cooling water systems.

The Cooling Towers will be sources of filterable PM/PM₁₀/PM_{2.5}.

Emission points associated with the melting process consists of:

- Preheat Burner (IMF24),
- One (1) Thermal Oil Horizontal Tank (2,642 gal - 10 m³),
- One (1) Thermal Oil Horizontal Expansion Tank (1,321 gal - 5 m³),
- Melting Furnace (IMF01),
- Melting Furnace Cooling Tower (IMF02),
- Gutter Exhaust to WESP (part of HE01),
- Gutter Cooling Tower (HE02),
- One (1) Filter Fines Receiving Silo (IMF10),

- Two (2) Storage Silos [Filter Fines Day Silo/Secondary Energy Materials] (IMF07),
- One (1) Sorbent Silo (IMF08), and
- One (1) Spent Sorbent Silo (IMF09).

2.1.5

Spinning

The melt flows out of the lower part of the furnace and is led to the spinning machine via the gutter channels. The spinners are 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 binder and cooling water is added to the flow of fibers. Also, the material is sprayed with de-dusting oil to give water-repellent properties and reduce dust emission in the factory and 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 primary wool web, and air is sucked through the perforation by means of under pressure in the chamber in a vertical direction.

Emissions from the Spinning Chamber consist primarily of filterable PM/PM10/PM2.5, CPM, VOC, and organic HAP (formaldehyde, methanol, phenol).

Exhaust from the Spinning Chamber will be conditioned (e.g. with quenching or water spraying) prior to the WESP (HE01).

2.1.6

Binder

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 storage tanks or delivered in drums/totes.

The binder storage consists of a series of tanks in a tank farm which is covered with a sheet roof but has no facades. A secondary containment is included in the structure.

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 . Binder mixed in the

Binder Mix Tank is pumped to the Circulating Tank and from here to the Binder Day Tank in the Furnace Building.

A separate storage is made for the de-dusting oil due to fire requirements. De-dusting oil is delivered in bulk by truck or in drums or intermediate bulk container (IBC) and unloaded into the storage tank (B252). From the storage tank the oil is pumped into a day tank in the furnace building (B300) and from there dosed into the spinning & wool collection process.

The standard binder is a urea-modified phenolic resin which is cured during the mineral wool process. Roxul will use varying binder formulations as technology advances to produce formaldehyde-free resins. This application is designed to address the use of varying resin materials.

Emissions from unloading, storage, and mixing of binder consist of VOC and organic HAP (formaldehyde, phenol, methanol).

Storage tanks include:

- One (1) Coupling Agent Vertical Storage Tank (264 gal - 1 m³);
- Ten (10) Coupling Agent Storage Containers (ea. 264 gal - 1 m³);
- Fifty (50) Coupling Agent Storage Drums (ea. 53 gal - 0.2 m³);
- One (1) Additive Vertical Storage Tank (53 gal - 0.2 m³);

- Seven (7) Resin Vertical Storage Tanks (ea. 15,850 gal - 60 m³);

- One (1) De-dust Oil Vertical Storage Tank (15,850 gal - 60 m³);
- Thirty (30) De-dust Oil Storage Containers (ea. 264 gal - 1 m³);
- Forty (40) Silicone Oil/Resin Storage Containers (ea. 264 gal - 1 m³);

- One (1) Vertical Binder Mix Tank (2,642 gal - 10 m³);

- One (1) Vertical Binder Circulating Tank (4,227 gal - 16 m³);
- One (1) Binder Vertical Day Tank (793 gal - 3 m³);
- Three (3) Binder Storage Containers (ea. 264 gal - 1 m³); and
- One (1) De-dust Oil Vertical Day Tank (264 gal - 1 m³).

2.1.7

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. The filter net may also be cleaned using with water. Dry ice pellets will be used for cleaning via blasting onto the perforated filter net. A pressurized storage tank will feed liquid CO₂ to a pelletizer unit which will form dry ice pellets (solid CO₂). The system continuously produces dry ice pellets which are fed to a blasting gun that directs the pellets to the perforated filter net.

Emissions from the production of dry ice pellets and the cleaning activities consist of fugitive CO₂.

2.1.8

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 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. The uncured mineral wool with fleece applied to the top and underside will enter the Curing Oven, 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 IBC containers (approximately 264 gal or 1 m³). 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. 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. The binder's content of organic HAPs will be below requirements for additional

control per the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Paper or Other Web Coating (NESHAP Subpart JJJJ).

2.1.9

Curing and Cooling

The wool web is conveyed to the pendulum (B400) which 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 is uncured wool (wet wool) is sent to the Recycle Plant via conveyors.

The density of the secondary wool lane is measured by means of isotope or x-ray device.

The wool lane is conveyed into the Curing Oven, 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 natural-gas fired afterburner controls CO, VOC, and organic HAP emissions, where after the gases are directed to the WESP (HE01).

Emissions from the Curing Oven consist of filterable PM/PM₁₀/ PM_{2.5}, CPM, NO_x, CO, SO₂, VOC, organic HAP (formaldehyde, methanol, phenol), CO₂, CH₄, and N₂O.

The curing oven is equipped with hoods at the inlet and outlet end to control the working environment in the event that hot air escapes the curing oven due to system pressure changes. The inlet and outlet hoods vent to the WESP (HE01).

After leaving the Curing Oven, the wool web is conveyed through a Cooling Section 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 filterable PM/PM₁₀/ PM_{2.5}, CPM, VOC, organic HAP (formaldehyde, methanol, phenol) and small amounts of NO_x and CO.

In summary, the following sources will be directed to the WESP as a combined emission point HE01:

- Gutter Exhaust,
- Spinning Chamber,
- Curing Oven Hoods,
- Curing Oven (following afterburner control), and
- Cooling Section.

2.1.10 *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:

- a. Branding wheels fired by natural gas combustion (combined maximum burner capacity⁴ is 0.4 MMBtu/hr or 120 kW);
- b. Laser marking; or
- c. Inkjet labeling.

Emissions from the Branding Wheels (option a) vent in the production building and consist of products of natural gas combustion.

Emission from inkjet labeling consists of VOC emissions from evaporation of organics in the ink and cleaner applied. The ink and cleaner are HAP-free. Emissions occur indoor and are fugitive.

Dust from the mechanical saws is removed pneumatically and directed to a baghouse filter (CE01). The collected dust/filter material is transported via closed conveyors to the Recycle Plant.

Water/fiber generated by water jet cutting is collected in the process water system and reused in the process.

Emissions from the De-dusting Baghouse (CE01) stack consist of filterable PM/PM₁₀/ PM_{2.5}.

2.1.11 *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.

⁴ Up to 8 branding wheels each 11 kWh equal to 88 kWh (0.3 MMBtu/hr); rounded to 0.4 MMBtu/hr

Dust from the packaging area is collected by vacuum and directed to the Vacuum Cleaning Baghouse (CE02).

Emissions from the Vacuum Cleaning Baghouse consist of filterable PM/PM₁₀/PM_{2.5}.

2.1.12

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 but not limited to 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 front end loaders (FEL) and conveyors, milling, and batching.

The cured wool waste is chopped up in pieces by knives in the line granulator, which is placed in the cold end building (B500) or in the edge-trim system with a cutting screw, which is placed in the curing oven building (B400).

The wool pieces are conveyed by covered belt conveyors to a closed recycling silo (B405). From the silo the wool pieces are sent via the dosing system and milled to the required size

The recycling silo and part of the closed conveyor in this system is placed outside the building.

A FEL will be used to transfer wool waste from indoor collection areas inside the recycling building (B240) and into a loading hopper. Mineral wool products returned from Roxul customers will be received in big bags (or similar) and fed to the loading hopper via FEL. The loading hopper feeds wool into the mill via a

screw conveyor or similar. Wool waste may also be recycled directly to the mill by means of belt and screw conveyor system. Waste wool is ground in the mill and exits via multiple conveyors to storage silos for milled wool waste. The hopper loading is connected to the de-dusting filter system (CE01). The silo area has one exhaust (CM08), and the area with the mill has one exhaust (CM09).

All of the re-melting recycling plant transfer and milling operations are conducted indoors. The building is kept closed with a fast roller gate controlled by the movement of the FEL. The building is equipped with roof ventilation equipped with particulate filters to control the working environment for industrial hygiene purposes (ammonia odor and mobile FEL exhaust gases).

The recycling plant will consist of the following emission points:

- De-dusting vents to De-dusting Baghouse (CE01), and
- Four (4) Recycle Building Vents (CM08, CM09, CM10, CM11).

2.2

ROCKFON LINE

The Rockfon Line will produce ceiling tiles using the mineral wool slabs produced on the Mineral Wool Line. The process will include cutting, sanding, glue application, feeding tissue, hot pressing, curing, paint application, drying, and packaging.

2.2.1

Rockfon Production

The Rockfon Line will produce ceiling tiles using the mineral wool slabs produced on the Mineral Wool Line. The mineral wool slabs will be split by a saw and go through a sanding machine to ensure proper dimension. The mineral wool slabs will be directed through a glue cabinet for application of an adhesive. A fleece layer is then applied over the adhesive at an unreeling station. The slabs are then hot pressed passes through an edge trimmer, dividing saw, and a fleece cutter prior to packaging and delivery to the customer.

Emissions from the IR Zone stack (RFNE1) and Hot Press stack (RFNE2) consists of filterable PM/PM₁₀/PM_{2.5}, CPM, VOC and organic HAP (formaldehyde and phenol).

Exhaust gases from cutting and sanding operations will be directed to the De-dusting Baghouse (RFNE8) for control of filterable PM/PM₁₀/PM_{2.5} emissions.

The milling and edge sanding exhaust will be directed to the De-dusting Baghouse (RFNE8) for control of filterable PM/PM₁₀/PM_{2.5} emissions. Material collected in RFNE8 will be conveyed in an enclosed container to the Recycle Plant for reuse in the process.

All paints used in the Rockfon Line will be water-based. Specifications are a maximum of 0.67 lb VOC/gal (80 g VOC/L) for any individual paint and 53 g VOC/kg glue.

Heat is supplied to the High Ovens, Drying Oven 1, and Drying Oven 2 & 3 by natural gas-fired burners through direct heating.

After cooling, the board tiles are then stacked, wrapped, and palletized for shipment.

Emissions from Drying Oven 1 (RFNE4), High Oven A (RFNE3), High Oven B (RFNE9), and Drying Oven 2 & 3 (RFNE6) will consist of filterable PM/PM₁₀/PM_{2.5}, CPM, NO_x, CO, SO₂, VOC, organic HAP (formaldehyde, phenol), CO₂, CH₄, and N₂O.

The Spray Paint Cabin, Drying Oven 1, and Drying Oven 2 & 3 exhaust will be directed through a particulate filter for control of filterable PM/PM₁₀/PM_{2.5} emissions.

Emissions from the Cooling Zone (RFNE7) will consist of filterable PM/PM₁₀/PM_{2.5}, CPM, VOC and organic HAP (formaldehyde and phenol).

The Rockfon Line process consists of the following emission points:

- IR Zone (RFNE1);
- Hot Press and Cure (RFNE2);
- De-dusting Baghouse (RFNE8);
- Drying Oven 1 (RFNE4);
- High Oven A (RFNE3);
- High Oven B (RFNE9);
- Spray Paint Cabin (RFNE5);
- Drying Oven 2 and 3 (RFNE6); and
- Cooling Zone (RFNE7).

2.2.2

Rockfon Storage Tanks

The electrically heated thermal oil system will be connected to an expansion tank (to compensate for the changing volume of thermal oil in the system) and drain tank (to facilitate system oil changes). Emissions from storage of thermal oil consist of VOC.

- One (1) Thermal Oil Horizontal Expansion Tank (212 gal - 0.8 m³), and
- One (1) Thermal Oil Horizontal Drain Tank (159 gal - 0.6 m³).

Water-based paint used in the Rockfon process may be diluted with water prior to application to Rockfon ceiling tiles. The paint will be mixed in an enclosed dilution tank and staged in the day tank prior to use:

- One (1) Paint Dilution Storage Tank (793 gal - 3 m³), and
- One (1) Paint Dilution Day Tank (397 gal - 1.5 m³).

Wash water generated from periodic cleaning of the Rockfon paint stations will be collected for onsite treatment via separation methods. Roxul will use dewatering flocculants and a filter press to separate paint solids from the water used for cleaning. The paint solids will be appropriately managed as waste and the treated water will be shipped offsite (under the appropriate waste category) or discharged (if desired and adequate permits are obtained).

A crusher will be operated inside the Rockfon production building which will accept material reject from the Rockfon Line. The crusher exhaust will be directed to the De-dusting Baghouse (RFNE8) for control of filterable PM/PM₁₀/PM_{2.5} emissions. Crushed material will be conveyed in an enclosed container to the Recycle Plant for reuse in the process.

The De-dusting Baghouse will be designed with an alternative venting option, so that filtered exhaust air can be directed through a High-efficiency Particulate Air (HEPA) filter and used as warm air in the Rockfon production building. Product quality and worker health necessitates the use of a HEPA filter for this exhaust. Any filterable PM/PM₁₀/PM_{2.5} emissions that may be emitted from the enclosed Rockfon production building would be emitted as a fugitive source; however these emissions would be a fraction of those emitted from the De-dusting Baghouse stack, due to the HEPA filter and "building" control. Dispersion modeling is conducted with the De-dusting Baghouse venting, since this is the worst case emissions scenario.

2.3 *OTHER FACILITY-WIDE OPERATIONS AND ACTIVITIES*

2.3.1 *Building Heating with Natural Gas Boilers*

Building heat will be supplied with a natural gas fired boilers.

Two natural gas-fired boilers will be installed to provide a source of building heat when the furnace is not in operation (CM03, CM04).

The Rockfon building will have a natural gas-fired boiler for building heating (RFN10).

Each of the three boilers will have a maximum rated heat input capacity of 5.0 MMBtu/hr (1,500 kW) and will be equipped with low-NO_x burners meeting 30 ppmvd @ 3% oxygen.

Although the boilers may only operate for a limited duration, they will be permitted to operate for 8,760 hours per year.

Emissions consist of the products of natural gas combustion.

2.3.2 *Process Water System*

The process water system consists of a series of tanks and a filter for recirculation of process water. The collected water is filtered on a band filter and stored in buffer tanks.

The filtered process water is used for dilution of binder and for flushing of processes (e.g. to transport fibers back in the system). Process water is also used for operation of the WESP. Process water is collected storm water from outside

areas to compensate for water loss due to evaporation. Additional water is supplied from the public water supply.

2.3.3 *Emergency Fire Pump Engines*

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 fire pump will be rated at 197 horsepower (hp) (147 kW). The engine will be certified to NSPS Subpart IIII engine standards and will operate only during emergencies or other limited scenarios as allowed by federal rules (i.e., maintenance checks, readiness testing, etc.). Emissions from the diesel fire pump engine will include the products of diesel combustion.

2.3.4 *Oxygen Plant*

Oxygen will be dosed to the Melting Furnaces to ensure oxygen enrichment. Initially, oxygen will be delivered to the site and stored in pressurized storage vessels; later an onsite oxygen plant is to be constructed. Oxygen is produced from ambient air.

The oxygen plant will emit primarily nitrogen and argon and is not a source of criteria pollutants, HAP, or GHG emissions.

2.3.5 *Compressed Air*

A number of air electric compressors will be installed to operate the machinery.

2.3.6 *Miscellaneous Storage Tanks*

Additional storage tanks that will be utilized for utility purposes include the following:

- One (1) Used Oil Horizontal Storage Tank (581 gal - 2.2 m³) for storage of used motor and gear oil;
- One (1) Diesel Fuel Horizontal Storage Tank (2,642 gal - 10 m³) for use in mobile equipment (e.g., front-end loaders); and
- Pressurized liquefied propane gas (LPG) storage tanks with filling station for forklift operation in warehouse area.

Emissions from unloading and storage of used oil and diesel fuel consists of VOC.

3.0

PREVENTION OF SIGNIFICANT DETERIORATION

West Virginia regulations in WV 45 CSR 14 establishes and adopts a preconstruction permit program in accordance with the policy of §101(b)(1) of the Clean Air Act (CAA), the purposes of §160 of the CAA, and the prevention of significant deterioration (PSD) of air quality requirements of 40 CFR §51.166. The PSD program applies to a new major stationary source or major modification that is located in an area formally designated as attainment or unclassifiable for any pollutant for which a National Ambient Air Quality Standard (NAAQS) exists (criteria pollutants). Jefferson County, West Virginia is designated as attainment or unclassifiable for all criteria pollutants. As shown in Table 3-1, the proposed facility will be a new PSD major source due to potential emissions of VOC in excess of 250 tons per year. Further, emissions of NO_x, CO, SO₂, PM, PM₁₀, PM_{2.5}, H₂SO₄ Mist, and CO_{2e} are also subject to PSD review due to potential emissions greater than the PSD significant emission rate (SER) for each pollutant.

Table 3-1: Summary of PSD Applicability for Regulated NSR Pollutants

Regulated NSR Pollutant	Project Potential Emissions (ton/year)	PSD SER (ton/year)	PSD Review Req'd?
NO _x	238.96	40	Yes
CO	71.40	100	Yes
VOC	471.41	40	Yes
SO ₂	147.45	40	Yes
PM ⁽¹⁾	129.23	25	Yes
PM ₁₀	153.19	15	Yes
PM _{2.5}	133.41	Primary PM _{2.5} : 10 NO _x : 40 SO ₂ : 40	Yes
O ₃	NO _x : 238.96 VOC: 471.41	NO _x : 40 VOC: 40	Yes
Lead	0.0002	0.6	No
H ₂ SO ₄ Mist	16.37	7	Yes
Fluorides ⁽²⁾	0.03	3	No
H ₂ S	-	10	No
Reduced Sulfur Compounds ⁽²⁾	-	10	No
Total Reduced Sulfur	-	10	No
CO _{2e}	152,934.82	75,000	Yes

Notes:

- As clarified in EPA's October 12, 2012 rulemaking (Implementation of the NSR Program for Particulate Matter Less Than 2.5 Micrometers (PM_{2.5}): Amendment to the Definition of "Regulated NSR Pollutant" Concerning Condensable Particulate Matter), "particulate matter emissions" are distinguished as three separate pollutants having separate regulatory classifications and requirements

under regulations for emissions control, permitting, and emissions measurement. The following conventions apply throughout this permit application for consistency with EPA's October 2012 rulemaking:

PM = filterable PM of any size, not including condensable PM

PM₁₀ = filterable PM₁₀ + condensable PM

PM_{2.5} = filterable PM_{2.5} + condensable PM

2. As described in 40 CFR 52.21(b)(50)(v), "*...the term regulated NSR pollutant shall not include any or all hazardous air pollutants either listed in section 112 of the Act, or added to the list pursuant to section 112(b)(2) of the Act, and which have not been delisted pursuant to section 112(b)(3) of the Act, unless the listed hazardous air pollutant is also regulated as a constituent or precursor of a general pollutant listed under section 108 of the Act.*". Section 108 of the CAA addresses the requirement to establish air quality standards for criteria pollutants (i.e., primary and secondary NAAQS). Fluorides and reduced sulfur compounds are not considered criteria pollutants with NAAQS pursuant to Section 108 of the CAA. As such, the regulated NSR pollutant, fluorides, does not include HF because it is a HAP and similarly, the regulated NSR pollutant, reduced sulfur compounds does not include COS because it is a HAP.

4.0 *FEDERAL REGULATORY REQUIREMENTS*

New Source Performance Standards (NSPS) are established for specific industrial categories in 40 CFR Part 60. West Virginia regulations in WV 45 CSR 16 incorporate the federal NSPS by reference. A review of the NSPS categories has been performed for applicability and is presented below.

4.1 *NON-APPLICABLE NSPS STANDARDS*

The NSPS subparts discussed in this section are not applicable, but are addressed for documentation purposes.

4.1.1 *NSPS Subpart Dc - Small Industrial Steam Generating Units*

NSPS Subpart Dc applies to each steam generating unit that is capable of combusting between 10 and 100 MMBtu/hr (2,930 - 29,300 kW) of fuel and for which construction, modification, or reconstruction is commenced after June 9, 1989. Steam generating units are defined as devices that combust any fuel and produce steam, heat water, or heat any transfer medium (40 CFR 60.41c). This term does not include process heaters, which are devices primarily used to heat a material to initiate or promote a chemical reaction.

The Natural Gas-Fired Boilers (CM03, CM04), Rockfon Building Heat (RFN10), and the Pre-heat Burner (IMF24) are not subject to NSPS Subpart Dc because they have a maximum rated heat input capacity of less than 10 MMBtu/hr (2,930 kW).

The remaining facility combustion equipment do not include any steam generating units as defined by NSPS Subpart Dc since the combustion of fuel in those sources provide direct heating to a process (i.e., combustion gases directly contact process materials). As such, the Melting Furnace (IMF01), Curing Oven (part of HE01), Product Marking (P_MARK), Rockfon Line ovens (RFNE3, RFNE4, RFNE6, RFNE9), and Coal Mill Burner (IMF05) do not meet the definition of steam generating units and are not subject to NSPS Subpart Dc.

4.1.2 *NSPS Subpart Kb - Volatile Organic Liquid Storage Vessels*

NSPS Subpart Kb applies to each storage tank containing a volatile organic liquid that is greater than 19,813 gal (75 m³) in capacity and that has been constructed, reconstructed, or modified after July 23, 1984. All tanks that store volatile organic liquids at the Roxul facility will have capacities less than 19,813 gal (75 m³) and are therefore not subject to NSPS Subpart Kb. Roxul maintains records of the design of each tank and will notify the agency of any changes from the original tank design.

4.1.3 *NSPS Subpart Y – Standards Of Performance For Coal Preparation And Processing Plants*

NSPS Subpart Y applies to affected facilities in coal preparation and processing plants that process more than 200 tons (181 Metric Tonnes (MT)) of coal per day [§60.250 (a)]. Coal preparation and processing plant means any facility (excluding underground mining operations) which prepares coal by one or more of the following processes: breaking, crushing, screening, wet or dry cleaning, and thermal drying. The maximum capacity of the proposed coal milling operation is below the applicability threshold of 200 tons (181 MT) per day and therefore is not subject to NSPS Subpart Y.

4.1.4 *NSPS Subpart CC – Glass Manufacturing Plants*

NSPS Subpart CC for glass manufacturing plants applies to each glass melting furnace that commences construction or modification after June 15, 1979. Glass melting furnace means a unit comprising a refractory vessel in which raw materials are charged, melted at high temperature, refined, and conditioned to produce molten glass. Roxul produces mineral wool insulation by melting rock and other minerals. The Roxul melting furnace does not produce molten glass, nor does it refine or condition melt. As such, the Roxul facility is not subject to the requirements of NSPS Subpart CC.

4.1.5 *NSPS Subpart LL – Standards Of Performance For Metallic Mineral Processing Plants*

NSPS Subpart LL applies to affected facilities in metallic mineral processing plants, such as each crusher, screen, bucket elevator, conveyor belt transfer point, etc.⁵ that commences construction or modification after August 24, 1982. A "metallic mineral processing plant" is defined in Subpart LL as "any combination of equipment that produces metallic mineral concentrates from ore...". Roxul is producing mineral wool and not a metallic mineral concentrate; as such, the site does not meet the definition of a metallic mineral processing plant.

4.1.6 *NSPS Subpart PPP – Wool Fiberglass Insulation Manufacturing Plants*

NSPS Subpart PPP applies to each owner or operator of a rotary spin wool fiberglass insulation manufacturing line that commences construction, modification, or reconstruction after February 7, 1984. Wool fiberglass insulation is defined as a thermal insulation material composed of glass fibers. The insulation produced at Roxul is not comprised of glass fibers and as such is not subject to the requirements of NSPS Subpart PPP.

⁵ See §60.380(a) for complete list of affected facilities.

4.1.7 NSPS Subpart VVV - Standards Of Performance For Polymeric Coating Of Supporting Substrates Facilities

NSPS Subpart VVV applies to any affected facility for which construction, modification, or reconstruction begins after April 30, 1987, except for the facilities specified in §60.740(d) of this section. Per §60.740(a), the affected facility is each coating operation and any onsite coating mix preparation equipment used to prepare coatings for the polymeric coating of supporting substrates. Coating operation means, "any coating applicator(s), flashoff area(s), and drying oven(s) located between a substrate unwind station and a rewind station that coats a continuous web to produce a substrate with a polymeric coating. Should the coating process not employ a rewind station, the end of the coating operation is after the last drying oven in the process." Onsite coating mix preparation equipment means, "those pieces of coating mix preparation equipment located at the same plant as the coating operation they serve."

The proposed paper facing operation in the cutting area is not subject to NSPS Subpart VVV as the paper to be used is pre-coated (i.e., Roxul will not conduct any paper coating operations). The following is a review of the relevant definitions with respect to coating operations included in this application (e.g., Fleece Application on the Mineral Wool Line (CM12, CM13), glue application in the IR Zone (RFNE1), and various Rockfon paint applications). Polymeric coating of supporting substrates means, "a web coating process that applies elastomers, polymers, or prepolymers to a supporting web other than paper, plastic film, metallic foil, or metal coil." Web coating means, "the coating of products, such as fabric, paper, plastic film, metallic foil, metal coil, cord, and yarn, that are flexible enough to be unrolled from a large roll; and coated as a continuous substrate by methods including, but not limited to, knife coating, roll coating, dip coating, impregnation, rotogravure, and extrusion." Substrate means, "the surface to which a coating is applied."

- The application of coating (binder) to the fleece material on the Mineral Wool Line would be considered web coating and in turn polymeric coating of supporting substrates, since it constitutes the coating of fabric that is flexible enough to be unrolled from a large roll and coated as a continuous substrate by roll coating with a polymer. The binder applied may be blended onsite prior to delivery to the Fleece Application station and therefore constitutes onsite coating mix preparation equipment.
- The glue applied to the Rockfon ceiling tiles (i.e., individual cured mineral wool slabs) does not meet the definition of web coating since it will not coat a continuous substrate that is flexible enough to be unrolled from a large roll. Further, the glue is not blended in a mixing vessel with solvent or any other materials prior to delivery and does not meet the definition of coating mix preparation equipment.
- The paints that will be applied to the edges and outer surface of the Rockfon ceiling tiles (i.e., individual cured mineral wool slabs) do not meet the definition of web coating since they will not coat a continuous substrate that is flexible enough to be unrolled from a large roll.

The Fleece Application operation meets the NSPS Subpart VVV definition of a coating operation with associated coating mix preparation equipment. However, per §60.740(d)(2), NSPS Subpart VVV does not apply to, “*Coating mix preparation equipment or coating operations during those times they are used to prepare or apply waterborne coatings so long as the VOC content of the coating does not exceed 9 percent by weight of the volatile fraction;*”. The VOC content⁶ of the binder coating is much less than 9 percent by weight of the volatile fraction, and as such NSPS Subpart VVV does not apply to the Fleece Application (CM12, CM13) or binder mixing.

4.1.8 ***NSPS Subpart CCCC – Standards Of Performance For Commercial And Industrial Solid Waste Incineration Units***

NSPS Subpart CCCC establishes new source performance standards for commercial and industrial solid waste incineration (CISWI) units. NSPS Subpart CCCC applies if an incineration unit meets all of the requirements in §60.2010(a)-(c) as follows:

- The incineration unit is a new incineration unit as defined in §60.2015;
- The incineration unit is a CISWI unit as defined in §60.2265; and
- The incineration unit is not exempt under §60.2020.

Commercial and industrial solid waste incineration (CISWI) unit is defined as, “*any distinct operating unit of any commercial or industrial facility that combusts, or has combusted in the preceding 6 months, any solid waste as that term is defined in 40 CFR part 241. If the operating unit burns materials other than traditional fuels as defined in §241.2 that have been discarded, and you do not keep and produce records as required by §60.2175(v), the operating unit is a CISWI unit. While not all CISWI units will include all of the following components, a CISWI unit includes, but is not limited to, the solid waste feed system, grate system, flue gas system, waste heat recovery equipment, if any, and bottom ash system. The CISWI unit does not include air pollution control equipment or the stack. The CISWI unit boundary starts at the solid waste hopper (if applicable) and extends through two areas: The combustion unit flue gas system, which ends immediately after the last combustion chamber or after the waste heat recovery equipment, if any; and the combustion unit bottom ash system, which ends at the truck loading station or similar equipment that transfers the ash to final disposal. The CISWI unit includes all ash handling systems connected to the bottom ash handling system.*”

⁶ VOC in the applied coating means, “the product of Method 24 VOC analyses or formulation data (if those data are demonstrated to be equivalent to Method 24 results) and the total volume of coating fed to the coating applicator.”

Anodes and coke fines meet the definition traditional fuels (i.e., fuels that have been historically managed as valuable fuel products rather than being managed as waste materials or alternative fuels) and as such are not solid wastes.

The proposed Roxul facility will accept mineral wool products returned from Roxul customers, such as but not limited to products damaged in shipping, excess wool products from construction sites, or directly from customers with the purpose of recovering the wool material for new mineral wool products. This mineral wool will be sized in the Recycling Plant prior to re-melting in the Melting Furnace (IMF01).

These mineral wool product returns would not meet the 40 CFR part 241 definition of solid waste since they are used as an *ingredient* in a combustion unit that would meet the legitimacy criteria of 40 CFR §241.3(d)(2) (i.e., management of material as valuable commodity, useful contribution to the manufacturing process, used to produce a valuable product, etc.). Per 40 CFR §241.3(b),

“(b) The following non-hazardous secondary materials are not solid wastes when combusted: ... (b)(3) Non-hazardous secondary materials used as an ingredient in a combustion unit that meet the legitimacy criteria specified in paragraph (d)(2) of this section.”

Therefore, the Melting Furnace is not a CISWI unit defined in §60.2265 because it does not combust solid waste. Roxul will maintain the records required to demonstrate that returned mineral wool is not a solid waste.

Applicable NSPS Standards

4.1.9

NSPS Subpart OOO – Nonmetallic Mineral Processing

NSPS Subpart OOO applies to the following affected facilities in fixed or portable nonmetallic mineral processing plants that commenced construction after August 31, 1983: each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading station. A “nonmetallic mineral processing plant” is defined as any combination of equipment that is used to crush or grind any nonmetallic mineral. The definition of nonmetallic mineral specifically mentions limestone, dolomite, and other minerals which may be contained in stone raw materials that will be sieved, crushed (if necessary), and conveyed in the charging building operations.

Per §60.672(d), truck dumping of nonmetallic minerals into any screening operation, feed hopper, or crusher is exempt from PM standards of NSPS Subpart OOO, which would exclude the Raw Material Loading Hopper (B215). Vacuum systems are not identified as affected facilities in NSPS Subpart OOO; therefore the Charging Building Vacuum Cleaning Filter (IMF21) is not subject to NSPS Subpart OOO. The remaining affected sources subject to PM emissions

limits include the belt conveyors connected to the charging building (IMF11, IMF12); indoor sieve, crusher, storage bins, and belt conveyors located inside the charging building (represented by IMF14, IMF15, IMF17, IMF18); various charging building outdoor collection bins (RM_REJ, S_REJ); and belt conveyors leading from the charging building to the furnace building (IMF16). The Filter Fines Day Silo/Secondary Energy Materials Silo (IMF07) and Filter Fines Receiving Silo (IMF10) are conservatively considered as part of the nonmetallic mineral processing plant because the silos will store stone or mineral raw materials that have been through the charging building operations.

After the final belt conveyor transfer from charging building operations to the furnace building, raw materials are dosed to a continuous weigh bin connected to the Melting Furnace. This bin is part of the mineral wool production operations and is not considered part of the nonmetallic mineral processing plant.

A summary of the applicable emission limits to affected sources subject to NSPS Subpart OOO is shown in Table 4-1 below.

Table 4-1: Summary of Applicable Emission Limits to NSPS Subpart OOO Affected Sources

Source ID	Source Description	Control Device (if present)	NSPS Subpart OOO Limit	
			Limit	Citation
RM_REJ	Raw Material Reject Collection Bin	-	7% opacity	§60.672(b) & Table 3 [fugitive emission limits]
S_REJ	Sieve Reject Collection Bin	-	7% opacity	
IMF07	Two (2) Storage Silos (Filter Fines Day/ Secondary Energy Materials)	Bin Vent Filter	7% opacity	§60.672(a) & Table 2; §60.672(f) [opacity in lieu of concentration limit for dry control devices on individual enclosed storage bins]
IMF10	Filter Fines Receiving Silo	Bin Vent Filter	7% opacity	
IMF11	Conveyor Transition Point (B215 to B220)	Fabric Filter	0.032 g/dscm (0.014 gr/dscf)	§60.672(a) & Table 2 [stack emission limits for affected facilities with capture systems]
IMF12	Conveyor Transition Point (B210 to B220)	Fabric Filter	0.032 g/dscm (0.014 gr/dscf)	
IMF14	Conveyor Transition Point (B220 No. 1)	Fabric Filter	0.032 g/dscm (0.014 gr/dscf)	
IMF15	Conveyor Transition Point (B220 No. 2)	Fabric Filter	0.032 g/dscm (0.014 gr/dscf)	
IMF16	Conveyor Transition Point (B220 to B300)	Fabric Filter	0.032 g/dscm (0.014 gr/dscf)	
IMF17	Charging Material Handling Building Vent 1	-	7% opacity	§60.672(e)(1) [fugitive emissions from building openings]

Source ID	Source Description	Control Device (if	NSPS Subpart OOO Limit	
IMF18	Charging Material Handling Building Vent 2	-	7% opacity	

Roxul will be required to submit applicable notifications and initial testing results for affected sources subject to NSPS Subpart OOO. Monitoring of baghouses required by §60.674(c) consists of quarterly 30-minute visible emissions inspections using EPA Method 22 or the alternative specified in §60.674(d) for operation of a bag leak detection system. Recordkeeping and reporting requirements will be applicable and will be conducted as required.

NSPS Subpart OOO does not apply to the following operations at the proposed facility as described below.

- The Recycling Plant is not part of a nonmetallic mineral processing plant because only formed mineral wool fibers are handled in this area (i.e., no stone or mineral raw materials).
- The capacity of the Melting Furnace Portable Crusher (170) will be equal to or less than the exemption threshold of 136 megagrams per hour (150 short tons per hour) per §60.670(c)(2). The portable crushing operation is separate from the charging building operations that are subject to NSPS Subpart OOO.
- Fresh and spent sorbent used in the desulfurization system at Roxul will be stored in silos and pneumatically conveyed either to or from the control system (e.g., no crushing, grinding, or other processing occurs). Sorbent handling is separate from the charging building operations that are subject to NSPS Subpart OOO. Therefore, the Sorbent Storage Silo (IMF08) and Spent Sorbent Silo (IMF09) are not part of a nonmetallic mineral processing plant and are not subject to NSPS Subpart OOO.

4.1.10 NSPS Subpart IIII - Stationary CI ICE

Federal NSPS regulations for stationary compression ignition (CI) internal combustion engines (ICE) are found at 40 CFR Part 60, Subpart IIII (“NSPS Subpart IIII”) and include emission limits and operating requirements for emergency CI engines that commenced construction after April 1, 2006. The Emergency Fire Pump Engine (EFP1) is subject to this subpart.

Pursuant to 40 CFR §60.4205(c), the Emergency Fire Pump Engine will be certified to meet the emission standards listed in Table 4 of NSPS Subpart IIII for PM, carbon monoxide (CO), and nitrogen oxides plus non-methane hydrocarbons (NO_x + NMHC).

Additional applicable requirements that apply to the Emergency Fire Pump Engine under NSPS Subpart IIII are summarized below:

- Purchase of a certified engine and install/configure the engine to the manufacturer's emission-related written instructions [40 CFR §60.4211(c)];
- 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 [40 CFR §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 operation⁷ [40 CFR §§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 [40 CFR §60.4207(b)]; and
- Recordkeeping of conducted maintenance and operating hours, including reason for operation, and any other applicable notification⁸, reporting, and recordkeeping requirements of 40 CFR §60.4214.

4.2 ***NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)***

NESHAP standards are established for specific pollutants and source categories in 40 CFR Part 61 and Part 63 in accordance with the Clean Air Act Amendments of 1990, which required development standards for sources of HAP. West Virginia regulations in WV 45 CSR 34 incorporate the federal NESHAP by reference. Potential HAP emissions from the Roxul facility are above the major source thresholds of 10 tpy (9.07 MT/year) of an individual HAP or 25 tpy (22.7 MT/year) of total HAP emissions. Thus, Roxul is a major source of HAP and is subject to any applicable MACT standards.

There are no existing or proposed NESHAP standards under 40 CFR Part 61 that are applicable to the Roxul facility.

A review of the NESHAP regulations under 40 CFR Part 63 has been performed for applicability to the Roxul facility and is presented below.

4.2.1 ***NESHAP Subpart DDD - Mineral Wool Production***

The requirements of NESHAP Subpart DDD apply 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

⁷ Hours of operation in emergency situations are not limited.

⁸ An initial notification is not required for emergency stationary ICE as specified in 40 CFR §60.4214(b).

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 MACT⁹. Although the Melting Furnace design can be differentiated from that of a traditional cupola, the Melting Furnace at its basic premise meets the current NESHAP Subpart DDD definition of a cupola (i.e., 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 COS (replacing the CO limit in the original standard) for open-top and closed-top cupolas, HF and HCl limits for cupolas with and without slag, and combined collection (spinning) and curing oven emission limits for formaldehyde, methanol, and phenol. The final revised emission limitations for new affected sources and the subcategories applicable to Roxul are summarized in Table 4-2 below.

Table 4-2: Summary of Final Revised NESHAP Subpart DDD Emission Limitations Applicable to Roxul

NESHAP Affected Operation	Final Revised NESHAP Limitation for New Sources
Cupolas (PM) ⁽¹⁾ [Tbl 2, Item 2]	0.10 lb PM/ton melt
Open-top Cupola [Tbl 2, Item 8]	3.2 lb COS/ton of melt ⁽²⁾
Cupola using Slag ⁽³⁾ [Tbl 2, Item 10]	0.015 lb HF/ton of melt 0.012 lb HCl/ton of melt
Combined Vertical ⁽⁴⁾ Collection/Curing [Tbl 2, Item 24]	2.4 lb formaldehyde/ton of melt 0.71 lb phenol/ton of melt 0.92 lb methanol/ton of melt

Notes:

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 NESHAP 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],

⁹ Per §63.1196, New Source means “any affected source that commences construction or reconstruction after May 8, 1997 for purposes of determining the applicability of the emissions limits in Rows 1-4 of Table 2. For all other emission limits new source means any affected source that commences construction or reconstruction after November 25, 2011.”

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 three percent 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 startup¹⁰ 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.

4.2.2 *NESHAP Subpart ZZZZ - Stationary RICE*

Federal NESHAP regulations for stationary Reciprocating Internal Combustion Engines (RICE) are found at 40 CFR Part 63, Subpart ZZZZ ("RICE MACT"). For the Emergency Fire Pump Engines, as new emergency stationary RICE with a site rating less 500 brake hp and located at a major source of HAP, the requirements of NESHAP Subpart ZZZZ are satisfied by meeting the requirements of NSPS Subpart IIII (per §63.6590(c)(7)). No further requirements apply for such engines under this part. As discussed in Section 4.1.10, the Emergency Fire Pump Engines comply with NSPS Subpart IIII.

4.2.3 *NESHAP Subpart DDDDD - Industrial, Commercial, and Institutional Boilers And Process Heaters*

Federal NESHAP regulations for industrial, commercial, and institutional boilers and process heaters that are located at major sources of HAP are found at 40 CFR

¹⁰ §63.9(b)(4)(v) of the NESHAP General Provisions requires submittal of a startup notification within 15 calendar days.

Part 63, Subpart DDDDD (“Boiler MACT”). Relevant definitions are noted below:

“Boiler means an enclosed device using controlled flame combustion and having the primary purpose of recovering thermal energy in the form of steam or hot water. Controlled flame combustion refers to a steady-state, or near steady-state, process wherein fuel and/or oxidizer feed rates are controlled. ...”

“Process heater means an enclosed device using controlled flame, and the unit's primary purpose is to transfer heat indirectly to a process material (liquid, gas, or solid) or to a heat transfer material (e.g., glycol or a mixture of glycol and water) for use in a process unit, instead of generating steam. Process heaters are devices in which the combustion gases do not come into direct contact with process materials....”

The Preheat Burner (IMF24), Natural Gas-Fired Boilers (CM03, CM04), and Rockfon Building Heat (RFN10) are subject to Boiler MACT as new affected sources and are required to be in compliance with Boiler MACT upon startup. The only applicable requirements for a natural gas fired boiler or process heater are work practices and applicable recordkeeping and reporting. §63.7540 and Table 3 (Work Practice Standards) allows tune-ups biennially for new gas 1 boilers with a heat input capacity between 5 and 10 MMBtu/hr (1,470-2,930 kW). Roxul will be required to perform tune-ups biennially in accordance with §63.7540 and Table 3 of Boiler MACT according to the capacity of each affected source.

Roxul will be required to submit notifications of startup, an NOCS report, and compliance reports after each periodic tune-up for all affected sources per §63.7550.

The Melting Furnace (IMF01), Curing Oven and emission control afterburner (part of HE01), Rockfon Line ovens (RFNE3, RFNE4, RFNE6, RFNE9), Product Marking (P_MARK) burners, and Coal Mill Burner (IMF05) do not meet the definition of a boiler or a process heater as defined in the final Boiler MACT rule, as these sources are not boilers and do not supply heat indirectly to a process material.

4.2.4 *NESHAP Subpart JJJJ - Paper or Other Web Coating*

The requirements of NESHAP Subpart JJJJ apply to each new and existing facility that is a major source of HAP, at which web coating lines are operated. The affected source subject to NESHAP Subpart JJJJ is the collection of all web coating lines at the facility per [§63.3300].

A web coating line is defined in §63.3310 as, “any number of work stations, of which one or more applies a continuous layer of coating material across the entire width or any

portion of the width of a web substrate, and any associated curing/drying equipment between an unwind or feed station and a rewind or cutting station.”¹¹ A work station means, “a unit on a web coating line where coating material is deposited onto a web substrate.”

The proposed paper facing operation in the cutting area is not subject to NESHAP Subpart JJJJ as the paper to be used is pre-coated (i.e., Roxul will not conduct any paper coating operations). The following is a review of the definitions of web and coating material with respect to the proposed Fleece Application and Rockfon coating operations.

Per §63.3310, web means, “a continuous substrate (e.g., paper, film, foil) which is flexible enough to be wound or unwound as rolls.”

- The fleece material would meet the definition of a web since it is a continuous substrate that is flexible enough to be unwound from a roll.
- Cured mineral wool slabs (with fleece applied on one or both sides) are not a continuous substrate which is flexible enough to be wound or unwound as a roll. Therefore, cured mineral wool slabs do not meet the definition of a web.

Per §63.3310, coating material means, “all inks, varnishes, adhesives, primers, solvents, reducers, and other coating materials applied to a substrate via a web coating line. Materials used to form a substrate are not considered coating materials.”

- The coating (binder) applied to the fleece material at the Fleece Application station on the Mineral Wool Line would meet the definition of a coating material since it is intended to act as an adhesive (by adhering the fleece material to the uncured mineral wool).
- The glue applied to Rockfon ceiling tiles (i.e., individual cured mineral wool slabs) would not meet the definition of a coating material since it will not be applied to a continuous substrate that is flexible enough to be wound or unwound as a roll. Further, the glue is HAP-free.
- The paints that will be applied in the Rockfon process to the edges and outer surface of the cured mineral wool slabs (with fleece adhered on both sides) do not meet the definition of a coating material since they are not applied to a web via a web coating line as described above (i.e., cured mineral wool slabs do not meet the definition of a web).

Given the review of definitions above, NESHAP Subpart JJJJ applies to the following web coating lines at the Roxul facility¹²:

- Fleece Application on the Mineral Wool Line:

¹¹ Unwind or feed station means, “a unit from which substrate is fed to a web coating line.” Rewind or cutting station means, “a unit from which substrate is collected at the outlet of a web coating line.”

¹² The Roxul facility web coating lines would not meet any of the exemption provisions of paragraphs (a) through (g) of §63.3300.

- Web Substrate: Fleece;
- Coating Material: Binder (mixed onsite by Roxul);
- Unwind/Feed Stations: Two (2) for fleece;
- Work Stations: Two (2) for applying binder to fleece;
- Associated Curing/Drying: Curing Oven (part of HE01) on the Mineral Wool Line; and
- No. of Rewind/Cutting Stations: One (1) on mineral wool line (cutting equipment downstream of Cooling Zone).

Roxul will be subject to the requirements for new affected facilities under the standard¹³, which include organic HAP (OHAP) emission limitations for web coating lines. For new affected sources, NESHAP Subpart JJJJ requires that OHAP emissions be limited as follows:

- No more than 2 percent of the OHAP applied for each month (98% reduction) [§63.3320(b)(1)];
- No more than 1.6 percent of the mass of coating materials applied for each month [§63.3320(b)(2)];
- No more than 8 percent of the coating solids applied for each month [§63.3320(b)(b)(3)]; or
- Outlet organic HAP concentration of 20 ppmvd by compound and 100% capture efficiency if an oxidizer is used to control organic emissions [§63.3320(b)(4)].

The binder that will be applied at the Fleece Application station is considered a compliant coating per NESHAP Subpart JJJJ without the need for additional controls. Therefore, Roxul will be subject to §63.3320(b)(2) or (b)(3), which correspond to a limit of 0.035 lb OHAP/lb coating material (0.016 kg OHAP/kg coating material) or 0.18 lb OHAP/lb coating solids material (0.08 kg OHAP/kg coating solids material) per 40 CFR §63.3370(a)(2)(i), (ii) for the use of "as-applied" compliant coating materials. Note that NESHAP Subpart JJJJ allows for compliance with these limits using VOC as a surrogate for organic HAP (as allowed by §63.3370(c)(1)(i) and §63.3360(c)(2)).

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

¹³ Per §63.3310, "New affected source means any affected source the construction or reconstruction of which is commenced after September 13, 2000."

4.2.5 NESHAP Subpart OOOO - Printing, Coating, And Dyeing Of Fabrics And Other Textiles

The requirements of NESHAP Subpart OOOO apply to each new, reconstructed, and existing affected source at a major source of HAP within each of the three subcategories listed in §63.4281(a): 1) the coating and printing subcategory, 2) the slashing subcategory, and 3) the dyeing and finishing subcategory.

§63.4281(d) specifies that web coating lines identified in (d)(1)-(4) are not part of the affected source regulated by NESHAP Subpart OOOO. Per §63.4281(d)(1), *“Any web coating operation that is part of the affected source of subpart JJJJ of this part (national emission standards for hazardous air pollutants for paper and other web coating). This would include any web coating line that coats both a paper and other web substrate and a fabric or other textile substrate for use in flexible packaging, pressure sensitive tape and abrasive materials, or any web coating line laminating a fabric substrate to paper.”* Further, the preamble to the NESHAP Subpart OOOO¹⁴ clarified overlap in applicability between NESHAP Subpart JJJJ and Subpart OOOO by stating, *“The final rule has been written to clarify that web coating lines ... where fabric is being laminated to a paper and other web substrate are subject to 40 CFR 63, subpart JJJJ, and not today's final rule.”* The proposed web coating line at Roxul (identified in Section 4.2.4 above) consists of a coating line where both “fabric” and an “other web substrate” (i.e., fleece and mineral wool) are adhered. Therefore, the proposed web coating line at Roxul is subject to NESHAP Subpart JJJJ and is not part of the affected source regulated by NESHAP Subpart OOOO.

The proposed paper facing operation in the cutting area is also not subject to NESHAP Subpart OOOO as the paper to be used is pre-coated (i.e., Roxul will not conduct any paper coating operations).

¹⁴ 68 FR 32172, May 29, 2003.

5.0 **STATE REGULATORY REQUIREMENTS**

This section outlines the West Virginia state air quality regulations that could be reasonably expected to apply to Roxul and makes an applicability determination for each regulation based on activities conducted at the site and the emissions of regulated air pollutants. This review is presented to supplement and/or add clarification to the information provided in the WVDEP Rule 14 permit application forms.

The West Virginia State Regulations address federal regulations, including Prevention of Significant Deterioration permitting, Title V permitting, New Source Performance Standards, and National Emission Standards for Hazardous Air Pollutants. The regulatory requirements in reference to the facility are described in detail in the below section.

5.1 **45 CSR 02 - TO PREVENT AND CONTROL PARTICULATE AIR POLLUTION FROM COMBUSTION OF FUEL IN INDIRECT HEAT EXCHANGERS**

This rule establishes emission limitations for smoke and particulate matter (filterable) discharged from fuel burning units. A fuel burning unit is defined as any unit that burns fuel to provide heat or power by indirect heat transfer.

Roxul will operate numerous combustion sources, none of which will be subject to the requirements of WV 45 CSR 02. The Melting Furnace (IMF01), Curing Oven (part of HE01), Product Marking (P_MARK), various drying ovens (RFNE4, RFN3, RFNE6, and RFNE9), and Coal Mill Burner (IMF05) operate as direct-fired units and do not meet the definition of an indirect heat exchanger. Direct-fired units are not subject to the requirements of this Rule.

Roxul will operate a number of indirect heat exchangers, including the Natural Gas-Fired Boilers (CM03, CM04), Rockfon Building Heat (RFN10), and the Pre-heat Burner (IMF24). Each of these units will qualify for the exemption noted in 45 CSR 2 Section 11, as they will have a heat input rating less than 10 MMBtu/hr (2,930 kW).

5.2 **45 CSR 04 - TO PREVENT AND CONTROL THE DISCHARGE OF AIR POLLUTANTS INTO THE AIR WHICH CAUSES OR CONTRIBUTES TO AN OBJECTIONABLE ODOR**

Operations conducted at the facility are subject to this requirement, which states "No person shall cause, suffer, allow or permit the discharge of air pollutants which causes or contribute to an objectionable odor at any location occupied by the public." Roxul will comply with the requirements of this Rule.

5.3 **45 CSR 05 - TO PREVENT AND CONTROL AIR POLLUTION FROM THE OPERATION OF COAL PREPARATION PLANTS, COAL HANDLING OPERATIONS AND COAL REFUSE DISPOSAL AREAS**

The facility is subject to the requirements of 45 CSR 7 and therefore, is not subject to this rule.

5.4 **45 CSR 06 - CONTROL OF AIR POLLUTION FROM THE COMBUSTION OF REFUSE**

Refuse is defined as "the useless, unwanted or discarded solid, liquid or gaseous waste materials resulting from community, commercial, industrial or citizen activities." Based upon this definition, Roxul will trigger applicability to this Rule for the combustion of the gaseous exhaust stream through the use of afterburners associated with the Curing Oven (CO-AB). Per 45 CSR 6-4.3, opacity of emissions from the afterburner shall not exceed 20 percent, except as provided by 4.4. Particulate matter (PM) emissions from this unit will not exceed the levels calculated in accordance with 6-4.1.

5.4.1 **45 CSR 6-4.1 - Determination for Maximum Allowable Particulate Emissions**

Curing Oven Afterburner (CO-AB):

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

The Maximum Allowable PM Emission exceeds the actual emission applied in the application. Demonstrated compliance with the permitted emission rate will demonstrate compliance with this rule. The estimated Total PM emission rate of 3.31 lb/hr (1.50 kg/hr) from the Curing Oven Afterburner is below the maximum allowable PM emission rate mandated by 45 CSR 06.

5.5 **45 CSR 7 - TO PREVENT AND CONTROL PARTICULATE AIR POLLUTION FROM MANUFACTURING PROCESSES AND ASSOCIATED OPERATIONS**

45 CSR 7 regulates the emissions of filterable particulate matter from source operations within manufacturing processes. Manufacturing processes are defined as any industrial or manufacturing actions or processes that emit smoke, particulate matter, or gaseous matter.

Roxul will operate multiple manufacturer processes that will emit filterable PM into the open air, including a mineral wool manufacturing process, a Rockfon manufacturing process, and material handling activities generating various fugitive emission sources. These separate manufacturing processes operate with separate source operations, which are defined as the last operation in a manufacturing process preceding the emissions of air contaminants.

The facility shall not emit filterable PM into the open air from any process source operation which is greater than twenty (20) percent opacity.

5.5.1

Mineral Wool Line

The expected filterable PM emission rate for the mineral wool process source operation is 25.53 lb/hr (11.58 kg/hr) and will demonstrate compliance with the Rule 7 requirements.

5.5.2

Rockfon Line

The expected filterable PM emission rate for the rockfon manufacturing process source operation is 1.12 lb/hr (0.51 kg/hr) and will demonstrate compliance with the Rule 7 requirements.

5.5.3

Materials Handling Sources

The expected filterable PM emission rate for the materials handling process source operation is 1.64 lb/hr (0.75 kg/hr) and will demonstrate compliance with the Rule 7 requirements.

5.5.4 *Coal Milling*

The expected filterable emission rate for the coal milling process source operation is 0.44 lb/hr (0.20 kg/hr) and will demonstrate compliance with the Rule 7 Requirements.

Per 45 CSR 7-5, Roxul will also have to limit fugitive emissions by equipping manufacturing processes with a system to minimize fugitive PM emissions. Roxul will utilize a combination of good housekeeping practices, partial/full enclosures, baghouses, and various filters throughout the facility to minimize fugitive PM emissions. All haul roads will be paved to minimize fugitive PM emissions. The facility is evaluated for BACT for all sources included within this application, including fugitive sources. Demonstration of compliance with BACT is expected to comply with the requirements of this Rule.

5.6 **45 CSR 10 - TO PREVENT AND CONTROL AIR POLLUTION FROM THE EMISSION OF SULFUR OXIDES**

This rule controls air pollution from the emission of sulfur oxides through the regulation of fuel burning units and manufacturing process source operations. Roxul will operate numerous fuel burning units which will operate as direct-fired units and, therefore, does not meet the definition of fuel burning unit in 45 CSR 10-2.8. The Melting Furnace (IMF01), Curing Oven (part of HE01), Product Marking (P_MARK), various drying ovens (RFNE4, RFN3, RFNE6, and RFNE9), and Coal Mill Burner (IMF05) operate as direct-fired units and do not meet the definition of an indirect heat exchanger. Direct-fired units are not subject to the requirements of this Rule.

Roxul will operate a number of indirect heat exchangers, including the Natural Gas-Fired Boilers (CM03, CM04), Rockfon Building Heat (RFN10), and the Pre-heat Burner (IMF24). Each of these units will qualify for the exemption noted in 45 CSR 2 Section 11, as they will have a heat input rating less than 10 MMBtu/hr (2,930 kW).

Section 4 of Rule 10 places an in-stack sulfur dioxide concentration limit of 2,000 ppm_v on existing source operations. As a newly proposed facility, Roxul will not be subject to this standard, although it is noted that the concentration of sulfur dioxides from the proposed facility are well below the thresholds established by the rule.

5.7 45 CSR 11 - PREVENTION OF AIR POLLUTION EMERGENCY EPISODES

The Roxul facility will be located in Jefferson County and will be subject to the emission reduction plans of this rule when an Air Pollution Alert, Warning, or Emergency is announced by the Director of the WVDEP for Air Quality Control Region 10.

5.8 45 CSR 14 - PERMITS FOR CONSTRUCTION AND MAJOR MODIFICATION OF MAJOR STATIONARY SOURCES OF AIR POLLUTION FOR THE PREVENTION OF SIGNIFICANT DETERIORATION

Federal construction permitting programs regulate new and modified sources of attainment pollutants under Prevention of Significant Deterioration. The requirements of this rule apply to the construction of any new major stationary source. The Roxul facility is classified as a major stationary source under this rule because of the potential to emit (PTE) at least two hundred fifty (250) tons per year of VOC. Further, emissions of NO_x, CO, SO₂, PM, PM₁₀, PM_{2.5}, H₂SO₄ Mist, and CO_{2e} are also subject to PSD review due to potential emissions greater than the PSD significant emission rate (SER) for each pollutant. Therefore, the facility is subject to this rule.

In order to comply with this regulation, this permit application contains the following information:

- Construction schedule for the facility;
- Description of the systems for continuous emission reduction planned to be implemented at the facility; and
- An air quality impact assessment of the facility and discussion on the nature of the effect the facility will have on the commercial, residential, and industrial growth of the area.

Roxul will apply BACT for each regulated NSR pollutant. Please refer to the BACT discussion, included as Appendix D of this permit application, for a detailed BACT assessment.

5.9 45 CSR 16 - STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES (NSPS)

45 CSR 16 applies to registrants that are subject to 40 CFR 60 Standards of Performance for New Source Stationary Sources (NSPS).

Roxul will be subject to the following NSPS subparts because of processes and equipment used at the facility:

- NSPS Subpart OOO – Standards of Performance for Nonmetallic Mineral Processing Plants; and
- NSPS Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.

No additional NSPS are applicable for this facility. Additional descriptions of these regulations are provided in the Federal Regulations section of this regulatory discussion.

5.10 45 CSR 17 - TO PREVENT AND CONTROL PARTICULATE MATTER AIR POLLUTION FROM MATERIALS HANDLING, PREPARATION, STORAGE, AND OTHER SOURCES OF FUGITIVE PARTICULATE MATTER

The facility will not be subject to this rule because sources that are subject to the fugitive PM emission requirements of WV 45 CSR 7 are exempt from the provisions of WV 45 CSR 17.

5.11 45 CSR 19 - PERMITS FOR CONSTRUCTION AND MAJOR MODIFICATION OF MAJOR STATIONARY SOURCES OF AIR POLLUTION WHICH CAUSE OR CONTRIBUTED TO NON-ATTAINMENT

The preconstruction permit program requirements of this rule do not apply to the facility because it will be a new stationary source in Jefferson County, an area designated as attainment for each NAAQS pollutant.

5.12 45 CSR 21 - TO PREVENT AND CONTROL AIR POLLUTION FROM THE EMISSIONS OF VOLATILE ORGANIC COMPOUNDS

45 CSR 21 applies to sources located in Putnam County, Kanawha County, Cabell County, Wayne County, and Wood County for control of the emission of VOCs through the application of reasonably available control technology. The facility will be located in Jefferson County and, therefore, will not be subject to the rule.

5.13 45 CSR 29 – RULES REQUIRING THE SUBMISSION OF EMISSION STATEMENTS FOR VOLATILE ORGANIC COMPOUND (VOC) EMISSIONS AND OXIDES OF NITROGEN (NO_x) EMISSIONS

45 CSR 29 requires the submission of an emission statement from stationary sources located in Putnam County, Kanawha County, Cabell County, Wayne County, Wood County, and Greenbrier County which have plant-wide VOC and/or NO_x emissions of greater than or equal to 25 tpy (22.7 MT/year). The facility will be located in Jefferson County and, therefore, will not be subject to the rule.

5.14 45 CSR 30 – REQUIREMENTS FOR OPERATING PERMITS

45 CSR 30 applies to the requirements of the federal Title V operating permit program (40 CFR 70). The major source thresholds with respect to the West Virginia Title V operating permit program regulations are 10 tpy (9.07 MT/year) of a single HAP, 25 tpy (22.7 MT/year) of any combination of HAP, and 100 tpy (90.7 MT/year) of other regulated pollutants.

Roxul will require a Title V Operating Permit. Pursuant to 45 CSR 30-4.1.a.2., Roxul must file a complete application to obtain the Title V operating permit within 12 months after the facility commences operation.

5.15 45 CSR 33 – ACID RAIN PROVISIONS AND PERMITS

The facility is not subject to 45 CSR 33 because the facility does not meet the definition of an affected source (power plants) under the Acid Rain Program under Title IV of the Clean Air Act.

5.16 45 CSR 34 – NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)

45 CSR 34 applies to registrants that are subject to NESHAP requirements. The RAN facility will be subject to the following NESHAP subparts because of processes and equipment used at the facility:

- NESHAP Subpart DDD – Mineral Wool Production;
- NESHAP Subpart JJJJ – Paper or Other Web Coating;
- NESHAP Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines (RICE); and
- NESHAP Subpart DDDDD – Industrial, Commercial, and Institutional Boilers and Process Heaters.

These NESHAP requirements are described in more detail in the Federal Regulations section of this regulatory discussion.

5.17

***45 CSR 40 - CONTROL OF OZONE SEASON NITROGEN OXIDES
EMISSIONS***

Roxul will not be subject to this regulation because the facility will not operate a unit with a maximum design heat input capacity greater than 250 MMBtu/hr (73,270 kW), a large NO_x SIP Call engine, or a kiln.

Figures

November 2017
Project No. 0408003

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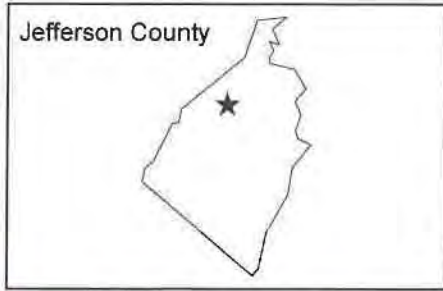
*Figure 1-1
Facility Site Map*

*November 2017
Project No. 0408003*

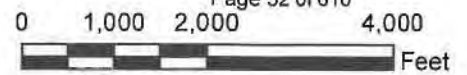
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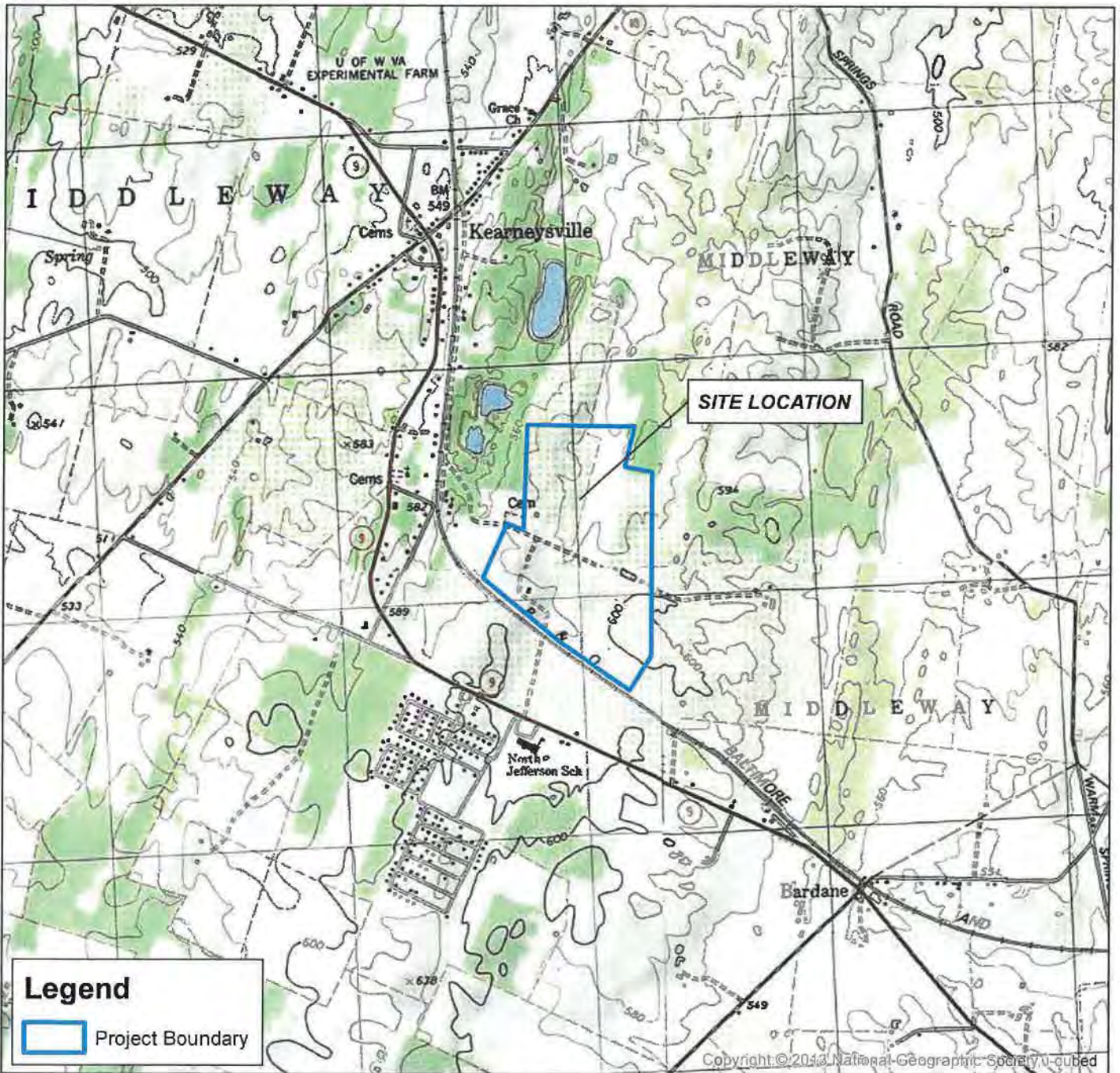
West Virginia



Jefferson County



LAT. 39.376 LON. -77.879
JEFFERSON COUNTY
WEST VIRGINIA



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USGS 1:24K 7.5' Quadrangle:
Martinsburg/Middleway, WV

SITE LOCATION MAP

Roxul USA Inc.

RAN Facility
Jefferson County
West Virginia

GIS Review: GM

CHK'D: GM

0408003

Drawn By:
SRV-10/4/17

Environmental Resources Management

Figure 1-1

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Figure 2-1
Facility Plot Plan with Emission Points

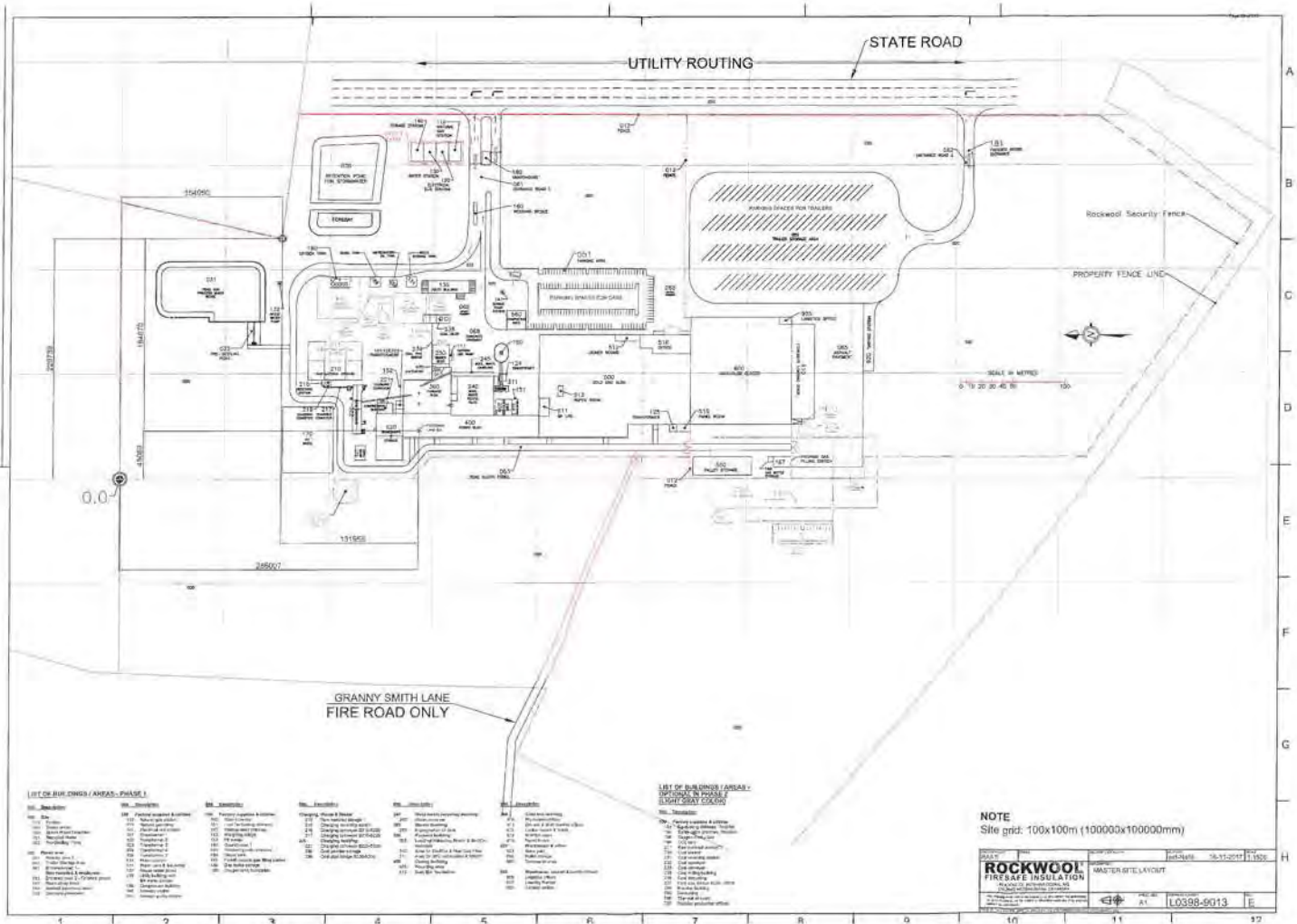
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Figure 2-2
Facility Plot Plan with Facility Boundary

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LIST OF BUILDINGS / AREAS - PHASE 1

No.	Description
001	Plant
002	Warehouse
003	Office
004	Workshop
005	Store
006	Workshop
007	Workshop
008	Workshop
009	Workshop
010	Workshop
011	Workshop
012	Workshop
013	Workshop
014	Workshop
015	Workshop
016	Workshop
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100	Workshop

LIST OF BUILDINGS / AREAS - PHASE 2

No.	Description
101	Plant
102	Warehouse
103	Office
104	Workshop
105	Store
106	Workshop
107	Workshop
108	Workshop
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112	Workshop
113	Workshop
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149	Workshop
150	Workshop

NOTE
Site grid: 100x100m (100000x100000mm)

DATE	16/11/2011	16/11/2011	16/11/2011
PROJECT	ROCKWOOL FIRE SAFE INSULATION	WATER SITE LAYOUT	
SCALE	A1		
PROJECT NO.	L0398-9013		

Figure 3-1
Mineral Wool Line Process Flow Diagram

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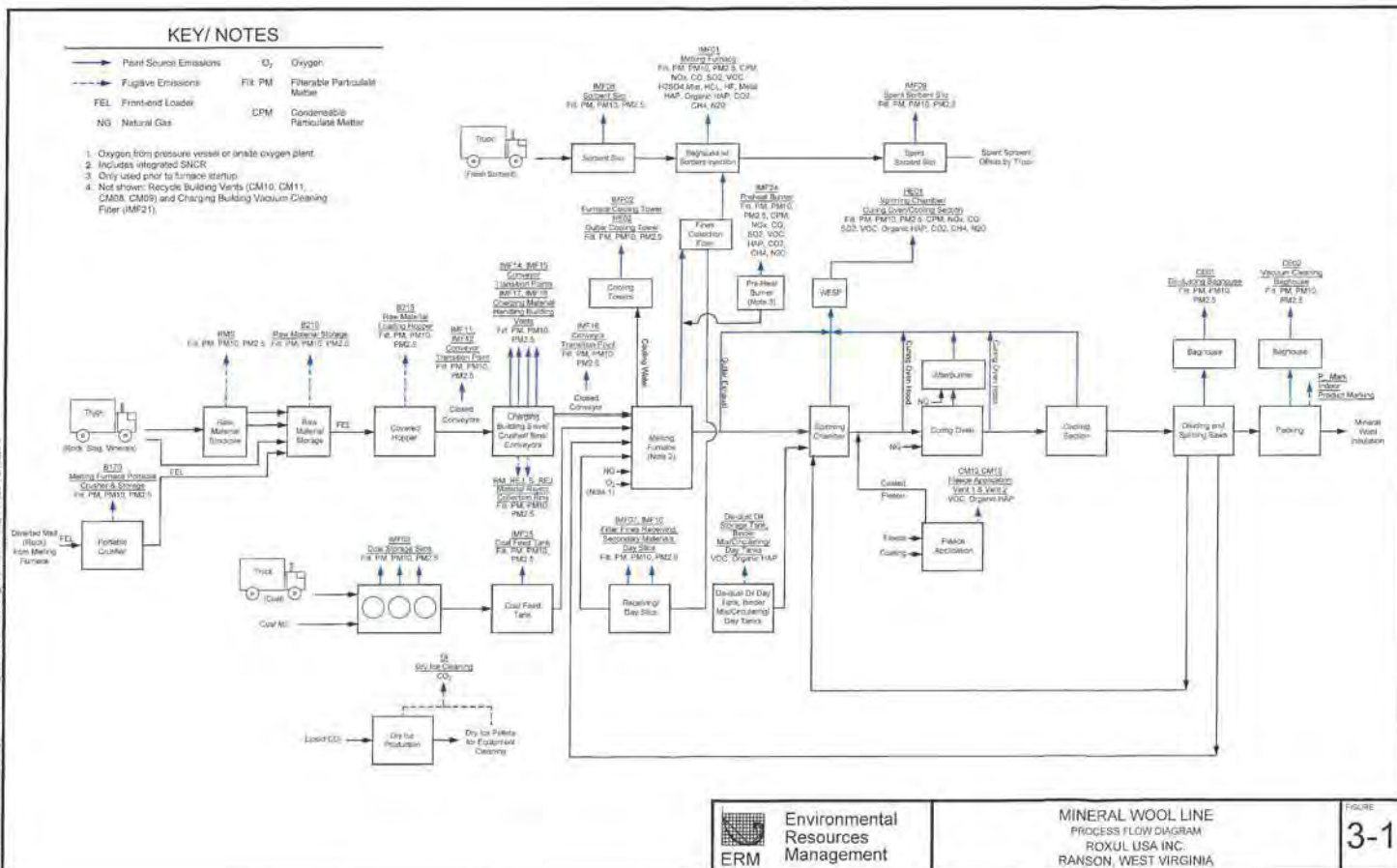
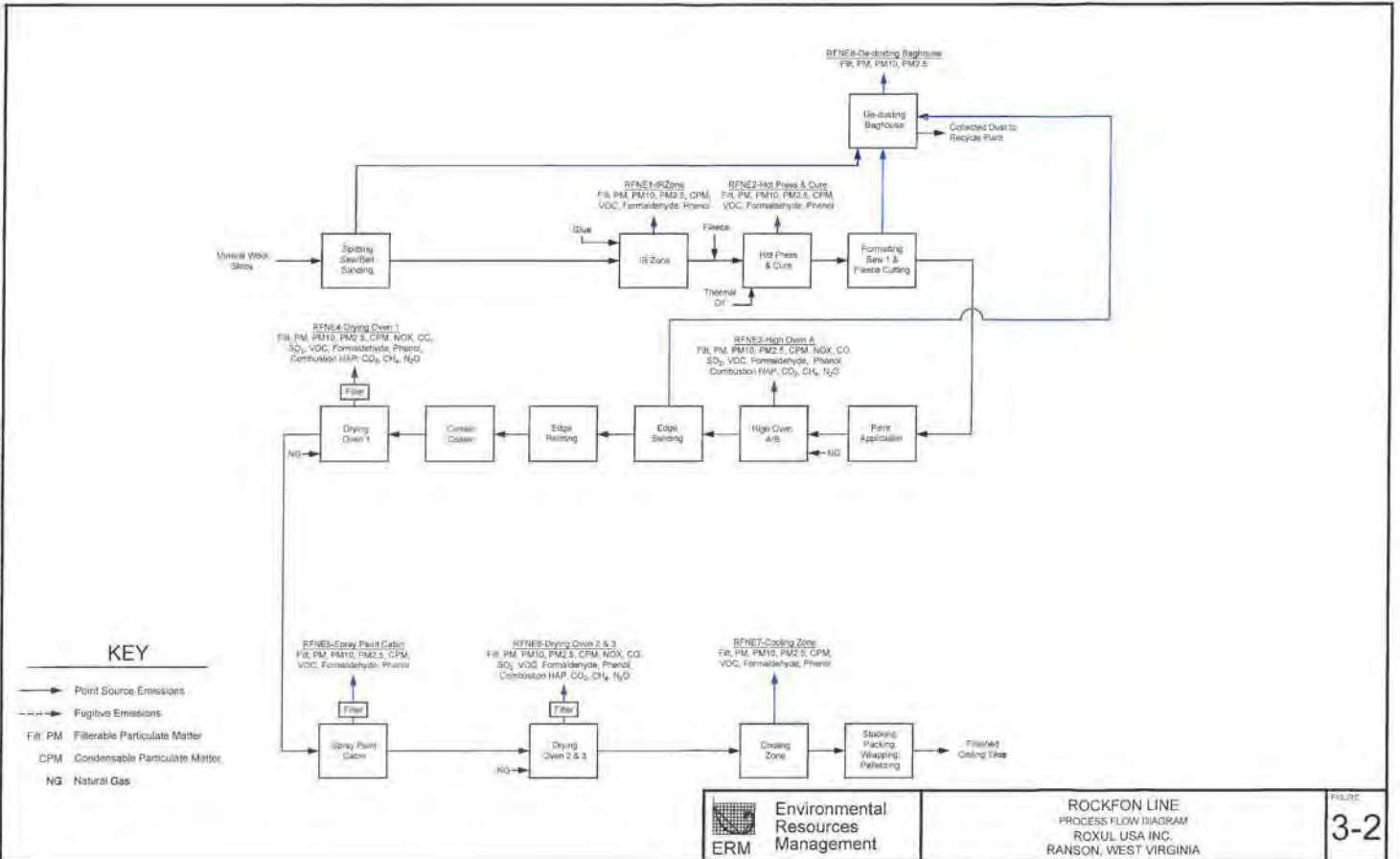


Figure 3-2
Rockfon Line Process Flow Diagram

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ROCKFON LINE
PROCESS FLOW DIAGRAM
ROXUL USA INC.
RANSON, WEST VIRGINIA

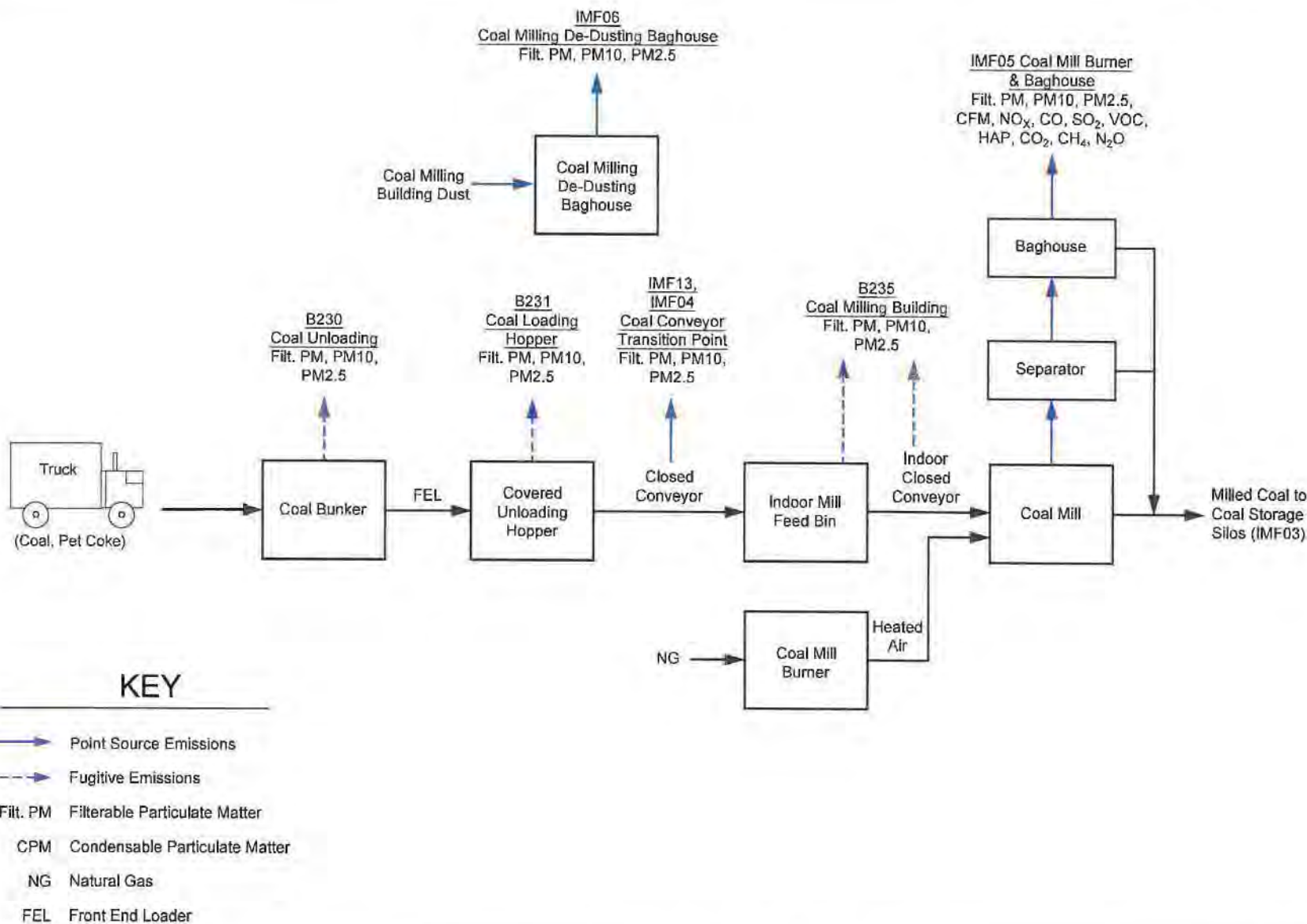
FIGURE
3-2

*Figure 3-3
Coal Milling Process Flow Diagram*

*November 2017
Project No. 0408003*

Environmental Resources Management
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KEY

- Point Source Emissions
- Fugitive Emissions
- Filt. PM Filterable Particulate Matter
- CPM Condensable Particulate Matter
- NG Natural Gas
- FEL Front End Loader



Environmental Resources Management

COAL MILLING
 PROCESS FLOW DIAGRAM
 ROXUL USA INC.
 RANSON, WEST VIRGINIA

FIGURE

3-3

Emission Calculations
Appendix A

November 2017
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Environmental Resources Management
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Roxul USA Inc.
Ranson, West Virginia
Source ID: Mineral Wool Line (L-1) Emissions

Table with columns: Stack ID(s), Source Description, Concentration, Flow Rate, Annual Emissions (MEPBC), Hourly Emissions (US), Modulated Emission Rate, Notes, Control Device. Rows include various processes like Making Furnace, Spinning Chamber, Curing Oven, etc.

- Notes:
1. Where data was not available, Filterable PM was conservatively assumed to be equal to Total PM10.
2. Calculation Method Reference:
3. Assumed 10% of the mass emissions of the Curing Oven for Cooling.
4. Mineral Fiber emissions were conservatively assumed equal to Filterable PM emissions for sources that may contain rock wool fibers.
Sample Calculations:
Hourly Emissions (lb/hr) = Fan Flow Rate (m3/min) * Exhaust Concentration (mg/m3) / 1,000,000 (kg/mg)
Annual Emissions (ton/year) = Hourly Emission Rate (lb/hr) / 2,000 (lb/ton)
Modulated Emission Rate (lb/hr) = Hourly Emissions (lb/hr) * 453.59 (g/lb) / 3,600 (sec/hr)

Roxul USA Inc.
Ranson, West Virginia
Source ID: Mineral Wool Line (L1) Emissions

Stack ID(s)	Source Description	Concentration		Flow Rate		METRIC		US		Modeled Emission Rate		Notes	Control Device
		(mg/Nm ³)	(gr/scf)	(Nm ³ /hr)	(scfm)	Hourly Emissions (kg/hr)	Annual Emissions (tonne/yr)	Hourly Emissions (lb/hr)	Annual Emissions (ton/year)	(g/s)	Averaging Period		
IMF01	Melting Furnace	-	-	-	-	-	-	-	-	-	-	-	-
	Filterable PM	31	0.013	33,900	21,414	1.05	9.21	2.32	10.15	-	-	Claimed CBI	Baghouse
	Total PM ₁₀	110	-	33,900	21,414	3.73	32.67	8.22	36.01	1.04E+00	24-hr, Annual	Note 2 (1)	Baghouse
	Total PM _{2.5}	100	-	33,900	21,414	3.39	29.70	7.47	32.73	9.42E-01	24-hr, Annual	Note 2 (1)	Baghouse
	NOx	500	-	33,900	21,414	16.95	148.48	37.37	163.67	4.71E+00	1-hr (base), Annual	Note 2 (1)	SNCR and Oxy-fuel burners
	CO	150	-	33,900	21,414	5.09	44.54	11.21	49.10	1.41E+00	1-hr (base), 8-hr	Note 2 (1)	-
	SO ₂	450	-	33,900	21,414	15.26	133.63	33.63	147.31	4.24E+00	1-hr (base), 3-hr, 24-hr, Annual	Note 2 (1)	Sorbent Injection System
	Non-HAP VOC	150	-	33,900	21,414	5.09	44.54	11.21	49.10	-	-	Note 2 (1)	-
	Total VOC	-	-	33,900	21,414	5.29	46.34	11.66	51.06	-	-	Note 2 (1)	-
	HF	4.9	-	33,900	21,414	0.17	1.47	0.37	1.62	-	-	Claimed CBI	Sorbent Injection System
	HCl	3.9	-	33,900	21,414	0.13	1.17	0.29	1.29	-	-	Claimed CBI	Sorbent Injection System
	COs	5	-	33,900	21,414	0.17	1.48	0.37	1.64	-	-	Note 2 (1-MAR)	-
	Formaldehyde	0.05	-	33,900	21,414	1.70E-03	0.01	3.74E-03	0.02	-	-	Note 2 (1-TCR)	-
	H ₂ SO ₄ Mist	50	-	33,900	21,414	1.70	14.85	3.74	16.37	-	-	Note 2 (1-MAR)	Sorbent Injection System
	Fluorides	0.1	-	33,900	21,414	3.39E-03	0.03	0.01	0.03	-	-	Note 2 (1-TCR)	Baghouse
	Arsenic	0.0012	-	33,900	21,414	4.07E-05	3.50E-04	8.97E-05	3.83E-04	-	-	Note 2 (1-DOE10)	Baghouse
	Lead	0.0005	-	33,900	21,414	1.70E-05	1.49E-04	3.74E-05	1.64E-04	-	-	Note 2 (1-DOE10)	Baghouse
	Mercury	0.0078	-	33,900	21,414	2.64E-04	2.32E-03	5.83E-04	2.56E-03	-	-	Note 2 (1-DOE10)	Baghouse
	Phenol	1	-	33,900	21,414	0.03	0.30	0.07	0.33	-	-	Note 2 (1-TCR)	-
	Mineral Fiber	-	-	33,900	21,414	1.05	9.21	2.32	10.15	-	-	Note 4	Baghouse
	Total HAPs	-	-	33,900	21,414	1.56	13.64	3.43	15.04	-	-	-	Sorbent Injection System
	CO ₂	290,150	-	33,900	21,414	9,836.28	80,165.80	21,865.26	94,981.42	-	-	Claimed CBI	-
	CH ₄	25	-	33,900	21,414	0.86	7.54	1.90	8.31	-	-	Claimed CBI	-
	N ₂ O	4	-	33,900	21,414	0.12	1.09	0.27	1.20	-	-	Claimed CBI	-

1 - Stack Testing from similar facility, scaled as appropriate to RAN process. Claimed CBI

4-Assumed 10% of the mass emissions of the Curing Oven for Cooling.

3. Proposed NESHAP Subpart DDD combines emission limits for formaldehyde, methanol, and phenol from spinning (collection) and curing.

4. Mineral Fiber emissions were conservatively assumed equal to Filterable PM emissions for sources that may contain rock wool fibers. The listed HAP, fine mineral fibers includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.

5. Maximum g/s emissions do not vary based on model averaging period (i.e., source permitted to operate at maximum capacity 24 hr/day, 365 day/year).

Sample Calculations:

Hourly Emissions (kg/hr) = Fan Flow Rate (Nm³/hr) * Exhaust Concentration (mg/Nm³) * 1,000,000 (mg/kg)

Hourly Emission Rate Filterable PM = Concentration PM (gr/scf) * (1 lb/7,000 grains) * Flow Rate (scfm) * (60 min/hr)

Annual Emissions (ton/yr) = Hourly Emission Rate (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

Annual Emissions (tonne/yr) = Hourly Emissions (kg/hr) * 8,760 (hr/yr) / 1,000 (kg/tonne)

CO₂ Equivalent (CO₂e) = CO₂ + (GWP₁₀₀ * CH₄) + (GWP₁₀₀ * N₂O)

Modeled Emission Rate (g/s) (for all Averaging Periods) = Hourly Emissions (lb/hr) * 453.59 (g/lb) / 3,600 (sec/hr)

Roxul USA Inc.
Ranson, West Virginia
Source ID: Pre-heat Burner (IMF24)

Operating Parameters, PER BOILER

Maximum Heat	1,500	kw
Input Capacity	5.12	MMBtu/hr
Operating Hours	8,760	hr/yr
Fuel Type	Natural Gas	
Fuel HHV	1.026	MMBtu/MMscf

Pollutant	Emission Factor ^{1,2}		US		METRIC		Modeled Emission Rate ⁴	
			Hourly Emissions	Annual Emissions	Hourly Emissions	Annual Emissions		
	(lb/MMscf)	(lb/MMBtu)	(lb/hr)	(ton/yr)	(kg/hr)	(tonne/yr)	(g/s)	Averaging Period
NO _x	72.42	0.0706	0.36	1.58	0.16	1.44	4.56E-02	1-hr, Annual
SO ₂	0.6	0.0006	3.00E-03	0.01	1.36E-03	0.01	3.77E-04	1-hr, 3-hr, 24-hr, Annual
PM/PM _{10T} /PM _{2.5T}	1.9	0.0019	0.01	0.04	4.30E-03	0.04	-	-
PM _{10T} /PM _{2.5T}	7.6	0.0074	0.04	0.17	0.02	0.15	4.78E-03	24-hr, Annual
Condensable PM	5.7	0.0056	0.03	0.12	0.01	0.11	-	-
CO	64	0.0819	0.42	1.84	0.19	1.67	5.28E-02	1-hr, 8-hr
VOC	5.5	0.0054	0.03	0.12	0.01	0.11	-	-
Lead	0.0005	4.87E-07	2.50E-06	1.09E-05	1.13E-06	9.92E-06	-	-
Hexane	1.8	0.0018	0.01	0.04	0.00	0.04	-	-
Total HAPs	1.89	0.0018	0.01	0.04	4.28E-03	0.04	-	-
CO ₂	-	116.98	599.25	2624.70	271.81	2,381.09	-	-
CH ₄	-	2.20E-03	0.01	0.05	5.12E-03	0.04	-	-
N ₂ O	-	2.20E-04	1.13E-03	4.95E-03	5.12E-04	4.49E-03	-	-
CO ₂ e ³	-	-	599.87	2,627.41	272.09	2,383.55	-	-

Notes:

ton = short tons
 tonne = metric tons

1. Natural Gas emission factor source AP-42 Table 1.4-1, 1.4-2, 1.4-3, and 1.4-4 for SO₂, PM_{10T}, PM_{2.5T}, CO, VOC, Lead, Hexane, Total HAPs. GHG emission factors per 40 CFR Part 98, Table C-1 and C-2. GWPs per 40 CFR 98, Table A-1. NO_x emission factor based on 80 ppmvd @ 3% O₂ per manufacturer specification.

2. PM_{10T} and PM_{2.5T} emission factors include filterable and condensable particulate matter (e.g., Total PM₁₀, PM_{2.5}).

3. CO₂ Equivalent (CO₂e) lb/hr, ton/yr = CO₂ + [GWP_{CH4} * CH₄] + [GWP_{N2O} * N₂O].

4. Maximum g/s emissions do not vary based on model averaging period (i.e., a source permitted to operate at maximum capacity 24 hr/day, 365 day/year).

Sample Calculations:

Hourly Emissions (lb/hr) = Emission Factor (lb/MMBtu) * Maximum Heat Input Capacity (MMBtu/hr)

Annual Emissions (ton/yr) = Hourly Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton) □

Hourly Emissions (kg/hr) = Hourly Emissions (lb/hr) / 2.2046 (lb/kg)

Annual Emissions (tonne/yr) = Hourly Emissions (kg/hr) * 8,760 (hr/yr) / 1,000 (kg/tonne) □

Modeled Emission Rate (g/s) [for all Averaging Periods] = Hourly Emissions (lb/hr) * 453.59 (g/lb) / 3,600 (sec/hr) □

Roxol USA, Inc.
Ransom, West Virginia
Material Handling Fugitive

Material Properties & Calculation Inputs

Raw Material	M-Mixture Content ¹ %
Rock/Slag/Material	Claimed Confirmed
Spill Raw Material	Claimed Confirmed
Waste Fuel/Residue/Spill	Claimed Confirmed

Pollutant	A-Particle Size Multiplier	E-Emission Factor ²		
		Rock/Slag/Material (lb/ton)	Spill Raw Material (lb/ton)	Devised Meth (lb/ton)
PM	0.74	Claimed Confirmed	Claimed Confirmed	Claimed Confirmed
PM10	0.53	Claimed Confirmed	Claimed Confirmed	Claimed Confirmed
PM2.5	0.353	Claimed Confirmed	Claimed Confirmed	Claimed Confirmed

Location	U-Wind Speed ³	
	mph	mi/h
Outdoor	8.91	2.01

- Notes:
 1. Mixture content (claim) as actual basis among various material included
 2. Outdoor wind speed was set at 8.91 mph based on 2015-2016 average wind speed data from station L11704
 3. Material size emission factor equation per 40 CFR Section 50.2.4.

- Sample Calculations:
 4. Emissions = (C)(M)(U)(M) * (M) * (M) * (M)
 5. Emission Factor Multiplier
 6. U = wind speed, meters per second (mi/h) (mi/h)
 7. M = material mixture content (%)

Material Delivery and Front-End Control Fugitive Emissions⁴

Road Source ID	Raw Material	Source Description	Loading Rate ¹	Emission Decline ²	Control Efficiency ³ (%)	Pollutant	METRIC				UNCONTROLLED		CONTROLLED		UNCONTROLLED		CONTROLLED		Modified Emission Rate ⁵		Class I AQIV Analysis (QIV)		
							Emissions		Emissions		Emissions		Emissions		24hr	Annual	24hr	Annual					
							(lb/day)	(lb/year)	(lb/day)	(lb/year)	(lb/day)	(lb/year)	(lb/day)	(lb/year)	(lb/day)	(lb/year)	(lb/day)	(lb/year)	(lb/day)	(lb/year)			
PM10	Rock/Slag/Material	Raw Material Storage - Delivery to 200-ton chutes (non offset by trucks)	3000	50%	90%	PM	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00		
						PM10	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						PM2.5	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						Total	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
PM10	Rock/Slag/Material	Raw Material Storage - Delivery to 200-ton chutes (offset by trucks)	3000	50%	90%	PM	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						PM10	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						PM2.5	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						Total	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
PM10	Rock/Slag/Material	Raw Material Loading Hopper	3000	50%	90%	PM	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						PM10	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						PM2.5	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						Total	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
PM10	Spill Raw Material	Raw Material Paved Collection Bin	3000	50%	90%	PM	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						PM10	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						PM2.5	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						Total	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
PM10	Spill Raw Material	Spill Paved Collection Bin	3000	50%	90%	PM	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						PM10	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						PM2.5	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						Total	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
PM10	Waste Fuel/Residue/Spill	Material Transfer Paved Collector & Storage - 1000 to 1000 (170) from portable tank	3000	50%	90%	PM	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						PM10	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						PM2.5	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00
						Total	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	1,000.00	3,650.00	0.00

- Notes:
 1. Loading rate for material storage operations is based on the maximum quantity delivered per day or per year.
 2. Assumed a control efficiency of 50% due to offloading location having 3m-dust control structures and 75% efficiency for 4-sided enclosures (leaves) in 2-sided enclosures with 100% efficiency.
 3. Large trucks are assumed to be 90% offset by FEI (dust collector). For dust the emissions from that time are negligible.
 4. Material properties in gray are not reported values, but are added as a total source emission rate.
 5. For dust screening tool, the annual steady-state equivalent emission rate (SE) was determined based on maximum daily emissions. For example QPM10 (SE) = PM10 (lb/day) * 365 (days).

- Sample Calculations:
 6. Controlled Emissions (lb/day) = (Loading Rate (lb/day) * (1 - Control Efficiency (%) * (1 - Control Efficiency (%))
 7. Uncontrolled Emissions (lb/day) = (Loading Rate (lb/day) * (1 - Control Efficiency (%))
 8. Modified Emission Rate (SE) = Daily Emissions (lb/day) / 24 (hr/day) for 24 hr time averaging period * 3,650 (days) * 400 (lb) / 1,000 (lb/ton)
 9. Modified Annual Emission Rate (SE) = Annual Emissions (lb/year) / 8,760 (hr/year) for annual time averaging period * 2,000 (lb/ton) * 400 (lb) / 1,000 (lb/ton)

Roxul USA, Inc.
Rainton, West Virginia
Material Handling Fugitives

2 Crusher Fugitive Emissions

Source ID	Source Description	Pollutant	Emission Factor ¹ (lb/ton)	METRIC		US		Hours of Operation		METRIC		US		Modelled Emission Rate ³		Class / AQRI Analysis (AQI)
				Processing Rate		Hourly (lb/hr)	Annual (lb/yr)	Hourly (lb/hr)	Annual (lb/yr)	Hourly	Annual	24-hr	Annual			
				(ton/hr)	(ton/day)									(ton/day)	(ton/yr)	
B175	Making Furnace Dished Metal Process Chamber	PM ₁₀	0.004	170	73,467	180.0	81,000	12	840	0.97	3.22	3.81	2.50	12.7E-06	2.50E-02	1.7E
		PM _{2.5}	0.0024							0.58	0.09	0.70	0.10			
		PM ₁₀	0.008							0.08	0.08	0.12	0.03			

- 1. PM₁₀ is 10% of PM per A-4-C Appendix B, Table B-22 for material handling and processing of aggregate and construction soil.
- 2. Emission factor for crushing of roofing furnace dished metal assumed to be similar to crushing of stone in A-4-C, Table B, 7.0.2.1. Uncontrolled PM emission factor is 0.004 lb/ton and uncontrolled PM₁₀ emission factor of 0.0024 lb/ton for tertiary crushing with conservatively used dust to lack of emission factors for primary or secondary crushing.
- 3. Modelled emission rates in grey are not modelled individually, but are added to a total source emission rate.
- 4. For CR screening tool, the annual steady-state stockpile emission rate (E) was determined. For source B175 (lb/yr) = 81,000 (lb/yr) * 1.8, 000 (lb/yr) * 1.545 (lb/yr).

Sample Calculations:
 Hourly Emissions (lb/hr) = Emission Factor (lb/ton) * Processing Rate (ton/hr)
 Annual Emissions (lb/yr) = Hourly Emissions (lb/hr) * Hours of Operation (hr/yr) / 2000 (lb/ton)
 Hourly Emissions (lb/hr) = Hourly Emissions (lb/hr) * 0.453592 kg/lb
 Annual Emissions (lb/yr) = Annual Emissions (lb/yr) / 1609 (kg/ton)
 Modelled 24-hr Emission Rate (lb/hr) = Daily Emissions (lb/day) / 24 (hr/day) / 24 (hr/day) [The 24-hr model averaging period] * 453.592 (kg/ton) / 1.609 (kg/ton)
 Modelled Annual Emission Rate (lb/yr) = Annual Emissions (lb/yr) / 8,760 (hr/yr) [for annual model averaging period] * 1,000 (lb/ton) * 453.592 (kg/ton) / 1.609 (kg/ton)

3 Wind Emission Emission from Outdoor Stockpiles

P^2	number of days per year with precipitation > 0.01 inch	144
P	percentage of area that the unobstructed wind speed exceeds 12 mph at the mean pile height	0.08
Stockpile Description	S ₅₀ content ¹	
Raw Material Stockpile (RMS)	12.7	
Waste (BTD) Stockpile	12.7	

Pollutant	Emission Factor ²	
	Raw Material Stockpile (lb/ton)	Waste (17%) Stockpile (lb/ton)
PM ₁₀	0.03	0.04
PM _{2.5}	0.02	0.03
PM ₁₀	0.03	0.04

- 1. S₅₀ content chosen as worst case among various materials in stockpile.
- 2. Number of days per year with precipitation greater than 0.01 inch based on Table B - Topographic Data for West Virginia in Application Handbook and Form for Revised Permit C42-C for West Virginia Department of Environmental Protection.
- 3. Percentage of time that the unobstructed wind speed exceeds 12 mph at the mean pile height based on AP-42 Ch. 15.2.5.2 Equation 11 and AP-42 Ch. 15.2.5.2 Equation 11 and AP-42 Ch. 15.2.5.2 Equation 11 and AP-42 Ch. 15.2.5.2 Equation 11.
- 4. Outdoor stockpile emission factor equation per WVDEG Ch. 15.2.5.2 for material stockpiles.
- 5. PM₁₀ is 10% of PM per A-4-C Appendix B, Table B-22 for material handling and processing of aggregate and construction soil.

Sample Calculations:
 $E_{PM10} (lb/yr) = 1.75 \times 10^{-11} \times (200 \times 1000) \times (1000)$
 $E_{PM2.5} (lb/yr) = 1.75 \times 10^{-11} \times (200 \times 1000) \times (1000)$
 $E_{PM10} (lb/yr) = 1.75 \times 10^{-11} \times (200 \times 1000) \times (1000)$
 $E_{PM2.5} (lb/yr) = 1.75 \times 10^{-11} \times (200 \times 1000) \times (1000)$
 percentage of days with > 0.01 inch of precipitation per year:
 percentage of area that the unobstructed wind speed exceeds 12 mph at the mean pile height

Stockpile Description	Stockpile Base Area ¹		Enclosure Description	Control Efficiency (%)	Pollutant	METRIC				US				Modelled Emission Rate ³		
	Max sq. ft.	acre				UNCONTROLLED Emissions		CONTROLLED Emissions		UNCONTROLLED Emissions		CONTROLLED Emissions		24-hr	Annual	
	(lb/hr)	(lb/ton/yr)				(lb/hr)	(lb/ton/yr)	(lb/hr)	(lb/ton/yr)	(lb/hr)	(lb/ton/yr)					
Raw Material Stockpile (RMS)	840	0.12	3-sided	50%	PM ₁₀	0.02	0.18	0.01	0.09	0.04	0.18	0.02	0.09	1.2E-06	1.9E-02	
					PM _{2.5}	0.01	0.09	0.005	0.04	0.02	0.09	0.01	0.04			
					PM ₁₀	1.43E-03	0.01	7.03E-04	0.01	3.15E-03	0.01	1.55E-03	0.01	1.98E-04		
					PM _{2.5}	0.07	0.50	0.03	0.25	0.15	0.80	0.07	0.43	4.40E-05	4.40E-05	
Crusher & Storage - PM Waste (BTD) Stockpile	1800	0.44	3-sided	50%	PM ₁₀	0.01	0.08	0.005	0.04	0.14	0.57	0.03	0.25	1.09E-06	1.09E-06	
					PM _{2.5}	0.01	0.08	0.005	0.04	0.01	0.08	0.01	0.08			

- 1. Assumed a control efficiency of 50% due to stacking locations having 3-sided enclosure enclosures.
- 2. Total full of the 20-acre stockpile area indicated by large model. Therefore wind erosion emissions are negligible due to size.
- 3. For wind erosion calculation methods, maximum pile emissions do not vary based on time-averaging period (i.e., a source permitted to operate at maximum capacity 24 hours, 365 days/yr).
- 4. Modelled emission rates in grey are not modelled individually, but are added to a total source emission rate.

Sample Calculations:
 Uncontrolled Hourly Emissions (lb/hr) = E (lb/ton/yr) * 24 (hr/day) * Base area of pile (acre)
 Uncontrolled Annual Emissions (lb/ton/yr) = E (lb/ton/yr) * 365 (days) * Base area of pile (acre)
 Controlled Emissions = Uncontrolled Emissions (lb/ton/yr) * Control Efficiency (%)
 Uncontrolled/Controlled Hourly Emissions (lb/ton/yr) = Uncontrolled/Controlled Emissions (lb/hr) * 0.453592 kg/lb
 Uncontrolled/Controlled Annual Emissions (lb/ton/yr) = Uncontrolled/Controlled Emissions (lb/yr) * 0.453592 kg/lb
 Modelled Emission Rate (lb/yr) for all averaging periods = Hourly Emissions (lb/hr) * 453.592 (kg/ton) / 1.609 (kg/ton)

Roxol USA, Inc.
 Ranson, West Virginia
 Material Handling Fugitives

Total Fugitive Emissions Summary

Source ID	Source Description	PM				PM ₁₀				PM _{2.5}				Class I AQW Analysis (GH) ¹ Tons/yr
		CONTROLLED Total Annual Emissions		CONTROLLED Total Annual Emissions		Modeled Emission Rate		CONTROLLED Total Annual Emissions		Modeled Emission Rate		CONTROLLED Total Annual Emissions		
		(short tons/yr)	(tonnes/year)	(short tons/yr)	(tonnes/year)	(24hr g/s)	(Annual g/s)	(short tons/yr)	(tonnes/year)	(24hr g/s)	(Annual g/s)	(short tons/yr)	(tonnes/year)	
0270	Raw Material Storage Delivered to 270 from offsite (by truck) or from stockpile (by FEV)	0.28	0.26	0.17	0.15	4.88E-03	3.53E-03	0.02	0.02	7.26E-04	5.19E-04	0.11		
0170	Material Storage, Electric Oxide & Sulfate, Mining Furnace Slag Portable Chamber + Disp to PE Wash (170) then portable chamber + Vented Emission from PE Wash (170) Stockpile	0.91	0.83	0.27	0.24	0.02	7.40E-03	0.08	0.05	8.08E-03	5.72E-03	1.13		
0140	Raw Material Stockpile Delivered to Stockpile from offsite (by truck) + Wind Emission from Raw Material Stockpile	0.11	0.10	0.06	0.05	3.26E-03	1.43E-03	2.82E-04	2.14E-04	3.06E-04	2.20E-04	0.11		

Roxul USA, Inc.
Ranson, West Virginia
Material Handling Vents

Roxul Source ID	Source Description ¹	Fan Flow Rate		METRIC						US		METRIC						US	
				Exhaust Concentration		Hourly Emissions		Annual Emissions		Modeled Emission Rate ³ 24-Hr, Annual	Exhaust Concentration		Hourly Emissions		Annual Emissions		Hourly Emissions	Annual Emissions	
				(m³/min)	(scfm)	(mg/m³)	(gr/scf)	(kg/hr)	(ton/yr)		(lb/hr)	(ton/yr)	(mg/m³)	(gr/scf)	(kg/hr)	(ton/yr)			(lb/hr)
IMF01	Coal Storage Silo No. 1	1,200	758	5	0.002	6.00E-03	0.05	0.01	0.06	1.67E-03	2.5	0.001	3.00E-03	0.03	0.01	0.03	8.33E-04		
	Coal Storage Silo No. 2	1,200	758	5	0.002	6.00E-03	0.05	0.01	0.06	1.67E-03	2.5	0.001	3.00E-03	0.03	0.01	0.03	8.33E-04		
	Coal Storage Silo No. 3	1,200	758	5	0.002	6.00E-03	0.05	0.01	0.06	1.67E-03	2.5	0.001	3.00E-03	0.03	0.01	0.03	8.33E-04		
	Total																		
IMF08	Coal Feed Tank	1,200	758	5	0.002	6.00E-03	0.05	0.01	0.06	1.67E-03	2.5	0.001	3.00E-03	0.03	0.01	0.03	8.33E-04		
IMF21	Charging Building Vacuum Cleaning Filter	500	316	5	0.002	2.50E-03	0.02	0.01	0.06	8.94E-04	2.5	0.001	1.25E-03	0.01	2.75E-03	0.01	3.47E-04		
IMF08	Sorbent Silo	1,200	758	5	0.002	6.00E-03	0.05	0.01	0.06	1.67E-03	2.5	0.001	3.00E-03	0.03	0.01	0.03	8.33E-04		
IMF07	Filter Fines Day Silo	1,250	790	5	0.002	6.25E-03	0.05	0.01	0.06	1.74E-03	2.5	0.001	3.12E-03	0.03	0.01	0.03	8.69E-04		
	Secondary Energy Materials Silo	1,250	790	5	0.002	6.25E-03	0.05	0.01	0.06	1.74E-03	2.5	0.001	3.12E-03	0.03	0.01	0.03	8.69E-04		
	Total																		
IMF06	Spent Sorbent Silo	1,200	758	5	0.002	6.00E-03	0.05	0.01	0.06	1.67E-03	2.5	0.001	3.00E-03	0.03	0.01	0.03	8.33E-04		
IMF10	Filter Fines Receiving Silo	1,200	758	5	0.002	6.00E-03	0.05	0.01	0.06	1.67E-03	2.5	0.001	3.00E-03	0.03	0.01	0.03	8.33E-04		
IMF11	Conveyor Transition Point (B215 to B220)	1,800	1,137	5	0.002	9.00E-03	0.07	0.01	0.06	2.50E-03	2.5	0.001	4.50E-03	0.04	0.01	0.04	1.25E-03		
IMF12	Conveyor Transition Point (B210 to B220)	1,800	1,137	5	0.002	9.00E-03	0.07	0.01	0.06	2.50E-03	2.5	0.001	4.50E-03	0.04	0.01	0.04	1.25E-03		
IMF14	Conveyor Transition Point (B220 No. 1)	1,800	1,137	5	0.002	9.00E-03	0.07	0.01	0.06	2.50E-03	2.5	0.001	4.50E-03	0.04	0.01	0.04	1.25E-03		
IMF16	Conveyor Transition Point (B220 No. 2)	1,800	1,137	5	0.002	9.00E-03	0.07	0.01	0.06	2.50E-03	2.5	0.001	4.50E-03	0.04	0.01	0.04	1.25E-03		
IMF18	Conveyor Transition Point (B220 to B300)	1,800	1,137	5	0.002	9.00E-03	0.07	0.01	0.06	2.50E-03	2.5	0.001	4.50E-03	0.04	0.01	0.04	1.25E-03		
In-door Charging Building (emitted from IMF17, IMF18)	Crusher	3,500	2,211	5	0.002	0.02	0.16	0.04	0.17	4.86E-03	2.5	0.001	0.01	0.08	0.02	0.08	2.43E-03		
	Total In-door with Settling Factor (50%)																		
	Total IMF17																		
	Total IMF18																		
CM10	Recycle Building Vent 1	30,000	18,950	10	0.004	0.30	2.63	0.68	2.90	3.33E-02	5	0.002	0.15	1.31	0.33	1.45	4.17E-02		
CM11	Recycle Building Vent 2	30,000	18,950	10	0.004	0.30	2.63	0.68	2.90	3.33E-02	5	0.002	0.15	1.31	0.33	1.45	4.17E-02		
CM09	Recycle Building Vent 3	2,500	1,579	10	0.004	0.09	0.22	0.06	0.24	0.94E-03	3	0.002	0.01	0.11	0.03	0.12	3.47E-03		
CM08	Recycle Building Vent 4	2,500	1,579	10	0.004	0.09	0.22	0.06	0.24	0.94E-03	3	0.002	0.01	0.11	0.03	0.12	3.47E-03		

Notes:

1. 'm' = short tons

2. 'm' = metric tons

3. PM2.5 is conservatively assumed to be 50% of PM for material handling

4. With the exception of IMF17 and IMF18, material handling vents are equipped with fabric filters or air vent filters. The in-door charging building sources (crusher) are equipped with fabric filters that vent inside the charging building and a 50% settling factor is applied for building control. These emissions are modeled as emitting from the Charging Building Vents IMF17 and IMF18.

5. Maximum g/a emissions do not vary based on model averaging period (i.e., a source permitted to operate at maximum capacity 24 hours, 365 days/year)

Sample Calculations

Hourly Emissions (kg/hr) = Fan Flow Rate (m³/hr) * Exhaust Concentration (mg/m³) * 1,000,000 (mg/kg)

Annual Emissions (ton/yr) = Hourly Emissions (kg/hr) * 8,760 (hr/yr) / 1,000 (kg/ton)

Hourly Emissions (lb/hr) = Fan Flow Rate (scfm) * Exhaust Concentration (gr/scf) * 7.00 (gr/lb) * 60 (min/hr)

Annual Emissions (ton/yr) = Hourly Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

Modeled Emission Rate (g/a) (for all Averaging Periods) = Hourly Emissions (lb/hr) * 453.59 (g/lb) / 3,600 (sec/hr)

Roxul USA, Inc.
Ranson, West Virginia
Source ID: Fleece Application (CM12, CM13)

Operating Parameters, per Source

Binder Applied to Fleece	185	kg/hr
Operating Hours ¹	8,760	hr/yr
Annual Binder Usage at Fleece Station	1,620,600	kg/yr
Organic HAP Emission Limit ²	0.016	kg OHAP/kg binder

Emission Calculations³

Pollutant	US		METRIC	
	Maximum Emission Rate		Maximum Emission Rate	
	(lb/hr)	(ton/yr)	(kg/hr)	(tonne/yr)
VOC	6.53	28.58	2.96	25.93
Total HAP	6.53	28.58	2.96	25.93

Notes:

ton = short tons

tonne = metric tons

1. For conservatism, emissions from the fleece application station are based on 8,760 hours per year.

2. The coating material, or in this case binder, regulated by NESHAP Subpart JJJJ is a compliant coating by formulation. The limit of 0.016 kg OHAP/kg coating material is stated in 40 CFR §63.3370(a)(2)(i) for the use of "as-applied" compliant coating materials from new affected sources (per §63.3320(b)(2) which states that HAP emissions must be limited to "no more than 1.6 percent of the mass of coating materials applied for each month at new affected sources"). Roxul may choose to comply with this limit using VOC as a surrogate for organic HAP as allowed by §63.3370(c)(1)(i) and §63.3360(c)(2). Therefore VOC emissions are shown as equal to organic HAP (Total HAP) emissions.

3. The fleece application equipment will be placed just prior to the entrance of the Curing Oven. While a majority of fleece application equipment emissions will be controlled by the Curing Oven afterburner as the fleece is cured onto the wet mineral wool in the Curing Oven, no credit is taken for VOC/organic HAP emission control in this calculation.

Sample Calculations:

Maximum Hourly Emission Rate (lb/hr) = Binder Applied to Fleece (kg/hr) * 0.016 (kg VOC/HAP / kg binder) * 2.2046 (lb/kg)

Maximum Annual Emission Rate (ton/yr) = Maximum Hourly Emission Rate (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

Maximum Hourly Emission Rate (kg/hr) = Maximum Hourly Emission Rate (lb/hr) * 0.4535924 (kg/lb)

Maximum Annual Emission Rate (tonne/yr) = Maximum Annual Emission Rate (ton/yr) * 0.9071847 (tonne/ton)

Roxul USA, Inc.
Ranson, West Virginia
Source ID: Dry Ice Cleaning

Operating Parameters, per Source

Dry Ice Production ¹	75	kg/hr
Annual Dry Ice Production	657,000	kg/yr
Operating Hours ²	8,760	hr/yr
CO ₂ Consumed	2.2	(loss factor)

Emission Calculations⁴

Source	US		METRIC	
	Hourly	Annual	Hourly	Annual
	(lb/hr)	(ton/yr)	(kg/hr)	(tonne/yr)
CO ₂ Emitted	363.76	1,593.28	165.00	1,445.40

Notes:

ton = short tons

tonne = metric tons

1. CO₂ consumption rate for dry ice production per manufacturer data sheet. The CO₂ factor represents the total quantity of CO₂ required to produce 1 kg CO₂ (accounts for CO₂ system loss).

2. For conservatism, emissions from dry ice cleaning station are based on 8,760 hours per year; however, 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.

Sample Calculations:

Dry Ice Production Rate (kg/yr) = Hourly Dry Ice Production Rate (kg/hr) * 8,760 (hrs/yr)

CO₂ Hourly Emission Rate (lb/hr) = Hourly Dry Ice Production Rate (kg/hr) * CO₂ Loss Factor * 2.2046 (lbs/kg)

CO₂ Annual Emission Rate (ton/yr) = CO₂ Emission Rate (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

CO₂ Hourly Emission Rate (kg/hr) = Hourly Emission Rate (lb/hr) * 0.45359 (kg/lb)

CO₂ Annual Emission Rate (tonne/yr) = Annual Emission Rate (ton/yr) * 0.90718 (tonne/ton)

Roxul USA Inc.
Ranson, West Virginia
Source ID: Product Marking

Operating Parameters

Maximum Heat Input Capacity	11	kw
No. of Branding Wheels	8	
Total Maximum Heat Input Capacity	88	kw
Operating hours	8,760	hr/yr
Fuel Type	Natural Gas	
Natural Gas HHV	1,026	Btu/scf

Combustion Emission Calculations (Total for all burners)

Pollutant	Emission Factor		US		METRIC		Modeled Emission Rate ⁴	
	(lb/MM scf)	(lb/MM Btu)	Hourly Emissions	Annual Emissions	Hourly Emissions	Annual Emissions	(g/s)	Averaging Period
			(lb/hr)	(ton/yr)	(kg/hr)	(tonne/yr)		
PM ₁₀ /PM _{2.5}	1.9	0.0019	7.41E-04	3.24E-03	3.36E-04	2.94E-03	-	-
PM ₁₀ /PM _{2.5}	7.6	0.0074	2.98E-03	1.30E-02	1.34E-03	1.18E-02	3.73E-04	24-hr, Annual
Nitrogen Oxides (NO _x)	100	0.097	0.04	0.17	0.02	0.15	4.91E-03	1-hr, Annual
Carbon Monoxide	84	0.0819	0.03	0.14	0.01	0.13	4.13E-03	1-hr, 8-hr
Sulfur Dioxide (SO ₂)	0.6	0.006	2.34E-04	1.02E-03	1.06E-04	9.29E-04	2.95E-05	1-hr, 3-hr, 24-hr Annual
VOC	5.5	0.0054	2.14E-03	9.39E-03	9.73E-04	8.52E-03	-	-
Lead	5.00E-04	4.87E-07	1.95E-07	8.54E-07	8.84E-08	7.75E-07	-	-
Hexane	1.80E+00	0.0018	7.02E-04	3.07E-03	3.18E-04	2.79E-03	-	-
Carbon Dioxide (CO ₂)	-	116.98	46.79	204.94	21.22	185.92	-	-
Methane (CH ₄)	-	0.0022	8.82E-04	3.86E-03	4.00E-04	3.50E-03	-	-
Nitrous Oxide (N ₂ O)	-	0.0002	8.82E-05	3.86E-04	4.00E-05	3.50E-04	-	-
CO ₂ Equivalent (CO ₂ e) ³	-	-	46.84	205.16	21.25	186.11	-	-
Total HAP	1.89	1.84E-03	7.36E-04	3.22E-03	3.34E-04	2.93E-03	-	-

Notes:

ton = short tons

tonne = metric tons

1. Natural Gas emission factor source AP-42 Table 1.4-1, 1.4-2, 1.4-3, and 1.4-4 for SO₂, PM₁₀, PM_{2.5}, CO, VOC, NO_x, Lead, Hexane, Total HAPs, GHG emission factors per 40 CFR Part 98, Table C-1 and C-2, GWPs per 40 CFR 98, Table A-1.

2. PM₁₀ and PM_{2.5} emission factors include filterable and condensable particulate matter (e.g., Total PM₁₀, PM_{2.5}).

3. CO₂ Equivalent (CO₂e) lb/hr, ton/yr = CO₂ + [GWP₁₀₀ * CH₄] + [GWP₁₀₀ * N₂O].

4. Maximum g/s emissions do not vary based on model averaging period (i.e., a source permitted to operate at maximum capacity 24 hr/day, 365 day/year).

Sample Calculations:

Hourly Emissions (lb/hr) = Emission Factor (lb/MMBtu) * Maximum Heat Input Capacity (MMBtu/hr)

Annual Emissions (ton/yr) = Hourly Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

Hourly Emissions (kg/hr) = Hourly Emissions (lb/hr) / 2.2046 (lb/kg)

Annual Emissions (tonne/yr) = Hourly Emissions (kg/hr) * 8,760 (hr/yr) / 1,000 (kg/tonne)

Modeled Emission Rate (g/s) [for all Averaging Periods] = Hourly Emissions (lb/hr) * 453.59 (g/lb) / 3,600 (sec/hr)

Ink VOC Emission Calculations¹

Material	Percent Volatile (%)	VOC Content (%)	HAP Content (%)	US			METRIC			Material
				Density (lb/gal)	Usage (gal)	Annual Emission Rate (ton/yr)	Density (g/L)	Usage (liters)	Annual Emission Rate (tonne/yr)	
Ink	100%	100%	0	7.58	2400	9.10	910	8200	8.25	DPI-411 VL
Cleaner	100%	100%	0	7.51	100	0.38	902	400	0.34	JAM7500 Cleaner
Totals						9.47			8.59	

Notes:

1. Material specifications for both solutions based on data presented in SDS. Conservatively assumed all material is VOC.

Sample Calculations:

Annual Emissions (ton/yr) = VOC Content (%) * Volatile Content (%) * Usage (gal) * Density (lb/gal) / 2,000 (lb/ton)

Annual Emissions (tonne/yr) = Annual Emissions (ton/yr) * 0.9071847 (tonne/ton)

Total VOC Emissions (Ink & Combustion)

Pollutant	US		METRIC
	Maximum Emission Rate (ton/yr)	Maximum Emission Rate (ton/yr)	Maximum Emission Rate (tonne/yr)
VOC	9.48		8.60

Roxul USA Inc.

Ranson, West Virginia

Source ID: Melting Furnace Cooling Tower (IMF02), Gutter Cooling Tower (HE02)

Operating Parameters

Roxul Source ID	No. of Towers	Circulating Cooling Water Flow Rate	
		(m3/hr)	(gpm)
IMF02	1	300	1,321
HE02	1	70	308

Drift Losses	0.001	% of Circulating Cooling Water
TDS ¹	1,500	ppmw Recommended Max Level
Operating Schedule	8,760	hr/yr

Emission Calculations

IMF02 6.6 lb/hr drift, per tower

	US		METRIC		Modeled Emission Rate ²	
	Hourly Emissions	Annual Emissions	Hourly Emissions	Annual Emissions	(g/s)	Averaging Period
	(lb/hr)	(ton/yr)	(kg/hr)	(tonne/yr)		
PM, PM ₁₀	0.01	0.04	4.50E-03	0.04	1.25E-03	24-hr, Annual
PM _{2.5}	4.96E-03	0.02	2.25E-03	0.02	6.25E-04	24-hr, Annual

HE02 1.5 lb/hr drift, per tower

	US		METRIC		Modeled Emission Rate ²	
	Hourly Emissions	Annual Emissions	Hourly Emissions	Annual Emissions	(g/s)	Averaging Period
	(lb/hr)	(ton/yr)	(kg/hr)	(tonne/yr)		
PM, PM ₁₀	2.31E-03	0.01	1.05E-03	9.19E-03	2.91E-04	24-hr, Annual
PM _{2.5}	1.16E-03	0.01	5.25E-04	4.60E-03	1.46E-04	24-hr, Annual

Notes:

ton = short tons

tonne = metric tons

1. Assume all TDS drift is emitted as PM/PM₁₀. PM_{2.5} is assumed to be 50% of PM/PM₁₀.

2. Maximum g/s emissions do not vary based on model averaging period (i.e., a source permitted to operate at maximum capacity 24 hr/day, 365 day/year).

Sample Calculations:

Drift Loss (lb/hr) = Circulating Flow (gpm) x 8.34 lb/gal * 60 mins/hr x % drift

Hourly Emissions (lb/hr) = Drift Loss (lb/hr) * TDS concentration (ppmw / 10⁶)

Annual Emissions (ton/yr) = Hourly (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

Hourly Emissions (kg/hr) = Hourly Emissions (lb/hr) * 0.4535924 (kg/lb)

Annual Emissions (tonne/yr) = Hourly (lb/hr) * 8,760 (hr/yr) / 1,000 (kg/tonne)

Roxul USA, Inc.
 Ranson, West Virginia
 Source ID: Coal Mill Burner with Baghouse (IMF05)

Coal Mill Natural Gas Burner Emission Calculations

Operating Parameters

Maximum Heat Input Capacity	1758	KW
Operating Hours	6,000	MMBtu/hr
HHV	0.760	hr/yr
Fuel Type	1.028	Btus/scf
	Natural Gas	

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (lb/MMBtu)	Max. Annual Operating Rate (MMBtu/yr)	US		METRIC		Modeled Emission Rate ¹	
				Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)	Hourly Emissions (kg/hr)	Annual Emissions (tonne/yr)	g/s	Averaging Period
NO _x	72	0.0706	52,591	0.42	1.88	0.18	1.88	5.34E-02	1-hr, Annual
SO ₂	0.8	0.0008	52,591	3.51E-03	0.02	1.59E-03	0.01	4.42E-04	1-hr, 3-hr, 24-hr, Annual
Condensable PM	5.7	0.0058	52,591	0.03	0.15	0.02	0.13	-	-
CO	84	0.0819	52,591	0.49	2.15	0.22	1.95	6.19E-02	24-hr, Annual
VOC	5.9	0.0054	52,591	0.03	0.14	0.01	0.13	-	-
Lead	0.0025	4.97E-07	52,591	2.93E-06	1.26E-05	1.33E-06	1.16E-05	-	-
Hexane	1.8	0.0018	52,591	0.01	0.05	4.78E-03	0.04	-	-
Total HAPs	1.868	0.0018	52,591	0.01	0.05	0.01	0.04	-	-
CO ₂	-	119.86	52,591	702.28	3,075.99	318.55	2,790.48	-	-
CH ₄	-	2.20E-03	52,591	0.01	0.06	0.01	0.05	-	-
N ₂ O	-	2.20E-04	52,591	0.00	0.01	8.00E-04	0.01	-	-
CO _{2e}	-	-	52,591	703.01	3,079.17	318.88	2,793.37	-	-

Notes:

ton = short tons

tonne = metric tons

1. Natural Gas emission factor source AP-42 Table 1.4-1, 1.4-2, 1.4-3, and 1.4-4 for SO₂, PM₁₀, PM_{2.5}, CO, VOC, Lead, Hexane, Total HAPs, Chromium. GHG emission factors per 40 CFR Part 98, Table C-1 and C-2. GWPs per 40 CFR 98, Table A-1. NO_x emission factor based on 60 ppmvd @ 3% O₂ per manufacturer specification.

2. PM₁₀ and PM_{2.5} emission factors include filterable and condensable particulate matter (e.g., Total PM₁₀, PM_{2.5}).

3. CO₂ Equivalent (CO_{2e}) lb/yr, ton/yr = CO₂ * [GWP₁₀₀ * CH₄] + [GWP₁₀₀ * N₂O]

4. Maximum g/s emissions do not vary based on model averaging period (i.e., a source permitted to operate at maximum capacity 24 hr/day, 365 days/year).

Sample Calculations:

Hourly Emissions (lb/hr) = Emission Factor (lb/MMBtu) * Maximum Heat Input Capacity (MMBtu/hr)

Annual Emissions (ton/yr) = Hourly Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

Hourly Emissions (kg/hr) = Hourly Emissions (lb/hr) (2.2046 lb/kg)

Annual Emissions (tonne/yr) = Hourly Emissions (kg/hr) * 8,760 (hr/yr) / 1,000 (kg/tonne)

Modeled Emission Rate (g/s) [for all Averaging Periods] = Hourly Emissions (lb/hr) * 453.59 (g/lb) / 3,600 (sec/hr)

Coal Mill Fluidized Bed Dryer - Coal Drying Emission Calculations^{1,2}

Pollutant	Emission Factor (lb pollutant/ton coal)	Max. Coal Feed Operating Rate ³	US		METRIC	
			Potential Hourly Emissions (lb/hr)	Potential Annual Emissions (ton/yr)	Potential Hourly Emissions (kg/hr)	Potential Annual Emissions (tonne/yr)
VOC	Claimed Confidential	Claimed Confidential	0.38	1.51	0.17	1.37
OPM	Claimed Confidential	Claimed Confidential	0.16	0.64	0.07	0.58

Note:

1. Claimed confidential.

2. CO, CO₂, and NO_x emissions are not expected because the coal is dried at 82°C which is not a high enough temperature to undergo combustion.

3. Operating rate for coal mill fluidized bed dryer is based on the maximum quantity delivered per day or per year.

Sample Calculations:

Hourly emissions (lb/hr) = E (lb pollutant/ton coal) * Operating Rate (ton/hr)

Annual Emissions (ton/yr) = E (lb pollutant/ton coal) * Operating Rate (ton/yr) / (2,000 lb/ton)

Hourly emissions (kg/hr) = Hourly emissions (lb/hr) * 0.4535924 kg/lb

Annual Emissions (tonne/yr) = Annual emissions (ton/yr) * 0.9071847 tonne/ton

Coal Milling Baghouse Emission Calculations¹

Roxul Source ID	Source Description	Pollutant	Particulate Outlet Loading		Fan Flow Rate		US		METRIC		Modeled Emission Rate		
			(gr/s/cf)	(mg/hr/m ³)	(m ³ /hr)	(scfm)	Hourly Emissions (lb/hr)	Annual Emissions (tons/yr)	Hourly Emissions (kg/hr)	Annual Emissions (tonne/yr)	g/s	Averaging Period	
			IMF05	Coal Milling Baghouse	PM ₁₀ , PM _{2.5} , PM _{2.5} EXT	0.005	12.3	4,547	2,673	0.12	0.64	0.06	0.49

Notes:

1. PM_{2.5} is conservatively assumed to be 50% of PM₁₀.

Sample Calculations:

Hourly Emissions (lb/hr) = Fan Flow Rate (scfm) * Exhaust Concentration (gr/scf) * 7,000 (gr/lb) * 60 (min/hr)

Annual Emissions (ton/yr) = Hourly Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)

Hourly Emissions (kg/hr) = Hourly Emissions (lb/hr) * 0.4535924 kg/lb

Annual Emissions (tonne/yr) = Annual Emissions (ton/yr) * 0.9071847 tonne/ton

Total Coal Milling Vent Emissions

Pollutant	US		METRIC		Modeled Emission Rate ¹	
	Hourly Emissions (lb/hr)	Annual Emissions (short ton/yr)	Hourly Emissions (kg/hr)	Annual Emissions (tonne/yr)	g/s	Averaging Period
NO _x	0.42	1.88	0.19	1.88	5.34E-02	1-hr, Annual
SO ₂	3.51E-03	0.02	1.59E-03	0.01	4.42E-04	1-hr, 3-hr, 24-hr, Annual
PM ₁₀ T	0.12	0.54	0.06	0.49	-	-
Total PM ₁₀	0.32	1.33	0.14	1.20	3.88E-02	24-hr, Annual
Total PM _{2.5}	0.26	1.06	0.12	0.96	3.22E-02	24-hr, Annual
CO	0.49	2.15	0.22	1.95	6.19E-02	1-hr, 3-hr
VOC	0.41	1.85	0.19	1.50	-	-
Lead	2.93E-06	1.28E-05	1.33E-06	1.16E-05	-	-
Hexane	0.01	0.05	0.00	0.04	-	-
Total HAPs	0.01	0.05	0.01	0.04	-	-
CO _{2e}	703.01	3,079.17	318.88	2,793.37	-	-

Notes:

1. Maximum g/s emissions do not vary based on model averaging period (i.e., a source permitted to operate at maximum capacity 24 hr/day, 365 days/year).

Sample Calculations:

Modeled Emission Rate (g/s) [for all Averaging Periods] = Hourly Emissions (lb/hr) * 453.59 (g/lb) / 3,600 (sec/hr)

Road USA, Inc.
 Rankin, West Virginia
 Coal Milling Material Handling

1 Coal Milling Material Handling Units

Road Segment ID	Source Description	Fuel Flow Rate		METRIC						US						Modeled Emissions Rate ¹ lb/yr Annual	
		lb/min	gpm	Exhaust Concentration		PM ₁₀ Fugitive		Annual Emissions		Hourly Emissions		Annual Emissions		Hourly Emissions			
				(ppmV)	(ppmV)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)		
0214	Coal Conveyer Transfer Point (PCT) to B231	1.802	1.127	8	2.057	0.33	0.09	2.76	0.0	2.00E-03	2.5	0.001	4.30E-03	0.04	0.01	0.04	1.20E-04
0215	Coal Conveyer Transfer Point (PCT) to B232	1.802	1.127	8	2.057	0.33	0.09	2.76	0.0	2.00E-03	2.5	0.001	4.30E-03	0.04	0.01	0.04	1.20E-04
0216	Coal Milling Machine Inlet Conveyer Transfer Point	1.802	1.127	8	0.900	2.50E-02	0.04	0.01	0.04	1.00E-03	2.0	0.001	3.20E-03	0.02	0.01	0.02	8.00E-05
0217	Coal Discharge Conveyor	1.802	0.717	8	0.900	0.70	0.04	0.04	0.04	2.00E-03	2.0	0.001	3.20E-03	0.02	0.01	0.02	8.00E-05

Notes:
 1. Fuel flow rate is based on 100% efficiency.
 2. Maximum gpm emissions are not very based on model operating point (i.e., a factor permitted to operate at maximum capacity 24 hours, 365 days/year).
 3. Modeled emissions rates are not modeled individually, but are based on the source emission rate.
 Sample Calculations:
 Hourly Emissions (lb/yr) = Fuel Flow Rate (gpm) * Exhaust Concentration (ppmV) * 0.0001 (lb/gal) * 60 (min/hr) * 24 (hr/day) * 365 (days/year)
 Annual Emissions (lb/yr) = Hourly Emissions (lb/yr) * 365 (days/year)
 Hourly Emissions (lb/yr) = Fuel Flow Rate (gpm) * Exhaust Concentration (ppmV) * 0.0001 (lb/gal) * 60 (min/hr) * 24 (hr/day) * 365 (days/year)
 Annual Emissions (lb/yr) = Hourly Emissions (lb/yr) * 365 (days/year)
 Modeled Emissions Rate (lb/yr) = Annual Emissions (lb/yr) / 365 (days/year)

2 Coal Milling Delivery and Front-End Loader Fugitive Emissions

Road Segment ID	Source Description	Emission Rate ¹	Emission Rate ²		Emission Rate ³	Emission Rate ⁴
			(lb/yr)	(lb/yr)		
0218	Coal Milling Delivery	1.802	0.717	0.04	0.04	0.04
0219	Front-End Loader	1.802	0.717	0.04	0.04	0.04

Notes:
 1. Emission rate based on 100% efficiency.
 2. Emission rate based on 100% efficiency.
 3. Emission rate based on 100% efficiency.
 4. Emission rate based on 100% efficiency.
 Sample Calculations:
 Emission Rate (lb/yr) = Fuel Flow Rate (gpm) * Exhaust Concentration (ppmV) * 0.0001 (lb/gal) * 60 (min/hr) * 24 (hr/day) * 365 (days/year)
 Annual Emissions (lb/yr) = Emission Rate (lb/yr) * 365 (days/year)
 Modeled Emissions Rate (lb/yr) = Annual Emissions (lb/yr) / 365 (days/year)

Road Segment ID	Source Description	Emission Rate ¹	Emission Rate ²	Emission Rate ³	METRIC						Modeled Emissions Rate ¹ lb/yr Annual	Clean Air Act Analysis (lb/yr)		
					UNCONTROLLED Emissions		CONTROLLED Emissions		UNCONTROLLED Emissions				CONTROLLED Emissions	
					(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)			(lb/yr)	(lb/yr)
0220	Coal Milling Delivery	1.802	0.717	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
0221	Coal Milling Delivery	1.802	0.717	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
0222	Coal Milling Delivery	1.802	0.717	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	

Notes:
 1. Emission rate based on 100% efficiency.
 2. Emission rate based on 100% efficiency.
 3. Emission rate based on 100% efficiency.
 4. Emission rate based on 100% efficiency.
 Sample Calculations:
 Emission Rate (lb/yr) = Fuel Flow Rate (gpm) * Exhaust Concentration (ppmV) * 0.0001 (lb/gal) * 60 (min/hr) * 24 (hr/day) * 365 (days/year)
 Annual Emissions (lb/yr) = Emission Rate (lb/yr) * 365 (days/year)
 Modeled Emissions Rate (lb/yr) = Annual Emissions (lb/yr) / 365 (days/year)

3 Total Coal Milling Fugitive Emissions Summary

Road Segment ID	Source Description	PM ₁₀		PM _{2.5}		CONTROLLED Total Annual Emissions		Modeled Emissions Rate		CONTROLLED Total Annual Emissions		Modeled Emissions Rate	
		(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	(lb/yr)	
0223	Coal Milling Delivery	0.04	0.04	0.04	0.04	1.20E-03	1.00E-03	0.01	0.01	0.20E-04	0.10E-04	0.04	0.04

Roxul USA Inc.
Ranson, West Virginia
Source ID: Rockton Line (RFN1) Emissions

Rockton Source ID	Source Description	Concentration		Flow Rate		METRIC				US		Modeled Emission Rate*	Notes	Control Device		
		(mg/Nm³)	(ppm)	(Nm³/hr)	(scfm)	Hourly Emission \$	Annual Emission \$	Hourly Emission \$	Annual Emission \$	(g/s)	Averaging Period					
RFN-E1	Rockton - IR Zone															
	Filterable PM	1.4	0.001	3,000	1,885	4.20E-03	0.04	0.01	0.04					Note 1, Note 2 (1)		
	Filterable PM ₁₀	1.4	0.001	3,000	1,885	4.20E-03	0.04	0.01	0.04					Note 1		
	Filterable PM _{2.5}	0.7	0.0003	3,000	1,885	2.10E-03	0.02	4.63E-03	0.02					Note 1		
	Condensable PM			3,000	1,885	4.20E-03	0.04	0.01	0.04					Note 1		
	Total PM ₁₀			3,000	1,885	0.01	0.07	0.02	0.08	2.33E-03	24-hr, Annual			Note 1		
	Total PM _{2.5}			3,000	1,885	6.30E-03	0.06	0.01	0.06	1.75E-03	24-hr, Annual			Note 1		
	VOC			3,000	1,885	See combined limit		See combined limit								
	Formaldehyde	1		3,000	1,885	4.20E-03	0.04	0.01	0.04					Note 2 (1)		
	Mineral Fiber			3,000	1,885	4.20E-03	0.04	0.01	0.04					Note 2		
	Phenol	1		3,000	1,885	6.00E-03	0.03	0.01	0.03					Note 2 (1)		
Total HAPs			3,000	1,885	0.01	0.09	0.02	0.10								
RFN-E2	Rockton - Hot Press & Cure															
	Filterable PM	1.4	0.0003	3,000	1,885	4.20E-03	0.04	0.01	0.04					Note 1, Note 2 (1)		
	Filterable PM ₁₀	1.4	0.0003	3,000	1,885	4.20E-03	0.04	0.01	0.04					Note 1		
	Filterable PM _{2.5}	0.7	0.0003	3,000	1,885	2.10E-03	0.02	4.63E-03	0.02					Note 1		
	Condensable PM			3,000	1,885	4.20E-03	0.04	0.01	0.04					Note 1		
	Total PM ₁₀			3,000	1,885	0.01	0.07	0.02	0.08	2.33E-03	24-hr, Annual			Note 1		
	Total PM _{2.5}			3,000	1,885	6.30E-03	0.06	0.01	0.06	1.75E-03	24-hr, Annual			Note 1		
	VOC			3,000	1,885	See combined limit		See combined limit								
	Formaldehyde	1		3,000	1,885	4.20E-03	0.04	0.01	0.04					Note 2 (1)		
	Mineral Fiber			3,000	1,885	4.20E-03	0.04	0.01	0.04					Note 3		
	Phenol	1		3,000	1,885	6.00E-03	0.03	0.01	0.03					Note 2 (1)		
Total HAPs			3,000	1,885	0.01	0.09	0.02	0.10					Note 2 (1)			
RFN-E3	Rockton - De-dusting Baghouse (WIPERS - CLASS EMISSIONS)															
	Filterable PM	1.3	0.0003	117,812	74,419	0.15	1.35	0.34	1.45	4.29E-02	24-hr, Annual			Note 1, Note 2 (1)	Baghouse	
	Filterable PM ₁₀	1.3	0.0003	117,812	74,419	0.15	1.35	0.34	1.45	4.29E-02	24-hr, Annual			Note 1	Baghouse	
	Filterable PM _{2.5}	0.68	0.0002	117,812	74,419	0.06	0.58	0.17	0.73	2.14E-02	24-hr, Annual			Note 1	Baghouse	
	Mineral Fiber			117,812	74,419	0.15	1.35	0.34	1.45					Note 3	Baghouse	
	Total HAPs			117,812	74,419	0.15	1.35	0.34	1.48						Baghouse	
	Rockton - De-dusting Baghouse (OPTIMAL to ROCKTON BUILDINGS)															
	Filterable PM	0.3	0.0001	117,812	74,419	0.02	0.14	0.03	0.15	1.6E-04	24-hr, Annual			Note 1, Note 2 (1)	Baghouse HEPA, BM ₂	
	Filterable PM ₁₀	0.3	0.0001	117,812	74,419	0.02	0.14	0.03	0.15	1.6E-04	24-hr, Annual			Note 1	Baghouse, HEPA, BM ₂	
	Filterable PM _{2.5}	0.13	0.00005	117,812	74,419	0.01	0.07	0.02	0.07	3.57E-04	24-hr, Annual			Note 1	Baghouse, HEPA, BM ₂	
	Mineral Fiber			117,812	74,419	0.02	0.14	0.03	0.15					Note 3	Baghouse HEPA, BM ₂	
Total HAPs			117,812	74,419	0.02	0.14	0.03	0.15						Baghouse HEPA, BM ₂		
RFN-E4	Rockton - High Oven A															
	Filterable PM	3.3	0.0013	8,000	5,053	0.03	0.23	0.06	0.25					Note 1, Note 2 (1)		
	Filterable PM ₁₀	3.3	0.0013	8,000	5,053	0.03	0.23	0.06	0.25					Note 1		
	Filterable PM _{2.5}	1.05	0.0007	8,000	5,053	0.01	0.12	0.03	0.13					Note 1		
	Condensable PM			8,000	5,053	0.03	0.23	0.06	0.25					Note 1		
	Total PM ₁₀			8,000	5,053	0.05	0.46	0.12	0.51	1.47E-02	24-hr, Annual			Note 1		
	Total PM _{2.5}			8,000	5,053	0.04	0.35	0.09	0.38	1.10E-02	24-hr, Annual			Note 1		
	NO _x	15.1		8,000	5,053	0.12	1.06	0.27	1.17	3.59E-02	1-hr, Annual			Claimed CBI		
	CO	12.7		8,000	5,053	0.10	0.89	0.22	0.86	2.62E-02	1-hr, 8-hr, 24-hr, Annual			Claimed CBI		
	SO ₂	0.69		8,000	5,053	7.24E-04	0.01	1.69E-03	0.01	2.01E-04	1-hr, 8-hr, 24-hr, Annual			Claimed CBI		
	VOC			8,000	5,053	See combined limit		See combined limit								
Formaldehyde	1		8,000	5,053	0.01	0.07	0.02	0.08					Note 2 (1)			
Hexane	0.3		8,000	5,053	2.17E-03	0.02	4.79E-03	0.02					Claimed CBI			
Lead	7.54E-05		8,000	5,053	6.03E-07	5.29E-06	1.33E-06	5.93E-06					Claimed CBI			
Mineral Fiber			8,000	5,053	0.03	0.23	0.06	0.25					Note 3			
Phenol	1		8,000	5,053	0.01	0.07	0.02	0.08					Note 2 (1)			
Total HAPs	5.6		8,000	5,053	0.04	0.36	0.10	0.43					Claimed CBI			
CO ₂	18,105		8,000	5,053	144.84	1,268.78	319.31	1,398.60					Claimed CBI			
CH ₄	0.3		8,000	5,053	2.73E-03	0.02	0.01	0.03					Claimed CBI			
H ₂ O	0.03		8,000	5,053	2.73E-04	2.39E-03	6.02E-04	2.64E-03					Claimed CBI			
CO _{2e}			8,000	5,053	144.99	1,270.09	319.64	1,400.04								
RFN-E5	Rockton - High Oven B															
	Filterable PM	3.3	0.0013	8,000	5,053	0.03	0.23	0.06	0.25					Note 1, Note 2 (1)		
	Filterable PM ₁₀	3.3	0.0013	8,000	5,053	0.03	0.23	0.06	0.25					Note 1		
	Filterable PM _{2.5}	1.05	0.0007	8,000	5,053	0.01	0.12	0.03	0.13					Note 1		
	Condensable PM			8,000	5,053	0.03	0.23	0.06	0.25					Note 1		
	Total PM ₁₀			8,000	5,053	0.05	0.46	0.12	0.51	1.47E-02	24-hr, Annual			Note 1		
	Total PM _{2.5}			8,000	5,053	0.04	0.35	0.09	0.38	1.10E-02	24-hr, Annual			Note 1		
	NO _x	15.1		8,000	5,053	0.12	1.06	0.27	1.17	3.59E-02	1-hr, Annual			Claimed CBI		
	CO	12.7		8,000	5,053	0.10	0.89	0.22	0.86	2.62E-02	1-hr, 8-hr, 24-hr, Annual			Claimed CBI		
	SO ₂	0.1		8,000	5,053	7.24E-04	0.01	1.69E-03	0.01	2.01E-04	1-hr, 8-hr, 24-hr, Annual			Claimed CBI		
	VOC			8,000	5,053	See combined limit		See combined limit								
Formaldehyde	1		8,000	5,053	0.01	0.07	0.02	0.08					Note 2 (1)			
Hexane	0.3		8,000	5,053	2.17E-03	0.02	4.79E-03	0.02					Claimed CBI			
Lead	7.54E-05		8,000	5,053	6.03E-07	5.29E-06	1.33E-06	5.93E-06					Claimed CBI			
Mineral Fiber			8,000	5,053	0.03	0.23	0.06	0.25					Note 3			
Phenol	1		8,000	5,053	0.01	0.07	0.02	0.08					Note 2 (1)			
Total HAPs	5.6		8,000	5,053	0.04	0.36	0.10	0.43					Claimed CBI			
CO ₂	18,105		8,000	5,053	144.84	1,268.78	319.31	1,398.60					Claimed CBI			
CH ₄	0.3		8,000	5,053	2.73E-03	0.02	0.01	0.03					Claimed CBI			
H ₂ O	0.03		8,000	5,053	2.73E-04	2.39E-03	6.02E-04	2.64E-03					Claimed CBI			
CO _{2e}			8,000	5,053	144.99	1,270.09	319.64	1,400.04								
RFN-E6	Rockton - Dry (In) Oven 1															
	Filterable PM	3.70	0.0015	5,000	3,158	0.02	0.16	0.04	0.18					Note 1, Note 2 (1)	Particulate Filter	
	Filterable PM ₁₀	3.70	0.0015	5,000	3,158	0.02	0.16	0.04	0.18					Note 1	Particulate Filter	
	Filterable PM _{2.5}	1.85	0.0008	5,000	3,158	0.01	0.08	0.02	0.09					Note 1	Particulate Filter	
	Condensable PM			5,000	3,158	0.02	0.16	0.05	0.18					Note 1		
	Total PM ₁₀			5,000	3,158	0.04	0.32	0.08	0.36	1.02E-02	24-hr, Annual			Note 1	Particulate Filter	
	Total PM _{2.5}			5,000	3,158	0.03	0.24	0.06	0.27	7.71E-03	24-hr, Annual			Note 1	Particulate Filter	
	NO _x	18.1		5,000	3,158	0.08	0.79	0.20	0.87	2.51E-02	1-hr, Annual			Claimed CBI		
	CO	15.2		5,000	3,158	0.08	0.67	0.17	0.73	2.11E-02	1-hr, 8-hr, 24-hr, Annual			Claimed CBI		
	SO ₂	0.1		5,000	3,158	9.43E-04	8.79E-03	1.20E-03	0.01	1.61E-04				Claimed CBI		
	VOC			5,000	3,158	See combined limit		See combined limit								
Formaldehyde	2		5,000	3,158	0.01	0.08	0.02	0.10					Note 2 (1)			
Hexane	0.3		5,000	3,158	1.62E-03	0.01	3.69E-03	0.02					Claimed CBI			
Lead	9.59E-05		5,000	3,158	4.33E-07	3.96E-06	9.96E-07	4.37E-06					Claimed CBI			
Mineral Fiber			5,000	3,158	0.02	0.16	0.04	0.18					Note 3	Particulate Filter		
Phenol	1		5,000	3,158	5.00E-03	0.04	0.01	0.05					Note 2 (1)			
Total HAPs	7.0		5,000	3,158	0.04	0.31	0.08	0.34					Claimed CBI			
CO ₂	21,709		5,000	3,158	180.63	951.89	235.49	1,048.65					Claimed CBI			
CH ₄	0.4		5,000	3,158	2.05E-03	0.02	4.51E-03	0.02					Claimed CBI			
H ₂ O	0.04		5,000	3,158	2.05E-04	1.76E-03	4.51E-04	1.96E-03					Claimed CBI			

Roxul USA Inc.
 Ranson, West Virginia
 Source ID: Rockfon Line (RFN) Emissions

Roxul Source ID	Source Description	Concentration		Flow Rate		METRIC		US		Modeled Emission Rate ^a	Notes	Control Device
		(mg/m ³)	(gr/dscf)	(Nm ³ /hr)	(scfh)	Hourly Emission ^b	Annual Emission ^b	Hourly Emission ^c	Annual Emission ^c			
	Pollutant					(lb/hr)	(tonne/yr)	(lb/hr)	(ton/year)	(lb)	At-Risk/yr Period	
RFN-E6	Rockfon - Spray Paint Cabin											
	Filterable PM	30	0.0081	10,000	6,317	0.20	1.75	0.44	1.93			Note 1, Note 2 (1) Particulate Filter
	Filterable PM ₁₀	20	0.0081	10,000	6,317	0.20	1.75	0.44	1.83			Note 1 Particulate Filter
	Filterable PM _{2.5}	10	0.0041	10,000	6,317	0.10	0.86	0.22	0.97			Note 1 Particulate Filter
	Condensable PM			10,000	6,317	0.20	1.75	0.44	1.83			Note 1
	Total PM ₁₀			10,000	6,317	0.40	3.50	0.88	3.86	1.11E-01	24-hr, Annual	Note 1 Particulate Filter
	Total PM _{2.5}			10,000	6,317	0.30	2.61	0.66	2.90	8.33E-02	24-hr, Annual	Note 1 Particulate Filter
	VOC			10,000	6,317	See combined limit	See combined limit					
	Formaldehyde			10,000	6,317	0.01	0.09	0.02	0.12			Note 2 (1)
	Mineral Fiber			10,000	6,317	0.20	1.75	0.44	1.83			Note 3 Particulate Filter
	Phenol			10,000	6,317	0.03	0.22	0.06	0.24			Note 2 (1)
	Total HAPs			10,000	6,317	0.23	2.06	0.62	2.27			
RFN-E8	Rockfon - Drying Oven 2 & 3											
	Filterable PM	2.38	0.0010	12,000	7,580	0.03	0.25	0.06	0.28			Note 1, Note 2 (1) Particulate Filter
	Filterable PM ₁₀	2.38	0.0010	12,000	7,580	0.03	0.25	0.06	0.28			Note 1 Particulate Filter
	Filterable PM _{2.5}	1.19	0.0008	12,000	7,580	0.01	0.13	0.03	0.14			Note 1 Particulate Filter
	Condensable PM			12,000	7,580	0.03	0.25	0.06	0.28			Note 1
	Total PM ₁₀			12,000	7,580	0.06	0.50	0.13	0.55	1.59E-02	24-hr, Annual	Note 1 Particulate Filter
	Total PM _{2.5}			12,000	7,580	0.04	0.38	0.09	0.41	1.16E-02	24-hr, Annual	Note 1 Particulate Filter
	NO _x	17.8		12,000	7,580	0.21	1.85	0.47	2.04	5.87E-03	1-hr, Annual	Classified CBI
	CO	14.8		12,000	7,580	0.16	1.55	0.39	1.71	4.93E-02	1-hr, 8-hr, 1-hr, 3-hr, 24-hr, Annual	Classified CBI
	SO ₂	0.1		12,000	7,580	1.27E-03	0.01	2.79E-03	0.01	3.52E-04		Classified CBI
	VOC			12,000	7,580	See combined limit	See combined limit					
	Formaldehyde	2		12,000	7,580	0.02	0.21	0.05	0.23			Note 2 (1)
	Benzene	0.3		12,000	7,580	3.80E-03	0.03	0.01	0.04			Classified CBI
	Lead	8.80E-05		12,000	7,580	1.06E-06	9.29E-06	2.39E-06	1.02E-05			Classified CBI
	Mineral Fiber			12,000	7,580	0.03	0.25	0.06	0.26			Note 3 Particulate Filter
	Phenol	1		12,000	7,580	0.01	0.11	0.03	0.12			Note 2 (1)
	Total HAPs	8.37		12,000	7,580	0.07	0.62	0.19	0.86			Classified CBI
	CO ₂	21,122		12,000	7,580	253.47	2,220.37	588.80	2,447.54			Classified CBI
	CH ₄	0.4		12,000	7,580	4.79E-03	0.04	0.01	0.05			Classified CBI
	N ₂ O	0.04		12,000	7,580	4.76E-04	4.18E-03	1.05E-03	4.51E-03			Classified CBI
	CO _{2e}			12,000	7,580	293.73	2,222.67	599.36	2,450.07			
RFN-E7	Rockfon - Coating Zone											
	Filterable PM	1.75	0.0007	25,000	15,792	0.04	0.38	0.10	0.42			Note 1, Note 2 (1)
	Filterable PM ₁₀	1.75	0.0007	25,000	15,792	0.04	0.38	0.10	0.42			Note 1
	Filterable PM _{2.5}	0.875	0.0004	25,000	15,792	0.02	0.19	0.05	0.21			Note 1
	Condensable PM			25,000	15,792	0.04	0.38	0.10	0.42			Note 1
	Total PM ₁₀			25,000	15,792	0.09	0.77	0.19	0.84	2.45E-02	24-hr, Annual	Note 1
	Total PM _{2.5}			25,000	15,792	0.07	0.57	0.14	0.63	1.82E-02	24-hr, Annual	Note 1
	VOC			25,000	15,792	See combined limit	See combined limit					
	Formaldehyde	1		25,000	15,792	0.03	0.22	0.06	0.24			Note 2 (1)
	Mineral Fiber			25,000	15,792	0.04	0.38	0.10	0.42			Note 3
	Phenol	1		25,000	15,792	0.03	0.22	0.06	0.24			Note 2 (1)
	Total HAPs			25,000	15,792	0.09	0.82	0.21	0.91			
RFN-E1	JR Zone											
RFN-E2	Hot Break & Cure											
	VOC					0.72	6.76	1.71	7.48			Classified CBI
RFN-E4	Drying Oven 1											
RFN-E3	High Oven A											
RFN-E5	High Oven B											
RFN-E6	Drying Oven 2 & 3											
RFN-E7	Coating Zone											
RFN-E5	Spray Paint Cabin											
	VOC					3.16	27.94	7.01	30.88			Classified CBI

Notes:
 1. Filterable PM₁₀ is conservatively assumed to be equal to PM. Filterable PM_{2.5} is assumed to equal 50% of PM. Condensable PM is equal to Filterable PM. For clarity:
 Total PM₁₀ = Filterable PM₁₀ + Condensable PM
 Total PM_{2.5} = Filterable PM_{2.5} + Condensable PM
 2. Calculation Method References/ Examples Calculations:
 1 - Stack Testing from similar facility, scaled as appropriate to RAN process.
 Classified Confidential
 4 - Sum of organic NAP
 3. Mineral Fiber emissions were conservatively assumed equal to Filterable PM₁₀ emissions for sources that may contain rock wool fibers. The listed HAP, type mineral fibers includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.
 4. Maximum g/h emissions do not vary based on model Wastepipe period (i.e., a source permitted to operate at maximum capacity 24 hr/day, 365 days/year).
 Sample Calculations:
 Hourly Emissions (lb/hr) = Flow Rate (Nm³/hr) * Exhaust Concentration (mg/m³) * 1,000,000 (mg/lb) * 1
 Hourly Emission Rate (Filterable PM) = Concentration (mg/m³) * 107,000 (gm³/hr) / Flow Rate (scfm) * 60 (min/hr)
 Hourly Emissions (lb/hr) = Hourly Emissions (kg/hr) * 2.20462 (lb/kg)
 Annual Emissions (ton/yr) = Hourly Emission Rate (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton)
 Annual Emissions (tonne/yr) = Hourly Emissions (kg/hr) * 8,760 (hr/yr) / 1,000 (kg/tonne)
 CO₂ Equivalent (CO₂e) = CO₂ + [GWPC_{CH4} * CH₄] + [GWPC_{N2O} * N₂O]
 Modeled Emission Rate (lb/hr) for all Averaging Periods = Hourly Emissions (lb/hr) * 453.59 (kg/lb) * 2.830 (scfh/lb)

Roxul USA Inc.
Ranson, West Virginia
Source ID: Natural Gas Boilers (CM03, CM04) & Rockfon Building Heat (RFN10)

Operating Parameters, PER BOILER

Maximum Heat Input	1,500	kw
Capacity	5.12	MMBtu/hr
Operating Hours	8,760	hr/yr
Fuel Type	Natural Gas	
Fuel HHV	1,026	MMBtu/MMscf

EMISSIONS SHOWN FOR AN INDIVIDUAL EMISSION POINT (PER BOILER)

Pollutant	Maximum Potential Emissions ^{1,2}		US		METRIC		Modeled Emission Rate ⁴	
	Emission Factor		Hourly Emissions Per Source	Annual Emissions Per Source	Hourly Emissions Per Source	Annual Emissions Per Source		
	(lb/MMscf)	(lb/MMBtu)	(lb/hr)	(ton/yr)	(kg/hr)	(tonne/yr)	(g/s)	Averaging Period
NO _x	36.21	0.0353	0.18	0.79	0.06	0.72	2.26E-02	1-hr, Annual
SO ₂	0.6	0.0006	3.00E-03	0.01	1.36E-03	0.01	3.77E-04	1-hr, 3-hr, 24-hr, Annual
PM/PM _{10F} /PM _{2.5F}	1.9	0.0019	0.01	0.04	4.30E-03	0.04	-	-
PM _{10T} /PM _{2.5T}	7.6	0.0074	0.04	0.17	0.02	0.15	4.78E-03	24-hr, Annual
Condensable PM	5.7	0.0056	0.03	0.12	0.01	0.11	-	-
CO	84	0.0819	0.42	1.84	0.19	1.67	5.26E-02	1-hr, 8-hr
VOC	5.5	0.0054	0.03	0.12	0.01	0.11	-	-
Lead	0.0005	4.87E-07	2.50E-06	1.09E-05	1.13E-06	9.82E-06	-	-
Hexane	1.8	0.0018	0.01	0.04	0.00	0.04	-	-
Total HAPs	1.89	0.0018	0.01	0.04	4.28E-03	0.04	-	-
CO ₂	-	116.98	599.25	2624.70	271.81	2,381.09	-	-
CH ₄	-	2.20E-03	0.01	0.05	5.12E-03	0.04	-	-
N ₂ O	-	2.20E-04	1.13E-03	4.95E-03	5.12E-04	4.49E-03	-	-
CO ₂ e ³	-	-	599.87	2,627.41	272.09	2,383.55	-	-

Notes:

ton = short tons

tonne = metric tons

1. Natural Gas emission factor source AP-42 Table 1.4-1, 1.4-2, 1.4-3, and 1.4-4 for SO₂, PM_{10T}, PM_{2.5T}, CO, VOC, Lead, Hexane, Total HAPs, Chromium. GHG emission factors per 40 CFR Part 98, Table C-1 and C-2. GWPs per 40 CFR 98, Table A-1. NO_x emission factor based on 30 ppmvd @ 3% O₂ per manufacturer specification.

2. PM_{10T} and PM_{2.5T} emission factors include filterable and condensable particulate matter.

3. CO₂ Equivalent (CO₂e) lb/hr, ton/yr = CO₂ + [GWP_{CH4} * CH₄] + [GWP_{N2O} * N₂O].

4. Maximum g/s emissions do not vary based on model averaging period (i.e., a source permitted to operate at maximum capacity 24 hr/day, 365 day/yr).

Sample Calculations:

Hourly Emissions (lb/hr) = Emission Factor (lb/MMBtu) * Maximum Heat Input Capacity (MMBtu/hr)

Annual Emissions (ton/yr) = Hourly Emissions (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton) □

Hourly Emissions (kg/hr) = Hourly Emissions (lb/hr) * 0.4535924 kg/lb

Annual Emissions (tonne/yr) = Hourly Emissions (kg/hr) * 8,760 (hr/yr) / 1,000 (kg/tonne) □

Modeled Emission Rate (g/s) [for all Averaging Periods] = Hourly Emissions (lb/hr) * 453.59 (g/lb) / 3,600 (sec/hr) □

Roxil USA Inc.
Ranson, West Virginia
Source ID: Emergency Fire Pump Engine (EFP1)

Operating Parameters, per fire pump engine

Fuel type	Diesel	0.0015% Sulfur
Maximum Firing Rate	197 hr	low
Operating hours	1.38 MMBtu/hr	hr/yr

Maximum Potential Emissions

Pollutant	Emission Factor			US		METRIC		Modeled Emission Rate ⁵		Class I AQRV Analysis (Q ₁₀) ⁶
	g/kw-hr	lb/hp-hr	Source	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)	Hourly Emissions (kg/hr)	Annual Emissions (ton/yr)	(g/s)	Averaging Period	
									ton/yr	
Filterable PM ₁₀ /PM _{2.5}	0.2	3.29E-04	NSPS III, Table 4 (0.20 g/kw-hr)	0.05	0.02	0.03	0.01	-	-	-
PM ₁₀	-	3.63E-04	Filterable + Condensable	0.06	0.02	0.03	0.02	5.42E-04	Annual	0.33
PM _{2.5}	-	3.83E-04	Filterable + Condensable	0.08	0.02	0.03	0.02	1.96E-04	24-hr	-
Condensable PM ⁷	-	5.99E-05	AP-42, Tab. 3.4-2	0.01	2.65E-03	4.62E-03	2.41E-03	5.42E-04	Annual	-
NO _x	4.0	6.576E-03	NSPS III, Table 4 (4.0 g/kw-hr NOx+NMHC)	1.30	0.32	0.59	0.29	9.32E-03	Annual	5.67
CO	3.5	5.754E-03	NSPS III, Table 4 (3.5 g/kw-hr)	1.13	0.28	0.51	0.26	intermittent excluded	1-hr, 6-hr	-
SO ₂	-	1.05E-05	Miss Balance	2.14E-03	5.36E-04	9.72E-04	4.86E-04	4.50E-05	3-hr, 24-hr, Annual	0.01
Combustion VOC	0.6	3.86E-04	15% of NSPS III, Table 4 (4.0 g/kw-hr NOx + NMHC)	0.19	0.05	0.08	0.04	intermittent excluded	1-hr	-
Total HAPs ⁸	-	2.71E-05	AP-42, (3.87x10 ⁻⁴ lb/MMBtu)	5.34E-03	1.34E-03	2.42E-03	1.21E-03	-	-	-
CO ₂	-	1.14	kg/MMBtu	224.65	56.16	101.90	50.95	-	-	-
CH ₄	-	4.63E-05	40 CFR 98, Title C-1 (3.0x10 ⁻³ kg/MMBtu)	8.11E-03	2.28E-03	4.13E-03	2.07E-03	-	-	-
N ₂ O	-	9.29E-05	40 CFR 98, Title C-1 (5.0x10 ⁻⁴ kg/MMBtu)	1.62E-03	4.56E-04	8.27E-04	4.13E-04	-	-	-
CO _{2e} ⁹	-	-	-	226.42	56.36	102.25	51.12	-	-	-

Notes:

- ton = short tons
tonne = metric tons
- Conservatively assuming PM = PM₁₀ / PM_{2.5}
- For AP-42, used average brake specific fuel consumption of 7,000 lb/hp-hr to convert lb/MMBtu emission factors to lb/hp-hr.
- CO₂ Equivalent (CO₂e) (lb/hr, ton/yr) = CO₂ + (GWPC_{CH4} * CH₄) + (GWPC_{N2O} * N₂O) / GWPC_{CO2} per 40 CFR 98, Table A-1 (CO₂ = 1, CH₄ = 25, N₂O = 298).
- Conservatively assumed all NSPS NO_x + NMHC limit emitted as NO_x.
- The Emergency Fire Pump will assume 100 hours of operation per year for testing and readiness purposes. As an intermittent source it would not be included in the 1-hr NO_x and SO₂ analyses as recommended by EPA (EPA Memorandum March 16, 2011). For the 1-hr and 6-hr CO, 24-hr PM₁₀/PM_{2.5}, and 3-hr and 24-hr SO₂ analyses, the Emergency Fire Pump will be modeled assuming emission rates conservatively based on an operation schedule of 1/2 hour per day. Modeled emissions for the 24-hr and annual SO₂ standard were conservatively set equal to the modeled 3-hr SO₂ emissions. Modeled emissions for the 3-hr CO standard were conservatively set equal to the modeled 1-hr CO emissions.

6. For QRI screening tool, the annual steady-state-equivalent emission rate (Q) was determined. For example Q_{NOx} (ton) = NO_x @ 500 hr/yr (tpp) * [8,760 (hr/yr) / 500 (hr/yr)]

Sample Calculations:

- Hourly Emissions (lb/hr) = Emission Factor (lb/hp-hr) * Maximum Firing Rate (hp)
- Annual Emissions (ton/yr) = Hourly Emissions (lb/hr) * 500 (hr/yr) / 2,000 (lb/ton)
- Hourly Emissions (kg/hr) = Hourly Emissions (lb/hr) * 0.4535924 kg/lb
- Annual Emissions (ton/year) = Annual Emissions (ton/yr) * 0.9071847 ton/ton
- SO₂ 3-hr, 24-hr, Annual Emission Rate (g/s) = Hourly Emissions (lb/hr) / 2 (per 0.5 hr/day assumption) / 3,600 (sec/hr)
- CO Modeled 1-hr, 6-hr Emission Rate (g/s) = Hourly Emissions (lb/hr) / 2 (per 0.5 hr/day assumption) * 453.59 (g/lb) / 3,600 (sec/hr)
- PM₁₀/PM_{2.5} Modeled 24-hr Emission Rate (g/s) = Daily Emissions (lb/hr) / 2 (per 0.5 hr/day assumption) / 24-hr model averaging period * 2,000 (lb/ton) * 453.59 (g/lb) / 3,600 (sec/hr)
- PM₁₀/PM_{2.5}/NO_x Modeled Annual Emission Rate (g/s) = Annual Emissions (ton/yr) (based on 500 hr/yr) / 8,760 (hr/yr) * 2,000 (lb/ton) * 453.59 (g/lb) / 3,600 (sec/hr)

Roxul USA Inc.
 Ranson, West Virginia
 Source ID: Facility-wide Fugitive Emissions from Paved Haul Roads

Emission Estimate For Paved Haulroads¹

k =	PM particle size multiplier ((lb/VMT))	0.011
N ₁₀ =	PM10 particle size multiplier ((lb/VMT))	0.0022
k _{2.5} =	PM2.5 particle size multiplier ((lb/VMT))	0.00054
S _{finished road} =	Finished product road surface silt loading, (g/m ²)	0.2
S _{raw material} =	Raw materials road surface silt loading, (g/m ²)	8.2
W ³ =	Mean Vehicle Weight (tons)	see table
P ⁴ =	Number of days per year with precipitation >0.01 inch	148
N =	Number of days in averaging period	365
CE ⁵ =	Control Efficiency, %	75%
-	Maximum Weeks of Operation per year	52
-	Hours of Operation per year	8,760

US Units

Item No.	Description	Empty Vehicle Weight (tons)	Load Weight (ton/day)	PM-2.5			PM10		
				Controlled Emissions		Total Modeled Emission Rate ¹		Class I AQRV Analysis (Q/d)	
				(ton/day)	(ton/year)	24-hr (g/s)	Annual (g/s)		ton/yr
1	Truck - Oil	Claimed Confidential	E-05	9.03E-04	4.34E-06	2.28E-04	4.65E-05	5.50E-06	0.01
2	Truck - Oxygen		E-05	0.01	8.95E-06	2.56E-03	8.40E-06	7.35E-05	0.01
3	Truck - Raw Material (Stone) to 210		E-04	0.13	1.43E-04	0.03	1.50E-03	9.67E-04	0.21
4	Truck - Coal/PET Coke		E-05	0.02	1.56E-06	4.46E-03	1.64E-04	1.28E-04	0.02
5	Truck - DeSOx and Binder		E-05	0.01	1.03E-06	2.94E-03	1.08E-04	8.49E-05	0.02
6	Truck - Waste		E-05	4.52E-03	3.95E-06	1.13E-03	4.15E-05	3.25E-05	0.01
7	Truck - Pallet and Foil		E-05	1.48E-03	1.29E-06	3.68E-04	1.36E-05	1.06E-05	1.92E-03
8	Truck - Finished Goods		E-05	0.01	1.09E-05	3.11E-03	1.14E-04	8.94E-05	0.02
9 ¹	FEL - Diverted Melt from Blag 300 to Pit Waste (170)		Controlled	0.01	1.41E-04	0.03	1.91E-05	1.55E-05	0.21
10 ¹	FEL - Crushed Melt from 170 to 210		Controlled	0.04	5.22E-05	0.01	5.48E-04	2.74E-04	0.06
11 ⁴	FEL - Coal/PET Coke from Bunker to Feed Hopper (for Milling)		E-05	2.90E-03	2.18E-06	7.28E-04	2.29E-05	2.09E-05	3.24E-03
12 ⁴	FEL - Raw Material from 210 to Feed Hopper		E-04	0.05	3.97E-05	0.01	4.16E-04	4.16E-04	0.05
13 ⁴	FEL - Raw Material from Stockpile to 210		E-04	0.02	1.49E-04	0.01	1.50E-03	1.49E-04	0.21
14	Truck - Raw Material from Stockpile to 210 (add 1 miles over Item 3)		E-04	0.01	8.89E-05	3.22E-03	5.33E-04	9.25E-05	0.13
		E-03	0.41	5.50E-04	0.10	5.83E-03	2.99E-03	0.97	
		E-06	2.90E-03	2.18E-06	7.28E-04	2.29E-05	2.09E-05	3.24E-03	
		E-05	0.01	1.22E-05	3.48E-03	1.28E-04	1.00E-04	0.02	

Source	Pollutant	No. of Modeled Segments	PEI
Raw Material Paved Haul Roads	PM-10	31	8.9
	PM-2.5		2.2
Finished Products Paved Haul Roads	PM-10	35	1.4
	PM-2.5		3.6

Metric Units

Item No.	Description	Empty Vehicle Weight (tonnes)	Load Weight (ton/day)	PM-2.5			Total Modeled Emission Rate	
				Controlled Emissions		Total Modeled Emission Rate ¹		
				(tonne/day)	(tonne/year)	24-hr (g/s)	Annual (g/s)	
1	Truck - Oil	Claimed Confidential	E-05	8.20E-04	3.94E-08	2.05E-04		
2	Truck - Oxygen		E-05	0.01	8.12E-06	2.32E-03		
3	Truck - Raw Material (Stone) to 210 or Stockpile		E-04	0.12	1.29E-04	0.03		
4	Truck - Coal/PET Coke		E-05	0.02	1.42E-05	4.05E-03		
5	Truck - DeSOx and Binder		E-05	0.01	9.31E-06	2.66E-03		
6	Truck - Waste		E-05	4.10E-03	3.58E-06	1.02E-03		
7	Truck - Pallet and Foil		E-05	1.34E-03	1.17E-06	3.35E-04		
8	Truck - Finished Goods		E-05	0.01	9.85E-06	2.82E-03		
9 ¹	FEL - Diverted Melt from Blag 300 to Pit Waste (170)		Controlled	0.03	1.22E-06	0.01		
10 ¹	FEL - Crushed Melt from 170 to 210		Controlled	0.03	4.73E-05	0.01		
11 ⁴	FEL - Coal/PET Coke from Bunker to Feed Hopper (for Milling)		E-05	2.63E-03	1.98E-06	6.59E-04		
12 ⁴	FEL - Raw Material from 210 to Feed Hopper		E-04	0.05	3.60E-05	0.01		
13 ⁴	FEL - Raw Material from Stockpile to 210		E-04	0.02	1.30E-04	4.70E-03		
14	Truck - Raw Material from Stockpile to 210 (add 1 miles over Item 3)		E-04	0.01	8.05E-05	2.92E-03		
		E-02	0.37	5.90E-04	0.09			
		E-05	2.63E-03	1.98E-06	6.59E-04			
		E-05	0.01	1.10E-05	3.15E-03			

Notes:

- ton = short tons
- tonne = metric tons
- FEL = front end loader
- 1. Modeled emission rates in gray are not modeled as a total, but divided out among the number of segments.
- 2. Maximum Trips per Day, Maximum Trips per Year, and Load Carried Weight by truck are based on data.
- 3. Loaded vehicle weight is a sum of empty vehicle weight and load carried weight, unless the sum is greater.
- 4. FEL empty vehicle weight based on operating weight of a Cat 930K Wheel Loader Standard Lift FEL.
- 5. For Q1 screening tool, the annual steady-state-equivalent emission rate (Q) was determined based on Sample Calculations:
 Uncontrolled Daily Emissions (ton/day) = E (lb/VMT) * Miles per trip * Max trips per day / 2000 (lb/ton)
 Uncontrolled Yearly Emissions (ton/year) = E (lb/VMT) * Miles per trip * Max trips per year / 2000 (lb/ton)
 Controlled Daily/Yearly Emissions (ton/day, ton/year) = Uncontrolled Daily/Yearly Emissions (ton/day, ton/year) * CE
 Uncontrolled/Controlled Daily/Yearly Emissions (ton/day, ton/year) = Uncontrolled/Controlled Daily/Yearly Emissions (ton/day, ton/year) * CE
 Modeled 24-hr Emission Rate (g/s) = Daily Emissions (ton/day) / 24 (hr/day) (for 24-hr model averaging period)
 Modeled Annual Emission Rate (g/s) = Annual Emissions (ton/yr) / 8,760 (hr/yr) (for annual model averaging period)

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West Virginia Department of Air Quality Application Forms
Appendix B

November 2017
Project No. 0408003

Environmental Resources Management
204 Chase Drive
Hurricane, West Virginia 25526
304-757-4777

 <p>WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION DIVISION OF AIR QUALITY 601 57th Street, SE Charleston, WV 25304 (304) 926-0475 www.dep.wv.gov/daq</p>		<p align="center">APPLICATION FOR NSR PERMIT AND TITLE V PERMIT REVISION (OPTIONAL)</p>	
<p>PLEASE CHECK ALL THAT APPLY TO NSR (45CSR13) (IF KNOWN):</p> <p><input checked="" type="checkbox"/> CONSTRUCTION <input type="checkbox"/> MODIFICATION <input type="checkbox"/> RELOCATION <input type="checkbox"/> CLASS I ADMINISTRATIVE UPDATE <input type="checkbox"/> TEMPORARY <input type="checkbox"/> CLASS II ADMINISTRATIVE UPDATE <input type="checkbox"/> AFTER-THE-FACT</p>		<p>PLEASE CHECK TYPE OF 45CSR30 (TITLE V) REVISION (IF ANY):</p> <p><input type="checkbox"/> ADMINISTRATIVE AMENDMENT <input type="checkbox"/> MINOR MODIFICATION <input type="checkbox"/> SIGNIFICANT MODIFICATION</p> <p>IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS ATTACHMENT S TO THIS APPLICATION</p>	
<p align="center"><i>FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.</i></p>			
<p>Section I. General</p>			
<p>1. Name of applicant (as registered with the WV Secretary of State's Office): Roxul USA Inc.</p>		<p>2. Federal Employer ID No. (FEIN): 99 - 0378111</p>	
<p>3. Name of facility (if different from above): RAN Facility</p>		<p>4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH</p>	
<p>5A. Applicant's mailing address: 71 Edmond Road, Suite 6 Kearneysville, WV 25430</p>		<p>5B. Facility's present physical address: N/A</p>	
<p>6. West Virginia Business Registration. Is the applicant a resident of the State of West Virginia? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>– If YES, provide a copy of the Certificate of Incorporation/Organization/Limited Partnership (one page) including any name change amendments or other Business Registration Certificate as Attachment A.</p> <p>– If NO, provide a copy of the Certificate of Authority/Authority of L.L.C./Registration (one page) including any name change amendments or other Business Certificate as Attachment A.</p>			
<p>7. If applicant is a subsidiary corporation, please provide the name of parent corporation: Rockwool Group</p>			
<p>8. Does the applicant own, lease, have an option to buy or otherwise have control of the <i>proposed site</i>? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>– If YES, please explain: Roxul will own the proposed site.</p> <p>– If NO, you are not eligible for a permit for this source.</p>			
<p>9. Type of plant or facility (stationary source) to be constructed, modified, relocated, administratively updated or temporarily permitted (e.g., coal preparation plant, primary crusher, etc.): Mineral Wool Insulation Manufacturing Facility</p>		<p>10. North American Industry Classification System (NAICS) code for the facility: 327993</p>	
<p>11A. DAQ Plant ID No. (for existing facilities only): N/A</p>		<p>11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): N/A</p>	

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

12A.

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

From WV-9 E, take the County Route 1 exit toward WV-480/Kearneysville/Leetown. Turn right onto Leetown Road and travel 0.4 miles. Turn left onto WV 115 and travel for 1.4 miles. Turn left onto Northport Avenue. Take a left onto Granny Smith Lane after traveling 0.4 mile to enter the facility.

12.B. New site address (if applicable):

**365 Granny Smith Lane
Kearneysville, WV 25340**

12C. Nearest city or town:

Kearneysville

12D. County:

Jefferson

12.E. UTM Northing (KM): **4362.62**

12F. UTM Easting (KM): **252.06**

12G. UTM Zone: **18**

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

New construction of facility.

14A. Provide the date of anticipated installation or change: **April 2018**

- If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: / /

14B. Date of anticipated Start-Up if a permit is granted:

October 2019

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

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

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

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

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

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

Section II. Additional attachments and supporting documents.

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

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

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

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

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

23. Provide a **Process Description** as **Attachment G**.
 – Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).
All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H**.
 – For chemical processes, provide a MSDS for each compound emitted to the air.

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

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

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

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

<input type="checkbox"/> Bulk Liquid Transfer Operations	<input checked="" type="checkbox"/> Haul Road Emissions	<input type="checkbox"/> Quarry
<input type="checkbox"/> Chemical Processes	<input type="checkbox"/> Hot Mix Asphalt Plant	<input checked="" type="checkbox"/> Solid Materials Sizing, Handling and Storage Facilities
<input type="checkbox"/> Concrete Batch Plant	<input type="checkbox"/> Incinerator	<input checked="" type="checkbox"/> Storage Tanks
<input type="checkbox"/> Grey Iron and Steel Foundry	<input checked="" type="checkbox"/> Indirect Heat Exchanger	

General Emission Unit, specify:
Mineral Wool Line – Melting Furnace, Spinning Chamber, Cooling Section, Curing Vents, Charging Material Handling Building Vents, and Dry Ice Cleaning
Rockfon Line - IR Zone, Hot Press, Cooling Zone, and Spray Paint Cabin

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

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

<input type="checkbox"/> Absorption Systems	<input checked="" type="checkbox"/> Baghouse	<input type="checkbox"/> Flare
<input type="checkbox"/> Adsorption Systems	<input type="checkbox"/> Condenser	<input type="checkbox"/> Mechanical Collector
<input checked="" type="checkbox"/> Afterburner	<input checked="" type="checkbox"/> Electrostatic Precipitator	<input type="checkbox"/> Wet Collecting System

Other Collectors, specify
Fabric Filters

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

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

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O**.
 > Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

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

33. **Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?
 YES NO
 > If **YES**, identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's **"Precautionary Notice – Claims of Confidentiality"** guidance found in the **General Instructions** as **Attachment Q**.

Section III. Certification of Information

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

Authority of Corporation or Other Business Entity Authority of Partnership

Authority of Governmental Agency Authority of Limited Partnership

Submit completed and signed Authority Form as Attachment R.

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

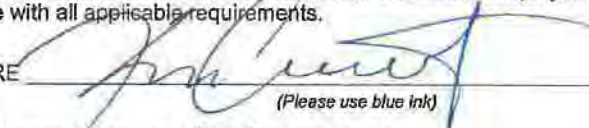
35A. Certification of Information. To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

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

Compliance Certification

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

SIGNATURE:  (Please use blue ink) DATE: November 20, 2017 (Please use blue ink)

35B. Printed name of signee: **Ken Cammarato** 35C. Title: **Vice President and General Legal Counsel**

35D. E-mail: **Ken.Cammarato@roxul.com** 36E. Phone: 36F. FAX:

36A. Printed name of contact person (if different from above): **Mette Drejstel** 36B. Title: **Group Environmental Manager**

36C. E-mail: **mette.drejstel@rockwool.com** 36D. Phone: 36E. FAX:

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

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



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

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

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

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Attachment A

**WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION
CERTIFICATE**

ISSUED TO:
**ROXUL USA INC.
DBA ROCKWOOL
71 EDMOND RD 6
KEARNEYSVILLE, WV 25430-2781**

BUSINESS REGISTRATION ACCOUNT NUMBER: 2348-4027

This certificate is issued on: **10/25/2017**

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

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

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

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

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

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

Attachment B

Attachment B

Site Map

Please see the site map for the RAN facility as Figure 1-1 in the Introduction of this permit application.

Attachment C

Attachment C
Construction Schedule

Construction is expected to start on the RAN facility in April 2018. RAN facility operations are expected to start in October 2019.

Attachment D

Attachment D
Regulation Discussion

Please see the regulatory discussion in Section 4 and Section 5 of the Introduction of this permit application for the federal and state regulatory discussions, respectively.

Attachment E

Attachment E

Plot Plan

Please see the plot plans for the RAN facility as Figure 2-1 and Figure 2-2 in the Introduction of this permit application.

Attachment F

Attachment F
Process Flow Diagrams

Please see redacted process flow diagrams for the RAN facility as Figure 3-1, Figure 3-2, and Figure 3-3 in the Introduction of this permit application. A confidential process flow diagram is submitted here in Attachment F.

Attachment G

Attachment G
Process Description

Please see the process description for the RAN facility as Section 2.0 in the Introduction of this permit application.

Attachment H

Attachment H
Safety Data Sheets

Please see the confidential safety data sheets submitted on CD-ROM as a part of this permit application. Justification for claiming this information confidential is provided in Attachment Q: Business Confidential Claims.

Attachment I

<p align="center">Attachment I Emission Units Table (includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)</p>						
Emission Unit ID ¹	Emission Point ID ²	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type ³ and Date of Change	Control Device ⁴
Mineral Wool Line						
IMF01	IMF01	Melting Furnace	2018	Claimed Confidential	New	IMF01-BH De-NOx De-SOx
IMF02	IMF02	Furnace Cooling Tower	2018	1,321 gpm (300 m ³ /hr)	New	None
IMF03A	IMF03A	Coal Storage Silo A	2018	TBD	New	IMF03A-FF
IMF03B	IMF03B	Coal Storage Silo B	2018	TBD	New	IMF03B-FF
IMF03C	IMF03C	Coal Storage Silo C	2018	TBD	New	IMF03C-FF
IMF07A	IMF07A	Filter Fines Day Silo	2018	TBD	New	IMF07A-FF
IMF07B	IMF07B	Secondary Energy Materials Silo	2018	TBD	New	IMF07B-FF
IMF08	IMF08	Sorbent Silo	2018	TBD	New	IMF08-FF
IMF09	IMF09	Spent Sorbent Silo	2018	TBD	New	IMF09-FF
IMF10	IMF10	Filter Fines Receiving Silo	2018	TBD	New	IMF10-FF
IMF11	IMF11	Conveyor Transition Point (B215 to B220)	2018	Claimed Confidential	New	IMF11-FF
B215	B215	Raw Material Loading Hopper	2018	Claimed Confidential	New	3-sided enclosure with cover
IMF12	IMF12	Conveyor Transition Point (B210 to B220)	2018	Claimed Confidential	New	IMF12-FF
IMF14	IMF14	Conveyor Transition Point (B220-1)	2018	Claimed Confidential	New	IMF14-FF
IMF15	IMF15	Conveyor Transition Point (B220-2)	2018	Claimed Confidential	New	IMF15-FF
IMF16	IMF16	Conveyor Transition Point (B220 to B300)	2018	Claimed Confidential	New	IMF16-FF
IMF21	IMF21	Charging Building Vacuum Cleaning Filter	2018	316 scfm (500 Nm ³ /hr)	New	IMF21-FF

RM_REJ	RM_REJ	Raw Material Reject Collection Bin	2018	Claimed Confidential	New	4-sided rubber drop guard
S_REJ	S_REJ	Sieve Reject Collection Bin	2018	Claimed Confidential	New	4-sided rubber drop guard
B170	B170	Melting Furnace Portable Crusher & Storage	2018	< 150 tph	New	None
B210	B210	Raw Material Storage - Loading	2018	Claimed Confidential	New	3-sided enclosure with cover
IMF24	IMF24	Preheat Burner	2018	5.1 MMBtu/hr	New	None
IMF25	IMF25	Coal Feed Tank	2018	Claimed Confidential	New	IMF25-FF
CO	HE01	Curing Oven	2018	Claimed Confidential	New	HE01 CO-AB
CO-HD	HE01	Curing Oven Hoods	2018	Claimed Confidential	New	HE01
GUT-EX	HE01	Gutter Exhaust	2018	Claimed Confidential	New	HE01
SPN	HE01	Spinning Chamber	2018	Claimed Confidential	New	HE01
CS	HE01	Cooling Section	2018	Claimed Confidential	New	HE01
HE02	HE02	Gutter Cooling Tower	2018	308 gpm (70 m ³ /hr)	New	None
CM12	CM12	Fleece Application Vent 1	2018	185 kg/hr	New	None
CM13	CM13	Fleece Application Vent 2	2018		New	None
CE01	CE01	De-dusting Baghouse	2018	44,217 scfm (70,000 Nm ³ /hr)	New	CE01-BH
CE02	CE02	Vacuum Cleaning Baghouse	2018	12,633 scfm (20,000 Nm ³ /hr)	New	CE02-BH
P_MARK	P_MARK	Product Marking	2018	0.04 MMBtu/hr (11 kW)	New	None

CM10	CM10	Recycle Plant Building Vent 1	2018	18,950 scfm (30,000 Nm ³ /hr)	New	CM10-FF
CM11	CM11	Recycle Plant Building Vent 2	2018	18,950 scfm (30,000 Nm ³ /hr)	New	CM11-FF
CM08	CM08	Recycle Plant Building Vent 3	2018	1,579 scfm (2,500 Nm ³ /hr)	New	CM08-FF
CM09	CM09	Recycle Plant Building Vent 4	2018	1,579 scfm (2,500 Nm ³ /hr)	New	CM09-FF
RMS	RMS	Raw Material Storage	2018	0.12 acres 500 m ²	New	3-sided enclosure with cover
IMF17	IMF17 / IMF18	Charging Material Handling Vent 1	2018	Claimed Confidential	New	Enclosed Indoors
IMF18	IMF17 / IMF18	Charging Material Handling Vent 2	2018	Claimed Confidential	New	Enclosed Indoors
DI	DI	Dry Ice Cleaning	2018	165.3 lb/hr 75 kg/hr	New	NA
Rockfon Line						
RFNE1	RFNE1	IR Zone	2018	Claimed Confidential	New	None
RFNE2	RFNE2	Hot Press	2018	Claimed Confidential	New	None
RFN3	RFN3	High Oven A	2018	Claimed Confidential	New	None
RFNE4	RFNE4	Drying Oven 1	2018	Claimed Confidential	New	RFNE4-FF
RFNE5	RFNE5	Spraying Cabin	2018	Claimed Confidential	New	RFNE5-FF
RFNE6	RFNE6	Drying Oven 2&3	2018	Claimed Confidential	New	RRNE6-FF
RFNE7	RFNE7	Cooling Zone	2018	Claimed Confidential	New	None
RFNE8	RFNE8	Rockfon De-Dusting Baghouse	2018	74,419 scfm (117,812 Nm ³ /hr)	New	RFNE8-BH
RFN9	RFN9	High Oven B	2018	Claimed Confidential	New	None

Coal Milling						
IMF04	IMF04	Coal Conveyor Transition Point (B213 to B215)	2018	Claimed Confidential	New	IMF04-FF
IMF05	IMF05	Coal Milling Burner & Baghouse	2018	Claimed Confidential	New	IMF05-BH
IMF06	IMF06	Coal Milling De-Dusting Baghouse	2018	Claimed Confidential	New	IMF06-BH
IMF13	IMF13	Coal Conveyor Transition Point (B213 to B215)	2018	Claimed Confidential	New	IMF13-FF
B235	B235	Coal Milling Building	2018	Claimed Confidential	New	Enclosed Indoors
B230	B230	Coal Unloading	2018	Claimed Confidential	New	3-sided enclosure with cover
B231	B231	Coal Unloading Hopper	2018	Claimed Confidential	New	3-sided enclosure with cover
Other RAN Facility Wide Sources						
CM03	CM03	Natural Gas Boiler 1	2018	5.1 MMBtu/hr (1.5 MW)	New	None
CM04	CM04	Natural Gas Boiler 2	2018	5.1 MMBtu/hr (1.5 MW)	New	None
EFP1	EFP1	Emergency Fire Pump Engine	2018	197 hp (147 kW)	New	None
RFN10	RFN10	Rockfon Building Heater	2018	5.1 MMBtu/hr (1.50 MW)	New	None
RAN Facility Storage Tanks						
TK-DF	TK-DF	Diesel Fuel Tank	2018	2,642 gal 10 m ³	New	None
TK-UO	TK-UO	Used Oil Tank	2018	581 gal 2.2 m ³	New	None
TK-TO1	TK-TO1	Thermal Oil Expansion Tank - Rockfon	2018	212 gal 0.8 m ³	New	None

TK-TO2	TK-TO2	Thermal Oil Drain Tank – Rockfon	2018	159 gal 0.6 m ³	New	None
TK-TO3	TK-TO3	Thermal Oil Tank - IMF	2018	2,642 gal 10 m ³	New	None
TK-TO4	TK-TO4	Thermal Oil Expansion Tank - IMF	2018	1,321 gal 5 m ³	New	None
TK-DO	TK-DO	De-dust Oil Storage Tank	2018	15,850 gal 60 m ³	New	None
TK-RS1	TK-RS1	Resin Storage Tank	2018	15,850 gal 60 m ³	New	None
TK-RS2	TK-RS2	Resin Storage Tank	2018	15,850 gal 60 m ³	New	None
TK-RS3	TK-RS3	Resin Storage Tank	2018	15,850 gal 60 m ³	New	None
TK-RS4	TK-RS4	Resin Storage Tank	2018	15,850 gal 60 m ³	New	None
TK-RS5	TK-RS5	Resin Storage Tank	2018	15,850 gal 60 m ³	New	None
TK-RS6	TK-RS6	Resin Storage Tank	2018	15,850 gal 60 m ³	New	None
TK-RS7	TK-RS7	Resin Storage Tank	2018	15,850 gal 60 m ³	New	None
TK-CA	TK-CA	Coupling Agent Storage Tank	2018	264 gal 1 m ³	New	None
TK-AD	TK-AD	Additive Storage Tank	2018	53 gal 0.2 m ³	New	None
TK-BM	TK-BM	Binder Mix Tank	2018	2,642 gal 10 m ³	New	None
TK-BC	TK-BC	Binder Circulation Tank	2018	4,227 gal 16 m ³	New	None
TK-BD	TK-BD	Binder Day Tank	2018	793 gal 3 m ³	New	None

TK-BS1	TK-BS1	Binder Storage Container	2018	264 gal 1 m ³	New	None
TK-BS2	TK-BS2	Binder Storage Container	2018	264 gal 1 m ³	New	None
TK-BS3	TK-BS3	Binder Storage Container	2018	264 gal 1 m ³	New	None
TK-DOD	TK-DOD	De-dust Oil Day Tank	2018	264 gal 1 m ³	New	None
TK-PD	TK-PD	Paint Dilution Storage Tank	2018	793 gal 3 m ³	New	None
TK-PDD	TK-PDD	Paint Dilution Day Tank	2018	397 gal 1.5 m ³	New	None

¹ For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S,... or other appropriate designation.

² For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.

³ New, modification, removal

⁴ For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

Attachment J

EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. <i>(Must match Emission Units Table & Plot Plan)</i>	Emission Point Type ¹	Emission Unit Vented Through This Point <i>(Must match Emission Units Table & Plot Plan)</i>		Air Pollution Control Device <i>(Must match Emission Units Table & Plot Plan)</i>		Vent Time for Emission Unit <i>(chemical processes only)</i>		All Regulated Pollutants - Chemical Name/CAS ³ <i>(Speciate VOCs & HAPS)</i>	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase <i>(At exit conditions, Solid, Liquid or Gas/Vapor)</i>	Est. Method Used ⁶	Emission Conc (ppmv or mg/m ⁴)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
Mineral Wool Line															
IMF01	Upward Vertical Stack	IMF01	Point	IMF01-BH	BH SNCR SIS	C	8760	NO _x			37.37	163.67	Gas/ Vapor	EE	
								SO ₂			33.63	147.31			
								CO			11.21	49.10			
								VOCs			11.66	51.08			
								PM ₁₀			8.22	36.01			
								PM _{2.5}			7.47	32.73			
								CO _{2e}			21,814.29	94,981.42			
								H ₂ SO ₄			3.74	16.37			
								Lead			<0.01	<0.01			
								Total HAPs			3.43	15.04			
IMF02	Upward Vertical Stack	IMF02	Point			C	8760	PM ₁₀			0.01	0.04	Solid	EE	
								PM _{2.5}			<0.01	0.02			

IMF03A	Upward Vertical Stack	IMF03A	Point	IMF03A-FF	FF	C	8760	PM ₁₀			0.01	0.06	Solid	EE	
								PM _{2.5}			<0.01	0.03			
IMF03B	Upward Vertical Stack	IMF03B	Point	IMF03B-FF	FF	C	8760	PM ₁₀			0.01	0.06	Solid	EE	
								PM _{2.5}			<0.01	0.03			
IMF03C	Upward Vertical Stack	IMF03C	Point	IMF03C-FF	FF	C	8760	PM ₁₀			0.01	0.06	Solid	EE	
								PM _{2.5}			<0.01	0.03			
IMF07A	Upward Vertical Stack	IMF07A	Point	IMF07A-FF	FF	C	8760	PM ₁₀			0.01	0.06	Solid	EE	
								PM _{2.5}			<0.01	0.03			
IMF07B	Upward Vertical Stack	IMF07B	Point	IMF07B-FF	FF	C	8760	PM ₁₀			0.01	0.06	Solid	EE	
								PM _{2.5}			<0.01	0.03			
IMF08	Upward Vertical Stack	IMF08	Point	IMF08-FF	FF	C	8760	PM ₁₀			0.01	0.06	Solid	EE	
								PM _{2.5}			<0.01	0.03			
IMF09	Upward Vertical Stack	IMF09	Point	IMF09-FF	FF	C	8760	PM ₁₀			0.01	0.06	Solid	EE	
								PM _{2.5}			<0.01	0.03			
IMF10	Upward Vertical Stack	IMF10	Point	IMF10-FF	FF	C	8760	PM ₁₀			0.01	0.06	Solid	EE	
								PM _{2.5}			<0.01	0.03			
IMF11	Upward Vertical Stack	IMF11	Point	IMF11-FF	FF	C	8760	PM ₁₀			0.02	0.09	Solid	EE	
								PM _{2.5}			<0.01	0.04			
IMF12	Upward Vertical Stack	IMF12	Point	IMF12-FF	FF	C	8760	PM ₁₀			0.02	0.09	Solid	EE	
								PM _{2.5}			<0.01	0.04			

IMF14	Upward Vertical Stack	IMF14	Point	IMF14-FF	FF	C	8760	PM ₁₀			0.02	0.09	Solid	Page 23 of 610	
								PM _{2.5}			<0.01	0.04			
IMF15	Upward Vertical Stack	IMF15	Point	IMF15-FF	FF	C	8760	PM ₁₀			0.02	0.09	Solid	EE	
								PM _{2.5}			<0.01	0.04			
IMF16	Upward Vertical Stack	IMF16	Point	IMF16-FF	FF	C	8760	PM ₁₀			0.02	0.09	Solid	EE	
								PM _{2.5}			<0.01	0.04			
IMF17	Upward Vertical Stack	IMF17	Point			C	8760	PM ₁₀			0.02	0.08	Solid	EE	
								PM _{2.5}			<0.01	0.04			
IMF18	Upward Vertical Stack	IMF18	Point			C	8760	PM ₁₀			0.02	0.08	Solid	EE	
								PM _{2.5}			<0.01	0.04			
IMF24	Upward Vertical Stack	IMF24	Point			C	8760	NO _x			0.36	1.58	Gas/ Vapor, Solid	EE	
								SO ₂			<0.01	0.01			
								CO			0.42	1.84			
								VOC			0.03	0.12			
								PM ₁₀			0.04	0.17			
								PM _{2.5}			0.04	0.17			
								CO ₂ e			599.87	2,627.41			
								Lead			<0.01	<0.01			
								Total HAPs			<0.01	0.04			
IMF25	Upward	IMF25	Point	IMF25-	FF	C	8760	PM ₁₀			0.01	0.06	Solid	EE	

	Vertical Stack			FF				PM _{2.5}			<0.01	0.03		
IMF21	Upward Vertical Stack	IMF21	Point	IMF21-FF	FF	C	8760	PM ₁₀			<0.01	0.02	Solid	EE
								PM _{2.5}			<0.01	0.01		
HE01	Upward Vertical Stack	HE01	Point			C	8760	NO _x			14.55	63.73	Gas/ Vapor, Solid	EE
								SO ₂			0.01	0.05		
								CO			1.82	7.97		
								VOC			78.02	341.71		
								PM ₁₀			21.21	92.89		
								PM _{2.5}			19.22	84.20		
								CO ₂ e			8,138.00	36,644.45		
								Phenol			19.37	84.85		
								Formaldehyde			12.79	56.01		
								Methanol			23.70	103.80		
			Total HAPs			77.07	337.56							
HE02	Upward Vertical Stack	HE02	Point			C	8760	PM ₁₀			<0.01	0.01	Solid	EE
								PM _{2.5}			<0.01	0.01		
CE01	Upward Vertical Stack	CE01	Point	CE01-BH	BH	C	8760	PM ₁₀			0.77	3.38	Solid	EE
								PM _{2.5}			0.77	3.38		
								Total HAPs			0.77	3.38		
CE02	Upward	CE02	Point	CE02-	BH	C	8760	PM ₁₀			0.22	0.97	Solid	EE

													Page 125 of 610	
	Vertical Stack			BH				PM _{2.5}		0.22	0.97			
								Total HAPs		0.22	0.97			
CM12	Vent	CM12	Point			C	8760	VOC		3.27	14.29	Gas/Vapor	EE	
								HAPs		3.27	14.29			
CM13	Vent	CM13	Point			C	8760	VOC		3.27	14.29	Gas/Vapor	EE	
								HAPs		3.27	14.29			
P_MARK	Vent	P_MARK	Volume			C	8760	NO _x		0.04	0.17	Gas/Vapor, Solid	EE	
								SO ₂		<0.01	<0.01			
								CO		0.03	0.14			
								VOC		<0.01	<0.01			
								PM ₁₀		<0.01	0.01			
								PM _{2.5}		<0.01	0.01			
								CO ₂ e		46.84	205.16			
								Lead		<0.01	<0.01			
								Total HAPs		<0.01	<0.01			
CM10	Upward Vertical Stack	CM10	Point	CM10-FF	FF	C	8760	PM ₁₀		0.66	2.90	Solid	EE	
								PM _{2.5}		0.33	1.45			
CM11	Upward Vertical Stack	CM11	Point	CM11-FF	FF	C	8760	PM ₁₀		0.66	2.90	Solid	EE	
								PM _{2.5}		0.33	1.45			
CM08	Upward	CM08	Point	CM08-	FF	C	8760	PM ₁₀		0.06	0.24	Solid	EE	

	Vertical Stack			FF				PM _{2.5}			0.03	0.12	Page 126 of 610	
CM09	Upward Vertical Stack	CM09	Point	CM09-FF	FF	C	8760	PM ₁₀			0.06	0.24	Solid	EE
								PM _{2.5}			0.03	0.12		
Rockfon Line														
RFNE1	Upward Vertical Stack	RFNE1	Point			C	8760	PM ₁₀			<0.01	0.04	Gas/ Vapor, Solid	EE
								PM _{2.5}			<0.01	0.02		
								Formaldehyde			<0.01	0.03		
								Phenol			<0.01	0.03		
								Total HAPs			0.02	0.10		
RFNE2	Upward Vertical Stack	RFNE2	Point			C	8760	PM ₁₀			<0.01	0.04	Gas/ Vapor, Solid	EE
								PM _{2.5}			<0.01	0.02		
								VOCs			1.71	7.48		
								Formaldehyde			<0.01	0.03		
								Phenol			<0.01	0.03		
								Total HAPs			0.02	0.10		
RFNE3	Upward Vertical Stack	RFNE3	Point			C	8760	NO _x			0.27	1.17	Gas/ Vapor, Solid	EE
								SO ₂			<0.01	<0.01		
								CO			0.22	0.98		
								PM ₁₀			0.06	0.25		

								PM _{2.5}		0.03	0.13		
								CO ₂ e		319.64	1,400.04		
								Lead		<0.01	<0.01		
								VOC		2.45	10.75		
								Formaldehyde		0.02	0.08		
								Hexane		<0.01	0.02		
								Phenol		0.02	0.08		
								Total HAPs		0.10	0.43		
RFNE4	Upward Vertical Stack	RFNE4	Point	RFNE4-FF	FF	C	8760	NO _x		0.20	0.87	Gas/Vapor, Solid	EE
								SO ₂		<0.01	0.01		
								CO		0.17	0.73		
								PM ₁₀		0.04	0.18		
								PM _{2.5}		0.02	0.09		
								CO ₂ e		239.73	1,050.03		
								Lead		<0.01	<0.01		
								VOC		0.76	3.31		
								Formaldehyde		0.02	0.10		
								Hexane		<0.01	0.02		
								Phenol		0.01	0.05		
								Total HAPs		0.08	0.34		

RFNE5	Upward Vertical Stack	RFNE5	Point	RFNE5-FF	FF	C	8760	PM ₁₀			0.44	1.93	Gas/Vapor, Solid	Page 28 of 610
								PM _{2.5}			0.22	0.97		
								VOC			0.09	0.39		
								Formaldehyde			0.02	0.10		
								Phenol			0.06	0.24		
								Total HAPs			0.52	2.27		
RFNE6	Upward Vertical Stack	RFNE6	Point	RFNE6-FF	FF	C	8760	NO _x			0.47	2.04	Gas/Vapor, Solid	EE
								SO ₂			<0.01	0.01		
								CO			0.39	1.71		
								PM ₁₀			0.13	0.55		
								PM _{2.5}			0.09	0.41		
								CO ₂ e			559.38	2,450.07		
								Lead			<0.01	<0.01		
								VOC			0.35	1.55		
								Hexane			<0.01	0.04		
								Formaldehyde			0.05	0.23		
								Phenol			0.03	0.12		
								Total HAPs			0.15	0.66		
RFNE7	Upward Vertical Stack	RFNE7	Point			C	8760	PM ₁₀			0.10	0.42	Gas/Vapor, Solid	EE
								PM _{2.5}			0.05	0.21		

								VOC			0.15	0.66		
								Formalde -hyde			0.06	0.24		
								Phenol			0.06	0.24		
								Total HAPs			0.21	0.91		
RFNE8	Upward Vertical Stack	RFNE8	Point	RFNE8- BH	BH	C	8760	PM ₁₀			0.34	1.49	Solid	EE
								PM _{2.5}			0.17	0.75		
								Total HAPs			0.34	1.49		
RFNE9	Upward Vertical Stack	RFNE9	Point			C	8760	NO _x			0.27	1.17	Gas/ Vapor, Solid	EE
								SO ₂			<0.01	0.01		
								CO			0.22	0.98		
								PM ₁₀			0.06	0.25		
								PM _{2.5}			0.03	0.13		
								CO _{2e}			319.64	1,400.04		
								Lead			<0.01	<0.01		
								VOC			2.77	12.13		
								Hexane			<0.01	0.02		
								Formalde -hyde			0.02	0.08		
								Phenol			0.02	0.08		
								Total HAPs			0.10	0.43		

RFN10	Upward Vertical Stack	RFN10	Point			C	8760	NO _x			0.18	0.79	Gas/ Vapor, Solid	Page 150 of 610
								SO ₂			<0.01	0.01		
								CO			0.42	1.84		
								VOC			0.03	0.12		
								PM ₁₀			0.04	0.17		
								PM _{2.5}			0.04	0.17		
								CO ₂ e			599.87	2,627.41		
								Lead			<0.01	<0.01		
								Hexane			<0.01	0.04		
								Total HAPs			<0.01	0.04		
Coal Milling														
IMF04	Upward Vertical Stack	IMF04	Point	IMF04-FF	FF	C	8760	PM ₁₀			0.02	0.09	Solid	EE
								PM _{2.5}			<0.01	0.04		
IMF05	Upward Vertical Stack	IMF05	Point	IMF05-BH	BH	C	8760	NO _x			0.42	1.86	Gas/ Vapor, Solid	EE
								SO ₂			<0.01	0.02		
								CO			0.49	2.15		
								VOCs			0.41	1.65		
								PM ₁₀			0.32	1.33		
								PM _{2.5}			0.26	1.06		
								CO ₂ e			703.01	3,079.17		
								Lead			<0.01	<0.01		
								Total HAPs			0.01	0.05		

IMF06	Upward Vertical Stack	IMF06	Point	IMF06-FF	FF	C	8760	PM ₁₀			0.22	0.97	Solid	Page EE of 610
								PM _{2.5}			0.11	0.48		
IMF13	Upward Vertical Stack	IMF13	Point	IMF13-FF	FF	C	8760	PM ₁₀			0.02	0.09	Solid	EE
								PM _{2.5}			<0.01	0.04		
Other RAN Facility Wide Sources														
CM03	Upward Vertical Stack	CM03	Point			C	8760	NO _x			0.18	0.79	Gas/ Vapor, Solid	EE
								SO ₂			<0.01	0.01		
								CO			0.42	1.84		
								VOC			0.03	0.12		
								PM ₁₀			0.04	0.17		
								PM _{2.5}			0.04	0.17		
								CO ₂ e			599.87	2,627.41		
								Lead			<0.01	<0.01		
								Hexane			<0.01	0.04		
								Total HAPs			<0.01	0.04		
CM04	Upward Vertical Stack	CM04	Point			C	8760	NO _x			0.18	0.79	Gas/ Vapor, Solid	EE
								SO ₂			<0.01	0.01		
								CO			0.42	1.84		
								VOC			0.03	0.12		
								PM ₁₀			0.04	0.17		
								PM _{2.5}			0.04	0.17		

								CO ₂ e			599.87	2,627.41		
								Lead			<0.01	<0.01		
								Hexane			<0.01	0.04		
								Total HAPs			<0.01	0.04		
EFP1	Upward Vertical Stack	EFP1	Point			EM	500	NO _x			1.30	0.32	Gas/Vapor	EE
								SO ₂			<0.01	<0.01		
								CO			1.13	0.28		
								VOC			0.19	0.05		
								PM ₁₀			0.08	0.02		
								PM _{2.5}			0.08	0.02		
								CO ₂ e			225.42	56.36		
								Total HAPs			<0.01	<0.01		
RAN Facility Storage Tanks														
TK-DF	Vent	TK-DF	Point			C	8760	Distillate fuel oil 2	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA Tanks
								VOC	<0.01	<0.01	<0.01	<0.01		
TK-UO	Vent	TK-UO	Point			C	8760	Distillate fuel oil 2	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA Tanks
								VOC	<0.01	<0.01	<0.01	<0.01		
TK-TO1	Vent	TK-TO1	Point			C	8760	Jet Naphtha	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA Tanks
								VOC	<0.01	<0.01	<0.01	<0.01		

TK-TO2	Vent	TK-TO2	Point			C	8760	Jet Naphtha	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA Tanks
								VOC	<0.01	<0.01	<0.01	<0.01		
TK-TO3	Vent	TK-TO3	Point			C	8760	Power Steering Fluid	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA Tanks
								VOC	<0.01	<0.01	<0.01	<0.01		
TK-TO4	Vent	TK-TO4	Point			C	8760	Power Steering Fluid	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA Tanks
								VOC	<0.01	<0.01	<0.01	<0.01		
TK-DO	Vent	TK-DO	Point			C	8760	Distillate fuel oil 2	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA Tanks
								VOC	<0.01	<0.01	<0.01	<0.01		
TK-RS1	Vent	TK-RS1	Point			C	8760	Formalde hyde	<0.01	0.01	<0.01	0.01	Gas/Vapor	O – EPA Tanks
								Methanol	<0.01	<0.01	<0.01	<0.01		
								VOC	<0.01	0.01	<0.01	0.01		
								HAP	<0.01	<0.01	<0.01	<0.01		
TK-RS2	Vent	TK-RS2	Point			C	8760	Formalde hyde	<0.01	0.01	<0.01	0.01	Gas/Vapor	O – EPA Tanks
								Methanol	<0.01	<0.01	<0.01	<0.01		
								VOC	<0.01	0.01	<0.01	0.01		
								HAP	<0.01	<0.01	<0.01	<0.01		
TK-RS3	Vent	TK-RS3	Point			C	8760	Formalde hyde	<0.01	0.01	<0.01	0.01	Gas/Vapor	O – EPA Tanks
								Methanol	<0.01	<0.01	<0.01	<0.01		

								VOC	<0.01	0.01	<0.01	0.01	Page 134 of 610	
								HAP	<0.01	<0.01	<0.01	<0.01		
TK-RS4	Vent	TK-RS4	Point			C	8760	Formaldehyde	<0.01	0.01	<0.01	0.01	Gas/Vapor	O – EPA Tanks
								Methanol	<0.01	<0.01	<0.01	<0.01		
								VOC	<0.01	0.01	<0.01	0.01		
								HAP	<0.01	<0.01	<0.01	<0.01		
TK-RS5	Vent	TK-RS5	Point			C	8760	Formaldehyde	<0.01	0.01	<0.01	0.01	Gas/Vapor	O – EPA Tanks
								Methanol	<0.01	<0.01	<0.01	<0.01		
								VOC	<0.01	0.01	<0.01	0.01		
								HAP	<0.01	<0.01	<0.01	<0.01		
TK-RS6	Vent	TK-RS6	Point			C	8760	Formaldehyde	<0.01	0.01	<0.01	0.01	Gas/Vapor	O – EPA Tanks
								Methanol	<0.01	<0.01	<0.01	<0.01		
								VOC	<0.01	0.01	<0.01	0.01		
								HAP	<0.01	<0.01	<0.01	<0.01		
TK-RS7	Vent	TK-RS7	Point			C	8760	Formaldehyde	<0.01	0.01	<0.01	0.01	Gas/Vapor	O – EPA Tanks
								Methanol	<0.01	<0.01	<0.01	<0.01		
								VOC	<0.01	0.01	<0.01	0.01		
								HAP	<0.01	<0.01	<0.01	<0.01		
TK-CA	Vent	TK-CA	Point			C	8760	Ethyl Alcohol	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA Tanks
								VOC	<0.01	<0.01	<0.01	<0.01		

TK-BA	Vent	TK-BA	Point			C	8760	-	-	-	-	-	NA	NA
TK-AD	Vent	TK-AD	Point			C	8760	Ethyl Alcohol	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA Tanks
								VOC	<0.01	<0.01	<0.01	<0.01		
TK-BM	Vent	TK-BM	Point			C	8760	Formaldehyde	<0.01	0.01	<0.01	0.01	Gas/Vapor	O – EPA Tanks
								Methanol	<0.01	<0.01	<0.01	<0.01		
								VOC	<0.01	0.01	<0.01	0.01		
								HAP	<0.01	<0.01	<0.01	<0.01		
TK-BC	Vent	TK-BC	Point			C	8760	Formaldehyde	<0.01	0.01	<0.01	0.01	Gas/Vapor	O – EPA Tanks
								Methanol	<0.01	<0.01	<0.01	<0.01		
								VOC	<0.01	0.01	<0.01	0.01		
								HAP	<0.01	<0.01	<0.01	<0.01		
TK-BD	Vent	TK-BD	Point			C	8760	Formaldehyde	<0.01	0.01	<0.01	0.01	Gas/Vapor	O – EPA Tanks
								Methanol	<0.01	<0.01	<0.01	<0.01		
								VOC	<0.01	0.01	<0.01	0.01		
								HAP	<0.01	<0.01	<0.01	<0.01		
TK-BS1	Vent	TK-BS1	Point			C	8760	Formaldehyde	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA Tanks
								VOC	<0.01	<0.01	<0.01	<0.01		
								HAP	<0.01	<0.01	<0.01	<0.01		
TK-BS2	Vent	TK-BS2	Point			C	8760	Formaldehyde	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA

								VOC	<0.01	<0.01	<0.01	<0.01	Page	Tanks
								HAP	<0.01	<0.01	<0.01	<0.01	10	10
TK-BS3	Vent	TK-BS3	Point			C	8760	Formaldehyde	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA Tanks
								VOC	<0.01	<0.01	<0.01	<0.01		
								HAP	<0.01	<0.01	<0.01	<0.01		
TK-DOD	Vent	TK-DOD	Point			C	8760	Distillate Fuel Oil 2	<0.01	<0.01	<0.01	<0.01	Gas/Vapor	O – EPA Tanks
								VOC	<0.01	<0.01	<0.01	<0.01		
TK-PD	Vent	TK-PD	Point			C	8760	VOC	0.01	0.03	0.01	0.03	Gas/Vapor	O – EPA Tanks
TK-PDD	Vent	TK-PDD	Point			C	8760	VOC	0.01	0.03	0.01	0.03	Gas/Vapor	O – EPA Tanks

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

- ¹ Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- ² Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- ³ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.
- ⁴ Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
- ⁵ Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
- ⁶ Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).
- ⁷ Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m³) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO₂, use units of ppmv (See 45CSR10).

Control Device Type Key:

BH – Baghouse

FF – Fabric Filter

SNCR – Selective Non-Catalytic Reduction

SIS – Sorbent Injection System

**Attachment J
EMISSION POINTS DATA SUMMARY SHEET**

Table 2: Release Parameter Data								
Emission Point ID No. <i>(Must match Emission Units Table)</i>	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow ¹ (acfm) <i>at operating conditions</i>	Velocity (fps)	Ground Level <i>(Height above mean sea level)</i>	Stack Height ² <i>(Release height of emissions above ground level)</i>	Northing	Easting
Mineral Wool Line								
IMF01	3.12	301.73	21,413.73	67.55	581.30	213.25	4362644.53	252093.48
IMF02	1.31	68	0.00	0.00	581.30	82.02	4362611.06	252090.68
IMF03	1.31	67.73	758.86	9.35	581.30	72.18	4362600.99	252153.8
IMF07	1.31	67.73	790.81	9.74	581.30	72.18	4362629.04	252100.67
IMF08	1.31	67.73	758.86	9.35	581.30	72.18	4362603.14	252107.95
IMF09	1.31	67.73	758.86	9.35	581.30	72.18	4362597.72	252107.68
IMF10	1.31	67.73	758.86	9.35	581.30	72.18	4362608.04	252108.17
IMF11	0.59	67.73	1,037.01	69.23	581.30	16.40	4362712.34	252100.41
IMF12	0.59	67.73	1,037.01	69.23	581.30	49.21	4362712.26	252096.06
IMF14	0.59	67.73	1,037.01	69.23	581.30	49.21	4362679.2	252060.05
IMF15	0.59	67.73	1,037.01	69.23	581.30	26.25	4362677.13	252094.8
IMF16	0.59	67.73	1,037.01	69.23	581.30	78.74	4362658.26	252084.71

IMF17	0.82	67.73	2,210.86	69.77	581.30	88.19	4362686.65	252081.92
IMF18	0.82	67.73	2,210.86	69.77	581.30	59.05	4362688.04	252055.29
IMF21	0.49	103.73	336.99	29.52	581.30	9.84	4362677.7	252073.32
IMF24	1.15	135	3,059.94	49.24	581.30	121.39	4362617.97	252086.77
IMF25	0.49	67.73	758.23	66.44	581.30	72.18	4362624.4	252083.22
HE01	12.96	103.73	369,528.94	56.89	581.30	213.25	4362545.58	252120.56
HE02	1.31	68	0.00	0.00	581.30	82.02	4362660.76	252073.05
CE01	3.77	103.73	44,217.14	70.44	581.30	114.83	4362534.51	252076.15
CE02	2.30	103.73	12,633.47	54.33	581.30	98.42	4362514.57	252061.87
CM10	3.28	103.73	18,950.20	39.93	581.30	49.21	4362572.56	252095.09
CM11	3.28	103.73	18,950.20	39.93	581.30	49.21	4362573.83	252069.22
CM08	0.82	103.73	1,597.18	53.25	581.30	49.21	4362557.26	252095.17
CM09	0.82	103.73	1,597.18	53.25	581.30	49.21	4362585.52	252098.26
Rockfon Line								
RFNE1	1.03	130.73	2,189.77	42.16	581.30	42.65	4362290.6	252016.04
RFNE2	1.03	103.73	2,090.93	40.26	581.30	42.65	4362332.12	252016.9
RFNE3	1.64	211.73	6,436.15	50.75	581.30	39.37	4362307.25	251985.27
RFNE4	1.64	319.73	4,667.98	36.81	581.30	39.37	4362292.23	251966.75
RFNE5	1.64	103.73	6,752.34	53.25	581.30	98.42	4362268.75	251965.62
RFNE6	2.62	319.73	11,204.48	34.51	581.30	49.21	4362250.44	251964.58

RFNE7	2.62	103.73	16,881.27	52.00	581.30	45.93	4362280.32	251978.47
RFNE8	5.12	103.73	74,418.90	64.44	581.30	98.42	4362258.51	252039.94
RFNE9	1.64	211.73	6,436.15	50.75	581.30	39.37	4362202.03	251981.62
RFN10	1.15	134.60	3,059.94	49.25	581.30	49.21	4362356	251989.27
Coal Milling								
IMF04	0.62	68.0	1,037.01	62.14	581.30	39.37	4362655.88	252180.06
IMF05	1.05	180.27	2,872.65	67.09	581.30	65.62	4362612.09	252166.68
IMF06	1.44	68.0	6,316.73	64.37	581.30	65.62	4362612.54	252166.66
IMF13	0.62	68.0	1,037.01	62.14	581.30	6.56	4362668.13	252181.48
Other RAN5 Facility Wide Sources								
CM03	1.15	134.60	3,059.94	49.25	581.30	49.21	4362638.42	252062.66
CM04	1.15	134.60	3,059.94	49.25	581.30	49.21	4362638.77	252055.49
EFP1	0.40	401.00	1,155.78	158.37	581.30	23.62	4362590.4	252183.52

¹ Give at operating conditions. Include inerts.

² Release height of emissions above ground level.

Attachment K

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

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

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

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

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS ¹	Maximum Potential Uncontrolled Emissions ²		Maximum Potential Controlled Emissions ³		Est. Method Used ⁴
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	PM ₁₀	<0.01	1.68	<0.01	0.41	O – AP-42
	PM _{2.5}	<0.01	0.41	<0.01	0.10	
Unpaved Haul Roads		--	--	--	--	--
Storage Pile Emissions – Raw Material Outdoor Stockpile (RMS)	PM ₁₀	0.02	0.09	0.01	0.04	EE
	PM _{2.5}	<0.01	0.01	<0.01	<0.01	
Storage Pile Emissions – Portable Crusher/Pit Waste Stockpile (B170)	PM ₁₀	0.07	0.31	0.03	0.15	EE
	PM _{2.5}	0.01	0.05	<0.01	0.02	
Loading/Unloading Operations		--	--	--	--	--
Wastewater Treatment Evaporation & Operations		--	--	--	--	--
Equipment Leaks		Does not apply	--	Does not apply	--	--
General Clean-up VOC Emissions		--	--	--	--	--
Other – Dry Ice Cleaning (DI)	CO ₂	363.76	1593.28	363.75	1593.28	EE
Other – Charging Material Handling Building Vent 1 (IMF 17)	PM ₁₀	0.02	0.08	0.02	0.08	EE
	PM _{2.5}	<0.01	0.04	<0.01	0.04	
Other – Charging Material Handling Building Vent 2 (IMF 18)	PM ₁₀	0.02	0.08	0.02	0.08	EE
	PM _{2.5}	<0.01	0.04	<0.01	0.04	
Other – Coal Milling Unloading (B230)	PM ₁₀	<0.01	<0.01	<0.01	<0.01	EE
	PM _{2.5}	<0.01	<0.01	<0.01	<0.01	
Other – Coal Loading Hopper (B231)	PM ₁₀	<0.01	<0.01	<0.01	<0.01	EE
	PM _{2.5}	<0.01	<0.01	<0.01	<0.01	
Other – Raw Material Reject Collection Bin (RM_REJ)	PM ₁₀	<0.01	<0.01	<0.01	<0.01	EE
	PM _{2.5}	<0.01	<0.01	<0.01	<0.01	
Other – Sieve Reject Collection Bin (S_REJ)	PM ₁₀	<0.01	<0.01	<0.01	<0.01	EE
	PM _{2.5}	<0.01	<0.01	<0.01	<0.01	
Other – Raw Material Loading Hopper (B215)	PM ₁₀	<0.01	0.11	<0.01	0.03	EE

	PM _{2.5}	<0.01	0.02	<0.01	<0.01	
Other – Melting Furnace Portable Crusher (B170)	PM ₁₀	<0.01	0.04	<0.01	0.02	EE
	PM _{2.5}	<0.01	<0.01	<0.01	<0.01	
Other – Raw Material Storage (B210)	PM ₁₀	<0.01	0.21	<0.01	0.13	EE
	PM _{2.5}	<0.01	0.03	<0.01	0.02	
Other – Coal Milling Building (B235)	PM ₁₀	<0.01	0.04	<0.01	0.04	EE
	PM _{2.5}	<0.01	0.02	<0.01	0.02	
Other – Product Marking Ink and Cleaner	VOC	2.16	9.47	2.16	9.47	EE

¹ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.

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

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

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

Attachment L

**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**

<p>1. Name or type and model of proposed affected source:</p> <p>Melting Furnace</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>Mineral Inputs (Claimed Confidential) – Charge Rate Claimed Confidential</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>Melted Mineral – Melt Rate Claimed Confidential</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>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.</p>

* 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 Nm³/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.

<p>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.</p>	
<p>MONITORING</p> <p>See proposed monitoring in Attachment O.</p>	<p>RECORDKEEPING</p> <p>See proposed recordkeeping in Attachment O.</p>
<p>REPORTING</p> <p>See proposed reporting in Attachment O.</p>	<p>TESTING</p> <p>See proposed testing in Attachment O.</p>
<p>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.</p> <p>RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.</p> <p>REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.</p> <p>TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.</p>	
<p>10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty</p> <p>NA</p>	

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	0.42			
Hydrocarbons				
NO _x	0.36			
Pb				
PM ₁₀				
SO ₂				
VOCs				
Other (specify)				

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

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 ×10 ⁶ BTU/hr	10. Peak heat input per unit: Claimed Confidential ×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: <input type="checkbox"/> Pulverized coal <input type="checkbox"/> Spreader stoker <input type="checkbox"/> Oil burners <input checked="" type="checkbox"/> Natural Gas Burner <input type="checkbox"/> Others, specify	14. Proposed type of burners and orientation: <input type="checkbox"/> Vertical <input type="checkbox"/> Front Wall <input type="checkbox"/> Opposed <input type="checkbox"/> Tangential <input type="checkbox"/> Others, specify
15. Type of draft: <input type="checkbox"/> Forced <input type="checkbox"/> Induced	16. Percent of ash retained in furnace: %
17. Will flyash be reinjected? <input type="checkbox"/> Yes <input type="checkbox"/> 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: <input type="checkbox"/> This equipment only <input checked="" type="checkbox"/> 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: %	

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 <i>Air Pollution Control Device Sheet(s)</i> for the control(s) used on this Emission Unit.				
41. Have you included the <i>air pollution rates</i> 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

**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*): **SPN**

1. Name or type and model of proposed affected source: Spinning Chamber
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 Wool – Rate Claimed Confidential
4. Name(s) and maximum amount of proposed material(s) produced per hour: Mineral Wool – Rate Claimed Confidential
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: NA

* 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): NA			
(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:			
(c) Theoretical combustion air requirement (ACF/unit of fuel):			
@	°F and	psia.	
(d) Percent excess air:			
(e) Type and BTU/hr of burners and all other firing equipment planned to be used:			
(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:			
(g) Proposed maximum design heat input:			× 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:			
@	104	°F and	14.7 psia
a. NO _x		lb/hr	grains/ACF
b. SO ₂		lb/hr	grains/ACF
c. CO		lb/hr	grains/ACF
d. PM ₁₀	10.85	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs (Non-HAP)	13.56	lb/hr	grains/ACF
g. Pb		lb/hr	grains/ACF
h. Specify other(s)			
PM _{2.5}	10.85	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.

<p>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.</p>	
<p>MONITORING</p> <p>See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING</p> <p>See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING</p> <p>See proposed reporting plan in Attachment O.</p>	<p>TESTING</p> <p>See proposed testing plan in Attachment O.</p>
<p>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.</p>	
<p>RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.</p>	
<p>REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.</p>	
<p>TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.</p>	
<p>10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty</p> <p>NA</p>	

**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*): **CS**

<p>1. Name or type and model of proposed affected source:</p> <p>Cooling Section</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>Mineral Wool – Throughput Claimed Confidential</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>Mineral Wool – Throughput Claimed Confidential</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>NA</p>

* 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): NA			
(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:			
(c) Theoretical combustion air requirement (ACF/unit of fuel):			
@	°F and	psia.	
(d) Percent excess air:			
(e) Type and BTU/hr of burners and all other firing equipment planned to be used:			
(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:			
(g) Proposed maximum design heat input:			× 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:			
@	104	°F and	14.7 psia
a. NO _x	1.32	lb/hr	grains/ACF
b. SO ₂		lb/hr	grains/ACF
c. CO	0.17	lb/hr	grains/ACF
d. PM ₁₀	7.05	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs (Non-HAP)	5.29	lb/hr	grains/ACF
g. Pb		lb/hr	grains/ACF
h. Specify other(s)			
PM _{2.5}	7.05	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.

<p>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.</p>	
<p>MONITORING</p> <p>See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING</p> <p>See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING</p> <p>See proposed reporting plan in Attachment O.</p>	<p>TESTING</p> <p>See proposed testing plan in Attachment O.</p>
<p>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.</p>	
<p>RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.</p>	
<p>REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.</p>	
<p>TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.</p>	
<p>10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty</p> <p>NA</p>	

**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*): **CM12 and CM13**

<p>1. Name or type and model of proposed affected source:</p> <p style="margin-top: 20px;">Fleece Application Vents</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p style="margin-top: 20px;">Binder Application Rate – 407.9 lb/hr (185 kg/hr)</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p style="margin-top: 20px;">Mineral Wool – Claimed Confidential</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p style="margin-top: 20px;">NA</p>

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

<p>6. Combustion Data (if applicable): NA</p>			
<p>(a) Type and amount in appropriate units of fuel(s) to be burned:</p>			
<p>(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:</p>			
<p>(c) Theoretical combustion air requirement (ACF/unit of fuel):</p>			
@	°F and	psia.	
<p>(d) Percent excess air:</p>			
<p>(e) Type and BTU/hr of burners and all other firing equipment planned to be used:</p>			
<p>(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:</p>			
<p>(g) Proposed maximum design heat input: × 10⁶ BTU/hr.</p>			
<p>7. Projected operating schedule:</p>			
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:			
@	°F and		psia
a. NO _x		lb/hr	grains/ACF
b. SO ₂		lb/hr	grains/ACF
c. CO		lb/hr	grains/ACF
d. PM ₁₀		lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs	5.82	lb/hr	grains/ACF
g. Pb		lb/hr	grains/ACF
h. Specify other(s)			
Total HAPs	5.82	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.

<p>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.</p>	
<p>MONITORING</p> <p>See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING</p> <p>See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING</p> <p>See proposed reporting plan in Attachment O.</p>	<p>TESTING</p> <p>See proposed testing plan in Attachment O.</p>
<p>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.</p>	
<p>RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.</p>	
<p>REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.</p>	
<p>TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.</p>	
<p>10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty</p> <p>NA</p>	

**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*): **CM08, CM09**

<p>1. Name or type and model of proposed affected source:</p> <p>Recycle Plant Building Vents 3 - 4</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>Recycled Material – Claimed Confidential</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>Mineral Wool – Claimed Confidential</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>NA</p>

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

<p>6. Combustion Data (if applicable): NA</p>		
<p>(a) Type and amount in appropriate units of fuel(s) to be burned:</p>		
<p>(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:</p>		
<p>(c) Theoretical combustion air requirement (ACF/unit of fuel):</p>		
@	°F and	psia.
<p>(d) Percent excess air:</p>		
<p>(e) Type and BTU/hr of burners and all other firing equipment planned to be used:</p>		
<p>(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:</p>		
<p>(g) Proposed maximum design heat input: × 10⁶ BTU/hr.</p>		
<p>7. Projected operating schedule:</p>		
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:			
@	°F and		psia
a. NO _x		lb/hr	grains/ACF
b. SO ₂		lb/hr	grains/ACF
c. CO		lb/hr	grains/ACF
d. PM ₁₀	0.05	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs		lb/hr	grains/ACF
g. Pb		lb/hr	grains/ACF
h. Specify other(s)			
PM _{2.5}	0.03	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.

<p>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.</p>	
<p>MONITORING See Attachment O</p>	<p>RECORDKEEPING See Attachment O</p>
<p>REPORTING See Attachment O</p>	<p>TESTING See Attachment O</p>
<p>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.</p>	
<p>RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.</p>	
<p>REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.</p>	
<p>TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.</p>	
<p>10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty</p>	

**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*): **DI**

<p>1. Name or type and model of proposed affected source:</p> <p>Dry Ice Cleaning – Fugitive Source</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>Dry Ice Production Rate – 165.35 lb/hr (75 kg/hr)</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>CO₂ (s) + Ambient Air → CO₂ (g)</p>

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

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:			
@	°F and		psia
a. NO _x		lb/hr	grains/ACF
b. SO ₂		lb/hr	grains/ACF
c. CO		lb/hr	grains/ACF
d. PM ₁₀		lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs		lb/hr	grains/ACF
g. Pb		lb/hr	grains/ACF
h. Specify other(s)			
CO ₂	363.76	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.

<p>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.</p>	
<p>MONITORING</p> <p>See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING</p> <p>See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING</p> <p>See proposed reporting plan in Attachment O.</p>	<p>TESTING</p> <p>See proposed testing plan in Attachment O.</p>
<p>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.</p>	
<p>RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.</p>	
<p>REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.</p>	
<p>TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.</p>	
<p>10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty</p> <p>NA</p>	

**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*): **RFNE1**

1. Name or type and model of proposed affected source: IR Zone
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: Rockfon – Rate Claimed Confidential
4. Name(s) and maximum amount of proposed material(s) produced per hour: Rockfon – Rate Claimed Confidential
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: NA

* 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): NA			
(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:			
(c) Theoretical combustion air requirement (ACF/unit of fuel):			
@	°F and	psia.	
(d) Percent excess air:			
(e) Type and BTU/hr of burners and all other firing equipment planned to be used:			
(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:			
(g) Proposed maximum design heat input:			× 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:			
@	131	°F and	14.7 psia
a. NO _x		lb/hr	grains/ACF
b. SO ₂		lb/hr	grains/ACF
c. CO		lb/hr	grains/ACF
d. PM ₁₀	0.02	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs	Combined Limit	lb/hr	grains/ACF
g. Pb		lb/hr	grains/ACF
h. Specify other(s)			
PM _{2.5}	0.01	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.

<p>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.</p>	
<p>MONITORING</p> <p>See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING</p> <p>See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING</p> <p>See proposed reporting plan in Attachment O.</p>	<p>TESTING</p> <p>See proposed testing plan in Attachment O.</p>
<p>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.</p>	
<p>RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.</p>	
<p>REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.</p>	
<p>TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.</p>	
<p>10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty</p> <p>NA</p>	

**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*): **RFNE2**

<p>1. Name or type and model of proposed affected source:</p> <p>Hot Press</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>Rockfon – Charge Rate Claimed Confidential</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>Rockfon – Production Rate Claimed Confidential</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>NA</p>

* 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): NA			
(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:			
(c) Theoretical combustion air requirement (ACF/unit of fuel):			
@	°F and	psia.	
(d) Percent excess air:			
(e) Type and BTU/hr of burners and all other firing equipment planned to be used:			
(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:			
(g) Proposed maximum design heat input:			× 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:			
@	104	°F and	14.7 psia
a. NO _x		lb/hr	grains/ACF
b. SO ₂		lb/hr	grains/ACF
c. CO		lb/hr	grains/ACF
d. PM ₁₀	0.02	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs	Combined Limit	lb/hr	grains/ACF
g. Pb		lb/hr	grains/ACF
h. Specify other(s)			
PM _{2.5}	0.01	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.

<p>MONITORING</p> <p>See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING</p> <p>See proposed recordkeeping plan in Attachment O.</p>
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<p>REPORTING</p> <p>See proposed reporting plan in Attachment O.</p>	<p>TESTING</p> <p>See proposed testing plan in Attachment O.</p>
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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): **RFN3**

Control Device ID No. (must match List Form):

Equipment Information

1. Manufacturer: TBD	2. Model No. Custom Serial No.
3. Number of units: Claimed Confidential	4. Use Direct-fired unit - Curing of paint during the Rockfon process.
5. Rated Boiler Horsepower: _____ hp	6. Boiler Serial No.:
7. Date constructed: 2018	8. Date of last modification and explain: NA
9. Maximum design heat input per unit: Claimed Confidential ×10 ⁶ BTU/hr	10. Peak heat input per unit: Claimed Confidential ×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: <input type="checkbox"/> Pulverized coal <input type="checkbox"/> Spreader stoker <input type="checkbox"/> Oil burners <input checked="" type="checkbox"/> Natural Gas Burner <input type="checkbox"/> Others, specify	14. Proposed type of burners and orientation: <input checked="" type="checkbox"/> Vertical <input type="checkbox"/> Front Wall <input type="checkbox"/> Opposed <input type="checkbox"/> Tangential <input type="checkbox"/> Others, specify
15. Type of draft: <input type="checkbox"/> Forced <input type="checkbox"/> Induced	16. Percent of ash retained in furnace: _____ %
17. Will flyash be reinjected? <input type="checkbox"/> Yes <input type="checkbox"/> No	18. Percent of carbon in flyash: _____ %

Stack or Vent Data

19. Inside diameter or dimensions: 1.64 ft.	20. Gas exit temperature: 211.73 °F
21. Height: 39.37 ft.	22. Stack serves: <input checked="" type="checkbox"/> This equipment only <input type="checkbox"/> Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: 6,436.15 ft ³ /min	
24. Estimated percent of moisture: _____ %	

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)				
Total HAPs				
CO ₂				
CH ₄				

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

Pollutant	Pounds per Hour lb/hr	grain/ACF	@ °F	PSIA
CO	0.22			
Hydrocarbons				
NO _x	0.27			
Pb				
SO ₂				
VOCs	Combined Limit – See Appendix A			
Other (specify)				
PM _{Fil}	0.06			
PM ₁₀	0.12			
PM _{2.5}	0.09			

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

Attachment L
Emission Unit Data Sheet
 (INDIRECT HEAT EXCHANGER)

Emission Unit ID No. must match List Form): **RFNE4**

Control Device ID No. (must match List Form): **RFNE4-FF**

Equipment Information

1. Manufacturer: TBD	2. Model No. TBD Serial No.
3. Number of units: Claimed Confidential	4. Use: Direct-fired unit - The drying oven is fired to dry the paint during the Rockfon process.
5. Rated Boiler Horsepower: NA hp	6. Boiler Serial No.: NA
7. Date constructed: 2018	8. Date of last modification and explain: N/A
9. Maximum design heat input per unit: Claimed Confidential ×10 ⁶ BTU/hr	10. Peak heat input per unit: Claimed Confidential ×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: <input type="checkbox"/> Pulverized coal <input type="checkbox"/> Spreader stoker <input type="checkbox"/> Oil burners <input checked="" type="checkbox"/> Natural Gas Burner <input type="checkbox"/> Others, specify	14. Proposed type of burners and orientation: <input checked="" type="checkbox"/> Vertical <input type="checkbox"/> Front Wall <input type="checkbox"/> Opposed <input type="checkbox"/> Tangential <input type="checkbox"/> Others, specify
15. Type of draft: <input type="checkbox"/> Forced <input type="checkbox"/> Induced	16. Percent of ash retained in furnace: %
17. Will flyash be reinjected? <input type="checkbox"/> Yes <input type="checkbox"/> No	18. Percent of carbon in flyash: %

Stack or Vent Data

19. Inside diameter or dimensions: 1.64 ft.	20. Gas exit temperature: 319.73 °F
21. Height: 39.37 ft.	22. Stack serves: <input checked="" type="checkbox"/> This equipment only <input type="checkbox"/> Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: 4,667.98 ft ³ /min	
24. Estimated percent of moisture: %	

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	0.17			
Hydrocarbons				
NO _x	0.20			
Pb				
SO ₂				
VOCs	Combined Limit – See Appendix A			
Other (specify)				
PM _{Fi1}	0.04			
PM ₁₀	0.08			
PM _{2.5}	0.06			
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 <i>Air Pollution Control Device Sheet(s)</i> for the control(s) used on this Emission Unit.				
41. Have you included the <i>air pollution rates</i> 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

**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*): **RFNE5**

<p>1. Name or type and model of proposed affected source:</p> <p>Spray Paint Cabin</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>Rockfon – Charge Rate Claimed Confidential</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>Rockfon – Production Rate Claimed Confidential</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>NA</p>

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

<p>6. Combustion Data (if applicable): NA</p>			
<p>(a) Type and amount in appropriate units of fuel(s) to be burned:</p>			
<p>(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:</p>			
<p>(c) Theoretical combustion air requirement (ACF/unit of fuel):</p>			
@	°F and	psia.	
<p>(d) Percent excess air:</p>			
<p>(e) Type and BTU/hr of burners and all other firing equipment planned to be used:</p>			
<p>(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:</p>			
<p>(g) Proposed maximum design heat input: × 10⁶ BTU/hr.</p>			
<p>7. Projected operating schedule:</p>			
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:			
@	°F and		psia
a. NO _x		lb/hr	grains/ACF
b. SO ₂		lb/hr	grains/ACF
c. CO		lb/hr	grains/ACF
d. PM ₁₀	0.44	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs	Combined Limit	lb/hr	grains/ACF
g. Pb		lb/hr	grains/ACF
h. Specify other(s)			
PM _{2.5}	0.22	lb/hr	grains/ACF
Total HAPs	0.52	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.

<p>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.</p>	
<p>MONITORING</p> <p>See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING</p> <p>See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING</p> <p>See proposed reporting plan in Attachment O.</p>	<p>TESTING</p> <p>See proposed testing plan in Attachment O.</p>
<p>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.</p>	
<p>RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.</p>	
<p>REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.</p>	
<p>TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.</p>	
<p>10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty</p> <p>NA</p>	

Attachment L
Emission Unit Data Sheet
 (INDIRECT HEAT EXCHANGER)

Emission Unit ID No. must match List Form): **RFNE6**

Control Device ID No. (must match List Form): **RFNE6-FF**

Equipment Information

1. Manufacturer: TBD	2. Model No. TBD Serial No.
3. Number of units: Claimed Confidential	4. Use Direct-fired unit - The drying oven is fired to dry the paint during the Rockfon 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 ×10 ⁶ BTU/hr	10. Peak heat input per unit: Claimed Confidential ×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: <input type="checkbox"/> Pulverized coal <input type="checkbox"/> Spreader stoker <input type="checkbox"/> Oil burners <input checked="" type="checkbox"/> Natural Gas Burner <input type="checkbox"/> Others, specify	14. Proposed type of burners and orientation: <input checked="" type="checkbox"/> Vertical <input type="checkbox"/> Front Wall <input type="checkbox"/> Opposed <input type="checkbox"/> Tangential <input type="checkbox"/> Others, specify
15. Type of draft: <input type="checkbox"/> Forced <input type="checkbox"/> Induced	16. Percent of ash retained in furnace: %
17. Will flyash be reinjected? <input type="checkbox"/> Yes <input type="checkbox"/> No	18. Percent of carbon in flyash: %

Stack or Vent Data

19. Inside diameter or dimensions: 2.62 ft.	20. Gas exit temperature: 319.73 °F
21. Height: 49.21 ft.	22. Stack serves: <input checked="" type="checkbox"/> This equipment only <input type="checkbox"/> Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: 11,204.48 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	×10 ³ gal	Claimed Confidential ×10 ⁶ ft ³ /hr	×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: <input type="checkbox"/> Manual <input type="checkbox"/> Automatic hi-low <input type="checkbox"/> Automatic full modulation <input type="checkbox"/> Automatic on-off			27. Gas burner manufacture: TBD			
			28. Oil burner manufacture: NA			
29. If fuel oil is used, how is it atomized? <input type="checkbox"/> Oil Pressure <input type="checkbox"/> Steam Pressure <input type="checkbox"/> Compressed Air <input type="checkbox"/> Rotary Cup <input type="checkbox"/> Other, specify						
30. Fuel oil preheated: <input type="checkbox"/> Yes <input type="checkbox"/> 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	0.39			
Hydrocarbons				
NO _x	0.47			
Pb				
SO ₂				
VOCs	Combined Limit – See Appendix A			
Other (specify)				
PM _{Fil}	0.06			
PM ₁₀	0.13			
PM _{2.5}	0.09			
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 <i>Air Pollution Control Device Sheet(s)</i> for the control(s) used on this Emission Unit.				
41. Have you included the <i>air pollution rates</i> 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

**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*): **RFNE7**

<p>1. Name or type and model of proposed affected source:</p> <p>Cooling Zone</p>
<p>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.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>Rockfon – Rate Claimed Confidential</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>Rockfon – Rate Claimed Confidential</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>NA</p>

* 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): NA			
(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:			
(c) Theoretical combustion air requirement (ACF/unit of fuel):			
@	°F and	psia.	
(d) Percent excess air:			
(e) Type and BTU/hr of burners and all other firing equipment planned to be used:			
(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:			
(g) Proposed maximum design heat input:			× 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:			
@	104	°F and	14.7 psia
a. NO _x		lb/hr	grains/ACF
b. SO ₂		lb/hr	grains/ACF
c. CO		lb/hr	grains/ACF
d. PM ₁₀	0.19	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs	Combined Limit	lb/hr	grains/ACF
g. Pb		lb/hr	grains/ACF
h. Specify other(s)			
PM _{2.5}	0.14	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.

<p>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.</p>	
<p>MONITORING</p> <p>See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING</p> <p>See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING</p> <p>See proposed reporting plan in Attachment O.</p>	<p>TESTING</p> <p>See proposed testing plan in Attachment O.</p>
<p>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.</p>	
<p>RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.</p>	
<p>REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.</p>	
<p>TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.</p>	
<p>10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty</p> <p>NA</p>	

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	×10 ³ gal	Claimed Confidential ×10 ⁶ ft ³ /hr	×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: <input type="checkbox"/> Manual <input type="checkbox"/> Automatic full modulation			27. Gas burner manufacture: TBD			
<input type="checkbox"/> Automatic hi-low <input type="checkbox"/> Automatic on-off			28. Oil burner manufacture: NA			
29. If fuel oil is used, how is it atomized? <input type="checkbox"/> Oil Pressure <input type="checkbox"/> Steam Pressure <input type="checkbox"/> Compressed Air <input type="checkbox"/> Rotary Cup <input type="checkbox"/> Other, specify						
30. Fuel oil preheated: <input type="checkbox"/> Yes <input type="checkbox"/> 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)				
Total HAPs				
CO ₂				
CH ₄				
38. What quantities of pollutants will be emitted from the boiler after controls?				
Pollutant	Pounds per Hour lb/hr	grain/ACF	@ °F	PSIA
CO	0.22			
Hydrocarbons				
NO _x	0.27			
Pb				
SO ₂				
VOCs	Combined Limit – See Appendix A			
Other (specify)				
PM _{FI}	0.06			
PM ₁₀	0.12			
PM _{2.5}	0.09			
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 <i>Air Pollution Control Device Sheet(s)</i> for the control(s) used on this Emission Unit.				
41. Have you included the <i>air pollution rates</i> 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

Attachment L
Emission Unit Data Sheet
 (INDIRECT HEAT EXCHANGER)

Emission Unit ID No. (must match List Form): **IMF05**

Control Device ID No. (must match List Form):

Equipment Information

1. Manufacturer: TBD	2. Model No. TBD Serial No.
3. Number of units: Claimed Confidential	4. Use: Direct-fired unit - To remove excess moisture from the milled coal.
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 ×10 ⁶ BTU/hr	10. Peak heat input per unit: Claimed Confidential ×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: <input type="checkbox"/> Pulverized coal <input type="checkbox"/> Spreader stoker <input type="checkbox"/> Oil burners <input checked="" type="checkbox"/> Natural Gas Burner <input type="checkbox"/> Others, specify	14. Proposed type of burners and orientation: <input type="checkbox"/> Vertical <input type="checkbox"/> Front Wall <input type="checkbox"/> Opposed <input type="checkbox"/> Tangential <input type="checkbox"/> Others, specify
15. Type of draft: <input type="checkbox"/> Forced <input type="checkbox"/> Induced	16. Percent of ash retained in furnace: %
17. Will flyash be reinjected? <input type="checkbox"/> Yes <input type="checkbox"/> No	18. Percent of carbon in flyash: %

Stack or Vent Data

19. Inside diameter or dimensions: 1.05 ft.	20. Gas exit temperature: 180.00 °F
21. Height: 65.52 ft.	22. Stack serves: <input checked="" type="checkbox"/> This equipment only <input type="checkbox"/> Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: 2,872.65 ft ³ /min	
24. Estimated percent of moisture: %	

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				
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	0.49			
Hydrocarbons				
NO _x	0.42			
Pb				
SO ₂				
VOCs				
Other (specify)				

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

Attachment L
Emission Unit Data Sheet
 (INDIRECT HEAT EXCHANGER)

Emission Unit ID No. must match List Form): **CM03**

Control Device ID No. (must match List Form):

Equipment Information

1. Manufacturer: TBD	2. Model No. TBD Serial No.
3. Number of units: 1	4. Use Provide building heat.
5. Rated Boiler Horsepower: 2012 hp	6. Boiler Serial No.:
7. Date constructed: 2018	8. Date of last modification and explain: NA
9. Maximum design heat input per unit: 5.12 $\times 10^6$ BTU/hr	10. Peak heat input per unit: 5.12 $\times 10^6$ BTU/hr
11. Steam produced at maximum design output: TBD LB/hr psig	12. Projected Operating Schedule: Hours/Day 24 Days/Week 7 Weeks/Year 52
13. Type of firing equipment to be used: <input type="checkbox"/> Pulverized coal <input type="checkbox"/> Spreader stoker <input type="checkbox"/> Oil burners <input checked="" type="checkbox"/> Natural Gas Burner <input type="checkbox"/> Others, specify	14. Proposed type of burners and orientation: <input type="checkbox"/> Vertical <input type="checkbox"/> Front Wall <input type="checkbox"/> Opposed <input type="checkbox"/> Tangential <input type="checkbox"/> Others, specify
15. Type of draft: <input type="checkbox"/> Forced <input type="checkbox"/> Induced	16. Percent of ash retained in furnace: %
17. Will flyash be reinjected? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	18. Percent of carbon in flyash: %

Stack or Vent Data

19. Inside diameter or dimensions: 1.15 ft.	20. Gas exit temperature: 134.33 °F
21. Height: 49.21 ft.	22. Stack serves: <input checked="" type="checkbox"/> This equipment only <input type="checkbox"/> Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: 3,059.94 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	4990 ft ³ /hr	ft ³ /hr	TPH	
Annually	×10 ³ gal	43.71 ×10 ⁶ ft ³ /yr	×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: <input type="checkbox"/> Manual <input type="checkbox"/> Automatic full modulation			27. Gas burner manufacture: TBD		
<input type="checkbox"/> Automatic hi-low <input type="checkbox"/> Automatic on-off			28. Oil burner manufacture: NA		
29. If fuel oil is used, how is it atomized? <input type="checkbox"/> Oil Pressure <input type="checkbox"/> Steam Pressure <input type="checkbox"/> Compressed Air <input type="checkbox"/> Rotary Cup <input type="checkbox"/> Other, specify					
30. Fuel oil preheated: <input type="checkbox"/> Yes <input type="checkbox"/> 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	0.41			
Hydrocarbons				
NO _x	0.18			
Pb				
PM ₁₀				
SO ₂				
VOCs				
Other (specify)				
39. How will waste material from the process and control equipment be disposed of?				
Wastes are not expected from a natural gas-fired boiler.				
40. Have you completed an <i>Air Pollution Control Device Sheet(s)</i> for the control(s) used on this Emission Unit.				
41. Have you included the <i>air pollution rates</i> 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.

Attachment L
Emission Unit Data Sheet
 (INDIRECT HEAT EXCHANGER)

Emission Unit ID No. must match List Form): **CM04**

Control Device ID No. (must match List Form):

Equipment Information

1. Manufacturer: TBD	2. Model No. TBD Serial No.
3. Number of units: 1	4. Use Provide building heat.
5. Rated Boiler Horsepower: 212 hp	6. Boiler Serial No.:
7. Date constructed: 2018	8. Date of last modification and explain: NA
9. Maximum design heat input per unit: 5.12 ×10 ⁶ BTU/hr	10. Peak heat input per unit: 5.12 ×10 ⁶ BTU/hr
11. Steam produced at maximum design output: TBD LB/hr psig	12. Projected Operating Schedule: Hours/Day 24 Days/Week 7 Weeks/Year 52
13. Type of firing equipment to be used: <input type="checkbox"/> Pulverized coal <input type="checkbox"/> Spreader stoker <input type="checkbox"/> Oil burners <input checked="" type="checkbox"/> Natural Gas Burner <input type="checkbox"/> Others, specify	14. Proposed type of burners and orientation: <input type="checkbox"/> Vertical <input type="checkbox"/> Front Wall <input type="checkbox"/> Opposed <input type="checkbox"/> Tangential <input type="checkbox"/> Others, specify
15. Type of draft: <input type="checkbox"/> Forced <input type="checkbox"/> Induced	16. Percent of ash retained in furnace: %
17. Will flyash be reinjected? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	18. Percent of carbon in flyash: %

Stack or Vent Data

19. Inside diameter or dimensions: 1.15 ft.	20. Gas exit temperature: 134.33 °F
21. Height: 49.21 ft.	22. Stack serves: <input checked="" type="checkbox"/> This equipment only <input type="checkbox"/> Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: 3,059.94 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	4990 ft ³ /hr	ft ³ /hr	TPH	
Annually	×10 ³ gal	43.71 ×10 ⁶ ft ³ /yr	×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: <input type="checkbox"/> Manual <input type="checkbox"/> Automatic hi-low <input type="checkbox"/> Automatic full modulation <input type="checkbox"/> Automatic on-off			27. Gas burner manufacture: TBD		
			28. Oil burner manufacture: NA		
29. If fuel oil is used, how is it atomized? <input type="checkbox"/> Oil Pressure <input type="checkbox"/> Steam Pressure <input type="checkbox"/> Compressed Air <input type="checkbox"/> Rotary Cup <input type="checkbox"/> Other, specify					
30. Fuel oil preheated: <input type="checkbox"/> Yes <input type="checkbox"/> 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	0.41			
Hydrocarbons				
NO _x	0.18			
Pb				
PM ₁₀				
SO ₂				
VOCs				
Other (specify)				

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

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

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

Attachment L
Emission Unit Data Sheet
 (INDIRECT HEAT EXCHANGER)

Emission Unit ID No. (must match List Form): **RFN10**

Control Device ID No. (must match List Form):

Equipment Information

1. Manufacturer: TBD	2. Model No. NA Serial No.
3. Number of units: 1	4. Use Provide building heat.
5. Rated Boiler Horsepower: 2012 hp	6. Boiler Serial No.:
7. Date constructed: 2018	8. Date of last modification and explain: NA
9. Maximum design heat input per unit: 5.12 ×10 ⁶ BTU/hr	10. Peak heat input per unit: 5.12 ×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: <input type="checkbox"/> Pulverized coal <input type="checkbox"/> Spreader stoker <input type="checkbox"/> Oil burners <input checked="" type="checkbox"/> Natural Gas Burner <input type="checkbox"/> Others, specify	14. Proposed type of burners and orientation: <input type="checkbox"/> Vertical <input type="checkbox"/> Front Wall <input type="checkbox"/> Opposed <input type="checkbox"/> Tangential <input type="checkbox"/> Others, specify
15. Type of draft: <input type="checkbox"/> Forced <input type="checkbox"/> Induced	16. Percent of ash retained in furnace: %
17. Will flyash be reinjected? <input type="checkbox"/> Yes <input type="checkbox"/> No	18. Percent of carbon in flyash: %

Stack or Vent Data

19. Inside diameter or dimensions: 1.15 ft.	20. Gas exit temperature: 134.33 °F
21. Height: 49.21 ft.	22. Stack serves: <input checked="" type="checkbox"/> This equipment only <input type="checkbox"/> Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: 3,059.94 ft ³ /min	
24. Estimated percent of moisture: %	

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	0.41			
Hydrocarbons				
NO _x	0.18			
Pb				
PM ₁₀				
SO ₂				
VOCs				
Other (specify)				
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 <i>Air Pollution Control Device Sheet(s)</i> for the control(s) used on this Emission Unit.				
41. Have you included the <i>air pollution rates</i> 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

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*): **EFP1**

1. Name or type and model of proposed affected source: Emergency Fire Pump Engine – 197 hp
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:
4. Name(s) and maximum amount of proposed material(s) produced per hour:
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: NA

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

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:			
@	°F and		psia
a. NO _x	1.30	lb/hr	grains/ACF
b. SO ₂	2.14E-03	lb/hr	grains/ACF
c. CO	1.13	lb/hr	grains/ACF
d. PM ₁₀	0.08	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs	0.19	lb/hr	grains/ACF
g. Pb		lb/hr	grains/ACF
h. Specify other(s)			
PM _{2.5}	0.08	lb/hr	grains/ACF
CO _{2e}	225.42	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.

<p>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.</p>	
<p>MONITORING See Attachment O</p>	<p>RECORDKEEPING See Attachment O</p>
<p>REPORTING See Attachment O</p>	<p>TESTING See Attachment O</p>
<p>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.</p>	
<p>RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.</p>	
<p>REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.</p>	
<p>TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.</p>	
<p>10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty</p> <p>Unit will comply with NSPS IIII Requirements.</p>	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Additive Storage Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-AD	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-AD
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply):	
<input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe)	
<input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof	
<input type="checkbox"/> Domed External (or Covered) Floating Roof	
<input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting	
<input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm	
<input type="checkbox"/> Pressurized ___ spherical ___ cylindrical	
<input type="checkbox"/> Underground	
<input type="checkbox"/> Other (describe)	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Binder Circulating Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-BC	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-BC
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.); NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
<p>18. Type of tank (check all that apply):</p> <p><input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe)</p> <p><input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof</p> <p><input type="checkbox"/> Domed External (or Covered) Floating Roof</p> <p><input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting</p> <p><input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm</p> <p><input type="checkbox"/> Pressurized ___ spherical ___ cylindrical</p> <p><input type="checkbox"/> Underground</p> <p><input type="checkbox"/> Other (describe)</p>	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chiefl>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Binder Day Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-BD	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-BD
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. <p style="text-align: center;">See Emission Calculations and US EPA Tanks Runs</p>	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply):	
<input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe)	
<input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof	
<input type="checkbox"/> Domed External (or Covered) Floating Roof	
<input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting	
<input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm	
<input type="checkbox"/> Pressurized ___ spherical ___ cylindrical	
<input type="checkbox"/> Underground	
<input type="checkbox"/> Other (describe)	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chieff/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Binder Mix Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-BM	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-BM
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Binder Storage Containers
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-BS1, TK-BS2, and TK-BS3	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-BS1, TK-BS2, and TK-BS3
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Coupling Agent Storage Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-CA	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-CA
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/ttn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/ttn/chieff>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Diesel Fuel Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-DF	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-DF
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name De-dust Oil Storage Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-DO	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-DO
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chieff/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name De-dust Oil Day Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-DOD	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-DOD
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Resin Storage Tanks
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-RS1 - TK-RS7	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-RS1 - TK-RS7
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.); NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
<p>18. Type of tank (check all that apply):</p> <p><input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe)</p> <p><input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof</p> <p><input type="checkbox"/> Domed External (or Covered) Floating Roof</p> <p><input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting</p> <p><input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm</p> <p><input type="checkbox"/> Pressurized ___ spherical ___ cylindrical</p> <p><input type="checkbox"/> Underground</p> <p><input type="checkbox"/> Other (describe)</p>	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chieff>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Thermal Oil Expansion Tank - Rockfon
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-T01	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-T01
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chiefl/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Thermal Oil Drain Tank - Rockfon
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-TO2	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-TO2
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.); NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
<p>18. Type of tank (check all that apply):</p> <p><input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe)</p> <p><input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof</p> <p><input type="checkbox"/> Domed External (or Covered) Floating Roof</p> <p><input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting</p> <p><input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm</p> <p><input type="checkbox"/> Pressurized ___ spherical ___ cylindrical</p> <p><input type="checkbox"/> Underground</p> <p><input type="checkbox"/> Other (describe)</p>	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Thermal Oil Tank - IMF
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-TO3	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-TO3
5. Date of Commencement of Construction (for existing tanks) N/A	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) N/A	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). N/A	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): N/A	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk S	2. Tank Name Thermal Oil Expansion Tank - IMF
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-TO4	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-TO4
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required) - See Attached EPA TANKS Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chiefl/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Used Oil Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-UO	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-UO
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required) - See Attached EPA TANKs Report for the following information

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min)	
16. Tank fill method <input type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input type="checkbox"/> Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Paint Dilution Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-PD	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-PD
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 793 gal	
9A. Tank Internal Diameter (ft) 4.0	9B. Tank Internal Height (or Length) (ft) 8.6
10A. Maximum Liquid Height (ft) 8.0	10B. Average Liquid Height (ft) 4.3
11A. Maximum Vapor Space Height (ft) 8.6	11B. Average Vapor Space Height (ft) 4.3
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. 793 gal	

13A. Maximum annual throughput (gal/yr) Claimed Confidential	13B. Maximum daily throughput (gal/day) Claimed Confidential
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) Claimed Confidential	
15. Maximum tank fill rate (gal/min) Claimed Confidential	
16. Tank fill method <input type="checkbox"/> Submerged <input checked="" type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof ___ vertical ___ horizontal <input checked="" type="checkbox"/> flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction: <input checked="" type="checkbox"/> Riveted <input type="checkbox"/> Gunite lined <input type="checkbox"/> Epoxy-coated rivets <input type="checkbox"/> Other (describe)		
20A. Shell Color	20B. Roof Color	20C. Year Last Painted
21. Shell Condition (if metal and unlined): <input checked="" type="checkbox"/> No Rust <input type="checkbox"/> Light Rust <input type="checkbox"/> Dense Rust <input type="checkbox"/> Not applicable		
22A. Is the tank heated? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
22B. If YES, provide the operating temperature (°F)		
22C. If YES, please describe how heat is provided to tank.		
23. Operating Pressure Range (psig): 0 to 0		
24. Complete the following section for Vertical Fixed Roof Tanks <input checked="" type="checkbox"/> Does Not Apply		
24A. For dome roof, provide roof radius (ft)		
24B. For cone roof, provide slope (ft/ft)		
25. Complete the following section for Floating Roof Tanks <input checked="" type="checkbox"/> Does Not Apply		
25A. Year Internal Floaters Installed:		
25B. Primary Seal Type: <input type="checkbox"/> Metallic (Mechanical) Shoe Seal <input type="checkbox"/> Liquid Mounted Resilient Seal (check one) <input type="checkbox"/> Vapor Mounted Resilient Seal <input type="checkbox"/> Other (describe):		
25C. Is the Floating Roof equipped with a Secondary Seal? <input type="checkbox"/> YES <input type="checkbox"/> NO		
25D. If YES, how is the secondary seal mounted? (check one) <input type="checkbox"/> Shoe <input type="checkbox"/> Rim <input type="checkbox"/> Other (describe):		
25E. Is the Floating Roof equipped with a weather shield? <input type="checkbox"/> YES <input type="checkbox"/> NO		

25F. Describe deck fittings; indicate the number of each type of fitting:		
ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
COLUMN WELL		
BUILT-UP COLUMN - SLIDING COVER, GASKETED:	BUILT-UP COLUMN - SLIDING COVER, UNGASKETED:	PIPE COLUMN - FLEXIBLE FABRIC SLEEVE SEAL:
LADDER WELL		
PIP COLUMN - SLIDING COVER, GASKETED:	PIPE COLUMN - SLIDING COVER, UNGASKETED:	
GAUGE-HATCH/SAMPLE PORT		
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:	
ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)
VACUUM BREAKER		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
RIM VENT		
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
DECK DRAIN (3-INCH DIAMETER)		
OPEN:	90% CLOSED:	
STUB DRAIN		
1-INCH DIAMETER:		
OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)		

26. Complete the following section for Internal Floating Roof Tanks <input checked="" type="checkbox"/> Does Not Apply	
26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: <input type="checkbox"/> Continuous sheet construction 5 feet wide <input type="checkbox"/> Continuous sheet construction 6 feet wide <input type="checkbox"/> Continuous sheet construction 7 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 7.5 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 12 feet wide <input type="checkbox"/> Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft ²)
For column supported tanks:	26G. Diameter of each column:
26F. Number of columns:	

IV. SITE INFORMATION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based. Harrisburg, Pennsylvania
28. Daily Average Ambient Temperature (°F) 52.83
29. Annual Average Maximum Temperature (°F) 62.08
30. Annual Average Minimum Temperature (°F) 43.59
31. Average Wind Speed (miles/hr) 7.66
32. Annual Average Solar Insulation Factor (BTU/(ft ² ·day)) 1,247.82
33. Atmospheric Pressure (psia) 14.57

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid: 49.71 - 59.33			
34A. Minimum (°F) 49.71	34B. Maximum (°F) 59.33		
35. Average operating pressure range of tank: 0 - 0			
35A. Minimum (psig) 0	35B. Maximum (psig) 0		
36A. Minimum Liquid Surface Temperature (°F) 49.71	36B. Corresponding Vapor Pressure (psia) 0.18		
37A. Average Liquid Surface Temperature (°F) 54.52	37B. Corresponding Vapor Pressure (psia) 0.21		
38A. Maximum Liquid Surface Temperature (°F) 59.33	38B. Corresponding Vapor Pressure (psia) 0.26		
39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition	VOC		
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

Attachment L EMISSIONS UNIT DATA SHEET STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT www.epa.gov/tnn/tanks.html), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (<http://www.epa.gov/tnn/chief/>).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name	2. Tank Name Paint Dilution Day Tank
3. Tank Equipment Identification No. (as assigned on <i>Equipment List Form</i>) TK-PDD	4. Emission Point Identification No. (as assigned on <i>Equipment List Form</i>) TK-PDD
5. Date of Commencement of Construction (for existing tanks) NA	
6. Type of change <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 397 gal	
9A. Tank Internal Diameter (ft) 4.2	9B. Tank Internal Height (or Length) (ft) 5.0
10A. Maximum Liquid Height (ft) 4.5	10B. Average Liquid Height (ft) 2.5
11A. Maximum Vapor Space Height (ft) 5.0	11B. Average Vapor Space Height (ft) 2.5
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. 397 gal	

13A. Maximum annual throughput (gal/yr) Claimed Confidential	13B. Maximum daily throughput (gal/day) Claimed Confidential
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) Claimed Confidential	
15. Maximum tank fill rate (gal/min) Claimed Confidential	
16. Tank fill method <input type="checkbox"/> Submerged <input checked="" type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input checked="" type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof ___ vertical ___ horizontal <input checked="" type="checkbox"/> flat roof ___ cone roof ___ dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction: <input checked="" type="checkbox"/> Riveted <input type="checkbox"/> Gunite lined <input type="checkbox"/> Epoxy-coated rivets <input type="checkbox"/> Other (describe)		
20A. Shell Color	20B. Roof Color	20C. Year Last Painted
21. Shell Condition (if metal and unlined): <input checked="" type="checkbox"/> No Rust <input type="checkbox"/> Light Rust <input type="checkbox"/> Dense Rust <input type="checkbox"/> Not applicable		
22A. Is the tank heated? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
22B. If YES, provide the operating temperature (°F)		
22C. If YES, please describe how heat is provided to tank.		
23. Operating Pressure Range (psig): 0 to 0		
24. Complete the following section for Vertical Fixed Roof Tanks		<input checked="" type="checkbox"/> Does Not Apply
24A. For dome roof, provide roof radius (ft)		
24B. For cone roof, provide slope (ft/ft)		
25. Complete the following section for Floating Roof Tanks		<input checked="" type="checkbox"/> Does Not Apply
25A. Year Internal Floaters Installed:		
25B. Primary Seal Type: <input type="checkbox"/> Metallic (Mechanical) Shoe Seal <input type="checkbox"/> Liquid Mounted Resilient Seal (check one) <input type="checkbox"/> Vapor Mounted Resilient Seal <input type="checkbox"/> Other (describe):		
25C. Is the Floating Roof equipped with a Secondary Seal? <input type="checkbox"/> YES <input type="checkbox"/> NO		
25D. If YES, how is the secondary seal mounted? (check one) <input type="checkbox"/> Shoe <input type="checkbox"/> Rim <input type="checkbox"/> Other (describe):		
25E. Is the Floating Roof equipped with a weather shield? <input type="checkbox"/> YES <input type="checkbox"/> NO		

25F. Describe deck fittings; indicate the number of each type of fitting:		
ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:
LADDER WELL		
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:	
GAUGE-HATCH/SAMPLE PORT		
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:	
ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)
VACUUM BREAKER		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
RIM VENT		
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
DECK DRAIN (3-INCH DIAMETER)		
OPEN:	90% CLOSED:	
STUB DRAIN		
1-INCH DIAMETER:		
OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)		

26. Complete the following section for Internal Floating Roof Tanks <input checked="" type="checkbox"/> Does Not Apply	
26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: <input type="checkbox"/> Continuous sheet construction 5 feet wide <input type="checkbox"/> Continuous sheet construction 6 feet wide <input type="checkbox"/> Continuous sheet construction 7 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 7.5 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 12 feet wide <input type="checkbox"/> Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft ²)
For column supported tanks:	26G. Diameter of each column:
26F. Number of columns:	

IV. SITE INFORMATION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based. Harrisburg, Pennsylvania
28. Daily Average Ambient Temperature (°F) 52.83
29. Annual Average Maximum Temperature (°F) 62.08
30. Annual Average Minimum Temperature (°F) 43.59
31. Average Wind Speed (miles/hr) 7.66
32. Annual Average Solar Insulation Factor (BTU/(ft ² ·day)) 1,247.82
33. Atmospheric Pressure (psia) 14.57

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid: 49.71 - 59.33			
34A. Minimum (°F) 49.71	34B. Maximum (°F) 59.33		
35. Average operating pressure range of tank: 0 - 0			
35A. Minimum (psig) 0	35B. Maximum (psig) 0		
36A. Minimum Liquid Surface Temperature (°F) 49.71	36B. Corresponding Vapor Pressure (psia) 0.18		
37A. Average Liquid Surface Temperature (°F) 54.52	37B. Corresponding Vapor Pressure (psia) 0.21		
38A. Maximum Liquid Surface Temperature (°F) 59.33	38B. Corresponding Vapor Pressure (psia) 0.26		
39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition	VOC		
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-AD Additive Storage Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Additive Vertical Storage Tank

Tank Dimensions

Shell Height (ft):	5.00
Diameter (ft):	3.00
Liquid Height (ft):	1.00
Avg. Liquid Height (ft):	1.00
Volume (gallons):	53.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft):	1.00
Slope (ft/ft) (Cone Roof):	0.67

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

TK-AD Additive Storage Tank - Vertical Fixed Roof Tank
Ranson , West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight.	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Coupling Agent	All	54.52	49.71	59.33	52.85	0.2138	0.1780	0.2555	19.4545			18.58	
Water						0.5438	0.4583	0.6426	46.0700			46.07	Option 2: A=8.321, B=1718.21, C=237.52
						0.2070	0.1723	0.2475	18.0153			18.02	Option 2: A=7.5294, B=1436.264, C=208.302

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-AD Additive Storage Tank - Vertical Fixed Roof Tank
Ranson , West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Coupling Agent	0.44	0.31	0.75
Water	0.39	0.27	0.66
	0.05	0.04	0.09

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-BC Binder Circulating Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Vertical Binder Circulating Tank

Tank Dimensions

Shell Height (ft):	10.00
Diameter (ft):	8.50
Liquid Height (ft):	9.18
Avg. Liquid Height (ft):	9.18
Volume (gallons):	4,227.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.25

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d Emissions Report - Summary Format Liquid Contents of Storage Tank

**TK-BC Binder Circulating Tank - Vertical Fixed Roof Tank
 Ranson , West Virginia**

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Binder	All	54.52	49.71	59.33	52.85	0.2389	0.2014	0.2824	19.6324			18.04	
						0.5438	0.4583	0.6428	46.0700			46.07	Option 2: A=8.321, B=1718.21, C=237.52
Formaldehyde						49.4375	45.1312	54.0526	30.0300			30.03	Option 2: A=7.15586, B=959.43, C=243.392
Methanol						1.2429	1.0647	1.4461	32.0400			32.04	Option 2: A=8.07918, B=1581.341, C=239.65
Phenol						0.0021	0.0016	0.0027	94.1112			94.11	Option 2: A=7.12198, B=1509.677, C=174.201
Water						0.2070	0.1723	0.2475	18.0153			18.02	Option 2: A=7.5294, B=1435.264, C=208.302

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-BC Binder Circulating Tank - Vertical Fixed Roof Tank
Ranson , West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Binder	132.14	0.78	132.92
Formaldehyde	27.02	0.16	27.18
Methanol	0.16	0.00	0.17
Water	104.95	0.62	105.57
Phenol	0.00	0.00	0.00
	0.00	0.00	0.00

TANKS 4.0.9d Emissions Report - Summary Format Tank Identification and Physical Characteristics

Identification

User Identification:	TK-BD Binder Day Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Binder Vertical Day Tank

Tank Dimensions

Shell Height (ft):	6.20
Diameter (ft):	4.70
Liquid Height (ft):	6.11
Avg. Liquid Height (ft):	6.11
Volume (gallons):	793.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft):	1.00
Slope (ft/ft) (Cone Roof):	0.43

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d Emissions Report - Summary Format Liquid Contents of Storage Tank

**TK-BD Binder Day Tank - Vertical Fixed Roof Tank
Ranson, West Virginia**

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Binder	All	54.52	49.71	59.33	52.85	0.2389	0.2014	0.2824	19.6324			18.04	
Formaldehyde						0.5438	0.4583	0.6428	46.0700			46.07	Option 2: A=8.321, B=1718.21, C=237.52
Methanol						49.4375	45.1312	54.0526	30.0300			30.03	Option 2: A=7.15686, B=959.43, C=243.392
Phenol						1.2429	1.0647	1.4461	32.0400			32.04	Option 2: A=8.07919, B=1581.341, C=239.65
Water						0.0021	0.0016	0.0027	94.1112			94.11	Option 2: A=7.12198, B=1509.677, C=174.201
						0.2070	0.1723	0.2475	18.0153			18.02	Option 2: A=7.5294, B=1435.264, C=208.302

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-BD Binder Day Tank - Vertical Fixed Roof Tank
Ranson, West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Binder	120.64	0.09	120.73
Formaldehyde	24.67	0.02	24.69
Methanol	0.15	0.00	0.15
Water	95.82	0.07	95.89
Phenol	0.00	0.00	0.00
	0.00	0.00	0.00

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-BM Binder Mix Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Vertical Binder Mix Tank

Tank Dimensions

Shell Height (ft):	10.50
Diameter (ft):	6.60
Liquid Height (ft):	10.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	2,642.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.43

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d Emissions Report - Summary Format Liquid Contents of Storage Tank

**TK-BM Binder Mix Tank - Vertical Fixed Roof Tank
Ranson , West Virginia**

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Binder	All	54.52	49.71	59.33	52.85	0.2389	0.2014	0.2824	19.6324			18.04	
						0.5438	0.4563	0.6428	46.0700			46.07	Option 2: A=8.321, B=1718.21, C=237.52
Formaldehyde						49.4375	45.1312	54.0526	30.0300			30.03	Option 2: A=7.15686, B=959.43, C=243.392
Methanol						1.2429	1.0647	1.4461	32.0400			32.04	Option 2: A=8.07918, B=1581.341, C=239.65
Phenol						0.0021	0.0016	0.0027	94.1112			94.11	Option 2: A=7.12198, B=1509.677, C=174.201
Water						0.2070	0.1723	0.2475	18.0153			18.02	Option 2: A=7.5294, B=1435.264, C=208.302

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-BM Binder Mix Tank - Vertical Fixed Roof Tank
Ranson , West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Binder	126.83	0.34	127.17
Formaldehyde	25.94	0.07	26.01
Methanol	0.16	0.00	0.16
Water	100.74	0.27	101.01
Phenol	0.00	0.00	0.00
	0.00	0.00	0.00

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-BS(1-3) Binder Storage Container
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Binder Storage Container

Tank Dimensions

Shell Height (ft):	7.80
Diameter (ft):	3.60
Liquid Height (ft) :	3.47
Avg. Liquid Height (ft):	3.47
Volume (gallons):	264.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	0.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d Emissions Report - Summary Format Liquid Contents of Storage Tank

**TK-BS(1-3) Binder Storage Container - Vertical Fixed Roof Tank
Ranson , West Virginia**

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Binder	All	54.52	49.71	59.33	52.85	0.2389	0.2014	0.2824	19.5324			18.04	
Formaldehyde						0.5438	0.4583	0.6428	46.0700			46.07	Option 2: A=8.321, B=1718.21, C=237.52
Methanol						49.4375	45.1312	54.0526	30.0300			30.03	Option 2: A=7.15686, B=959.43, C=243.392
Phenol						1.2429	1.0647	1.4461	32.0400			32.04	Option 2: A=8.07919, B=1581.341, C=239.65
Water						0.0021	0.0016	0.0027	94.1112			94.11	Option 2: A=7.12198, B=1509.677, C=174.201
						0.2070	0.1723	0.2475	18.0153			18.02	Option 2: A=7.5294, B=1435.264, C=208.302

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-BS(1-3) Binder Storage Container - Vertical Fixed Roof Tank
Ranson , West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Binder	3.31	0.53	3.84
Formaldehyde	0.68	0.11	0.79
Methanol	0.00	0.00	0.00
Phenol	0.00	0.00	0.00
Water	2.63	0.42	3.05
	0.00	0.00	0.00

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-CA Coupling Agent Storage Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Coupling Agent Vertical Storage Tank

Tank Dimensions

Shell Height (ft):	7.80
Diameter (ft):	3.60
Liquid Height (ft) :	3.47
Avg. Liquid Height (ft):	3.47
Volume (gallons):	264.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.56

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

TK-CA Coupling Agent Storage Tank - Vertical Fixed Roof Tank
Ranson, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Coupling Agent	All	54.52	49.71	59.33	52.85	0.2138	0.1780	0.2555	19.4545			18.58	
Water						0.5438	0.4583	0.6428	46.0700			46.07	Option 2: A=8.321, B=1718.21, C=237.52
						0.2070	0.1723	0.2475	18.0153			18.02	Option 2: A=7.5294, B=1435.264, C=208.302

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-CA Coupling Agent Storage Tank - Vertical Fixed Roof Tank
Ranson, West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Coupling Agent	0.42	0.48	0.90
	0.05	0.06	0.11
Water	0.37	0.42	0.79

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-DF Diesel Fuel Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Horizontal Tank
Description:	Diesel Fuel Horizontal Storage Tank

Tank Dimensions

Shell Length (ft):	9.40
Diameter (ft):	6.90
Volume (gallons):	2,642.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

TK-DF Diesel Fuel Tank - Horizontal Tank
Ranson, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	54.52	49.71	59.33	52.85	0.0054	0.0045	0.0064	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-DF Diesel Fuel Tank - Horizontal Tank
Ranson, West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.88	0.35	1.23

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-DO De-dust Oil Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	De-dust Oil Vertical Storage Tank

Tank Dimensions

Shell Height (ft):	21.00
Diameter (ft):	13.80
Liquid Height (ft):	14.17
Avg. Liquid Height (ft):	14.17
Volume (gallons):	15,850.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	Y

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.14

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

TK-DO De-dust Oil Tank - Vertical Fixed Roof Tank
Ranson, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	122.00	122.00	122.00	122.00	0.0220	0.0220	0.0220	130.0000			188.00	

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-DO De-dust Oil Tank - Vertical Fixed Roof Tank
Ranson, West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	3.60	0.00	3.60

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-DOD De-dust Oil Day Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	De-dust Oil Vertical Day Tank

Tank Dimensions

Shell Height (ft):	5.00
Diameter (ft):	3.00
Liquid Height (ft):	4.80
Avg. Liquid Height (ft):	4.80
Volume (gallons):	264.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.87

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

TK-DOD De-dust Oil Day Tank - Vertical Fixed Roof Tank
Ranson, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	54.52	49.71	59.33	52.85	0.0054	0.0045	0.0064	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-DOD De-dust Oil Day Tank - Vertical Fixed Roof Tank
Ranson, West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.28	0.01	0.29

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-RS(1-7) Resin Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Resin Vertical Storage Tank

Tank Dimensions

Shell Height (ft):	21.00
Diameter (ft):	13.80
Liquid Height (ft):	15.00
Avg. Liquid Height (ft):	15.00
Volume (gallons):	15,850.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	Y

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.14

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-RS(1-7) Resin Tank - Vertical Fixed Roof Tank
Ranson , West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Resin	69.23	0.00	69.23
Formaldehyde	23.21	0.00	23.21
Methanol	0.17	0.00	0.17
Water	45.86	0.00	45.86
Phenol	0.00	0.00	0.00

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-TO1 Thermal Oil Expansion Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Horizontal Tank
Description:	Thermal Oil Horizontal Expansion Tank

Tank Dimensions

Shell Length (ft):	6.50
Diameter (ft):	3.00
Volume (gallons):	212.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	Y
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

TK-TO1 Thermal Oil Expansion Tank - Horizontal Tank
Ranson, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Jet naphtha (JP-4)	All	572.00	572.00	572.00	572.00	2.7000	2.7000	2.7000	80.0000			120.00	

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-TO1 Thermal Oil Expansion Tank - Horizontal Tank
Ranson, West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Jet naphtha (JP-4)	0.93	0.00	0.93

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-TO2 Thermal Oil Drain Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Horizontal Tank
Description:	Thermal Oil Horizontal Drain Tank

Tank Dimensions

Shell Length (ft):	6.50
Diameter (ft):	3.00
Volume (gallons):	159.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	Y
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

TK-TO2 Thermal Oil Drain Tank - Horizontal Tank
Ranson, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Jet naphtha (JP-4)	All	572.00	572.00	572.00	572.00	2.7000	2.7000	2.7000	80.0000			120.00	

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-TO2 Thermal Oil Drain Tank - Horizontal Tank
Ranson, West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Jet naphtha (JP-4)	0.93	0.00	0.93

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-TO3 Thermal Oil Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Horizontal Tank
Description:	Thermal Oil Horizontal Tank

Tank Dimensions

Shell Length (ft):	9.40
Diameter (ft):	6.90
Volume (gallons):	2,642.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	Y
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

TK-TO3 Thermal Oil Tank - Horizontal Tank
Ranson, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Power Steering Fluid	All	392.00	392.00	392.00	392.00	0.0123	0.0123	0.0123	390.0000			390.00	

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-TO3 Thermal Oil Tank - Horizontal Tank
Ranson, West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Power Steering Fluid	0.08	0.00	0.08

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-TO4 Thermal Oil Expansion Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Horizontal Tank
Description:	Thermal Oil Horizontal Expansion Tank

Tank Dimensions

Shell Length (ft):	7.70
Diameter (ft):	5.40
Volume (gallons):	1,321.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	Y
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

TK-TO4 Thermal Oil Expansion Tank - Horizontal Tank
Ranson, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Power Steering Fluid	All	392.00	392.00	392.00	392.00	0.0123	0.0123	0.0123	390.0000			390.00	

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-TO4 Thermal Oil Expansion Tank - Horizontal Tank
Ranson, West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Power Steering Fluid	0.08	0.00	0.08

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	TK-UO Used Oil Tank
City:	Ranson
State:	West Virginia
Company:	Roxul USA Inc.
Type of Tank:	Horizontal Tank
Description:	Used Oil Horizontal Storage Tank

Tank Dimensions

Shell Length (ft):	7.70
Diameter (ft):	5.40
Volume (gallons):	1,321.00
Turnovers:	
Net Throughput(gal/yr):	
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Harrisburg, Pennsylvania (Avg Atmospheric Pressure = 14.57 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

TK-UO Used Oil Tank - Horizontal Tank
Ranson, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	54.52	49.71	59.33	52.85	0.0054	0.0045	0.0064	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-UO Used Oil Tank - Horizontal Tank
Ranson, West Virginia

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.07	0.17	0.24

TANKS 4.0.9d
Emissions Report - Summary Format
Total Emissions Summaries - All Tanks in Report

Emissions Report for: Annual

Tank Identification				Losses (lbs)
TK-AD Additive Storage Tank	Roxul USA Inc.	Vertical Fixed Roof Tank	Ranson , West Virginia	0.75
TK-BC Binder Circulating Tank	Roxul USA Inc.	Vertical Fixed Roof Tank	Ranson , West Virginia	132.92
TK-BD Binder Day Tank	Roxul USA Inc.	Vertical Fixed Roof Tank	Ranson, West Virginia	120.73
TK-BM Binder Mix Tank	Roxul USA Inc.	Vertical Fixed Roof Tank	Ranson , West Virginia	127.17
TK-BS(1-3) Binder Storage Container	Roxul USA Inc.	Vertical Fixed Roof Tank	Ranson , West Virginia	3.84
TK-CA Coupling Agent Storage Tank	Roxul USA, Inc.	Vertical Fixed Roof Tank	Ranson, West Virginia	0.90
TK-DF Diesel Fuel Tank	Roxul USA Inc.	Horizontal Tank	Ranson, West Virginia	1.23
TK-DO De-dust Oil Tank	Roxul USA Inc.	Vertical Fixed Roof Tank	Ranson, West Virginia	3.60
TK-DOD De-dust Oil Day Tank	Roxul USA, Inc.	Vertical Fixed Roof Tank	Ranson, West Virginia	0.28
TK-RS(1-7) Resin Tank	Roxul USA Inc.	Vertical Fixed Roof Tank	Ranson , West Virginia	69.23
TK-TO1 Thermal Oil Expansion Tank	Roxul USA Inc.	Horizontal Tank	Ranson, West Virginia	0.93
TK-TO2 Thermal Oil Drain Tank	Roxul USA Inc.	Horizontal Tank	Ranson, West Virginia	0.93
TK-TO3 Thermal Oil Tank	Roxul USA Inc.	Horizontal Tank	Ranson, West Virginia	0.08
TK-TO4 Thermal Oil Expansion Tank	Roxul USA Inc.	Horizontal Tank	Ranson, West Virginia	0.08
TK-UO Used Oil Tank	Roxul USA Inc.	Horizontal Tank	Ranson, West Virginia	0.24
Total Emissions for all Tanks:				462.91

**Attachment L
FUGITIVE EMISSIONS FROM PAVED HAULROADS**

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

Item Number	Description	Mean Vehicle Weight (tons)	Miles per Trip	Maximum Trips per Day	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1	Truck - Binder Oil	Claimed Confidential	0.46	Claimed Confidential	Claimed Confidential	All roads at the RAN5 facility will be paved. Roxul will operate a street sweeper on an as needed basis to minimize the generation of dusts from road traffic.	75%
2	Truck - Oxygen		0.46				
3	Truck - Raw Material to 210		0.46				
4	Truck - Coal/PET Coke		0.46				
5	Truck - DeSOx and Binder		0.46				
6	Truck - Waste		0.46				
7	Truck - Pallet and Foil		0.76				
8	Truck - Finished Goods		0.76				
9	FEL - Diverted Melt from Bldg 300 to Pit Waste (170)		0.27				
10	FEL - Crushed Melt from 170 to 210		0.10				
11	FEL - Coal/PET Coke from Bunker to feed Hopper (for Milling)		0.02				
12	FEL - Raw Material from 210 to Feed Hopper		0.06				
13	FEL - Raw Material from Stockpile to 210		0.16				
14	Truck - Raw Material from Stockpile to 210		0.27				

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

$$E = [k \times (sL)^{0.91} \times (W)^{1.02}] \times [1 - P/(4N)] =$$

lb/Vehicle Mile Traveled (VMT)

Where:

$k =$	Particle size multiplier (lb/VMT)	PM - 0.011 PM ₁₀ - 0.0022 PM _{2.5} - 0.00054
$sL =$	Road surface silt loading (g/m ²)	Finished product road surface silt loading - 0.2 Raw materials road surface silt loading - 8.2
$P =$	Number of "wet" days with at least 0.01 in of precipitation during the averaging period	148
$N =$	Number of days in the averaging period	365
$W =$	Average vehicle weight traveling the road (tons)	See table above

For lb/hr: $[lb \div VMT] \times [VMT \div trip] \times [Trips \div Hour] =$ lb/hr

For TPY: $[lb \div VMT] \times [VMT \div trip] \times [Trips \div Hour] \times [Ton \div 2000 lb] =$ Tons/year

SUMMARY OF PAVED HAULROAD EMISSIONS

Item No.	Uncontrolled PM ₁₀		Controlled PM ₁₀	
	lb/hr	ton/yr	lb/hr	ton/yr
1	<0.01	<0.01	<0.01	<0.01
2	<0.01	0.04	<0.01	0.01
3	<0.01	0.55	<0.01	0.14
4	<0.01	0.07	<0.01	0.02
5	<0.01	0.05	<0.01	0.01
6	<0.01	0.02	<0.01	<0.01
7	<0.01	0.01	<0.01	<0.01
8	<0.01	0.05	<0.01	0.01
9	<0.01	0.42	<0.01	0.10
10	<0.01	0.16	<0.01	0.04
11	<0.01	0.01	<0.01	<0.01
12	<0.01	0.24	<0.01	0.06
13	<0.01	0.08	<0.01	0.02
14	<0.01	0.05	<0.01	0.01
TOTALS	0.01	1.68	<0.01	0.42

Item No.	Uncontrolled PM _{2.5}		Controlled PM _{2.5}	
	lb/hr	ton/yr	lb/hr	ton/yr
1	<0.01	<0.01	<0.01	<0.01
2	<0.01	0.01	<0.01	<0.01
3	<0.01	0.13	<0.01	0.03
4	<0.01	0.02	<0.01	<0.01
5	<0.01	0.01	<0.01	<0.01
6	<0.01	<0.01	<0.01	<0.01
7	<0.01	<0.01	<0.01	<0.01
8	<0.01	0.01	<0.01	<0.01
9	<0.01	0.10	<0.01	0.03
10	<0.01	0.04	<0.01	0.01
11	<0.01	<0.01	<0.01	<0.01
12	<0.01	0.06	<0.01	0.01
13	<0.01	0.02	<0.01	0.01
14	<0.01	0.01	<0.01	<0.01
TOTALS	<0.01	0.41	<0.01	0.10

Attachment L
Emission Unit Data Sheet
 (NONMETALLIC MINERALS PROCESSING)

Control Device ID No. (must match List Form):

Equipment Information

1. Plant Type: <input type="checkbox"/> Hot-mix asphalt facility that reduces the size of nonmetallic minerals embedded in recycled asphalt pavement <input type="checkbox"/> Plant without crushers or grinding mills and containing a stand-alone screening operation <input type="checkbox"/> Sand and gravel plant <input type="checkbox"/> Common clay plant <input type="checkbox"/> Crushed stone plant <input type="checkbox"/> Pumice plant <input checked="" type="checkbox"/> Other, specify Mineral Wool Insulation Production Facility						
2. Plant Style: <input checked="" type="checkbox"/> Fixed Plant <input checked="" type="checkbox"/> Portable Plant (Recycle Crusher)			3. Plant Capacity: Claimed Confidential tons/hr			
4. Underground mine: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			5. Storage: <input checked="" type="checkbox"/> Open <input checked="" type="checkbox"/> Enclosed			
6.	Emission Facility Type	Equipment Type Used	ID Number of Emission Unit	Manufacturer	Model Number/Serial Number	Date of Manufacture
	Conveyors	Transfer Point with Fabric Filter	IMF04*	TBD		
			IMF12			
			IMF13*			
			IMF14			
			IMF15			
			IMF16			
			IMF11			
	Crusher	Portable Fixed	B170 IMF17/18	TBD		
	Secondary Crushers					
	Tertiary Crushers					
	Grinder					
	Hoppers	Loading Hopper	B215	TBD		
			B231*			
	Rock Drills					
	Screens					
	Enclosed Storage	3-sided with cover / Building	RM_REJ	NA		
			S_REJ			
			B235*			
	Outdoor Storage	Stockpile	B210	NA		
			B170			
			RMS			
	Other	Storage Silos	IMF03A-C, IM07A-B, IMF08 IMF09 IMF10	NA		

Emission Facility Type	Operation Rate	Annual Production Tons/year	Number of Units	Air Pollution Control Device Used
	Design Ton/hr			
Conveyors	Claimed Confidential	Claimed Confidential	6	Fabric Filters
Crusher	Claimed Confidential	Claimed Confidential	1	Fabric Filter Vents Indoors
Crusher Portable	< 150 tons/hr	81,000	1	Indoor Settling / None
Secondary Crushers				
Tertiary Crushers				
Grinder				
Hoppers	Claimed Confidential	Claimed Confidential	2	Fabric Filters
Rock Drills				
Screens				
Enclosed Storage	Claimed Confidential	Claimed Confidential	4 Areas	Fabric Filters / None
Outdoor Storage	Claimed Confidential	Claimed Confidential	2 Areas	None
Other				
Other				

7. Provide a diagram and/or schematic that shows the proposed process of the operation or plant. The diagram and/or schematic is to show all sources, components and facets of the operation or plant in an understandable line sequence of the operation. The diagram should include all the equipment involved in the operation; such as conveyors, transfer points, stockpiles, crushers, facilities, vents, screens, truck dump bins, truck, barge and railcar loading and unloading, etc. Appropriate sizing and specifications of equipment should be included in the diagram. The diagram shall logical follow the entire process load-in to load-out.

8. Roads	Paved Miles of Road	Unpaved Miles of Road	Watered		Other Control (Specify)
			Miles	Frequency	
Plant Yard	See Haul Roads Emission Unit Data Sheet				
Access Roads					

9. Vehicle Type						
Vehicle Type	Mean Vehicle Speed in mph	Mean Vehicle Weight in Tons		Number of Wheels	Distance Traveled per Round Trip	
		Empty	Full		Paved Feet or Miles	Unpaved Feet or Miles
Raw Aggregate	See Haul Roads Emission Unit Data Sheet					
Loaders						
Product Trucks						

10. Describe all proposed materials storage facilities associated with the **Emission Units** listed.

Roxul will operate raw material storage bunkers with 3-sided enclosures and a roof. Roxul will operate a lime storage silo, three (3) milled coal storage silos, a raw sorbent storage silo, spent sorbent storage silo, filter fines receiving storage silo, filter fines day silo, and a secondary materials silo. Pit waste will be stored in an outside stockpile.

Storage Activity						
ID of Emission Unit	B210	B170	B230*	RMS		
Type Storage	3-sided	3-sided	3-sided	3-sided		
Material Stored	Rock/Slag/Minerals	Pit Waste	Coal*	Rock/Slag/Minerals		
Typical Moisture Content (%)	Claimed Confidential	Claimed Confidential	Claimed Confidential	Claimed Confidential		
Avg % of material passing through 200 mesh sieve						
Maximum Total Yearly Throughput in storage (tons)	Claimed Confidential	Claimed Confidential	Claimed Confidential	Claimed Confidential		
Maximum Stockpile Base Area (ft ²)	5,227.2	19,166.4	TBD	500		
Maximum Stockpile height (ft)	TBD	TBD	TBD	TBD		
Dust control method applied to storage	3-sided	3-sided	3-sided	3-sided		
Method of material load-in to bin or stockpile	FEL	FEL	Truck	Truck		
Dust control method applied during load-in	3-sided	3-sided	Fabric Filter	3-sided		
Method of material load-out to bin or stockpile	FEL	FEL	FEL	FEL		
Dust control method applied during load-out	3-sided	3-sided	3-sided	3-sided		
Storagepiles	Estimated Annual Tons	Turnover Rate (Ton/Month)	Wetted as Piled	Number of Sides Enclosed	Other Dust Control	Loading Method (Loader, Conveyor) IN/OUT
Coarse: over 1"						
Fine: 1" to ¼"						
¼" and less						
MFG. Sand						

Other, specify						
Conveying and Transfer						
Describe the conveying system including transfer points associated with proposed Emission Units (crushers, etc...).						
Describe any methods of emission control to be used with these proposed conveying systems:						
Fabric filters on individual conveyor vents						

ID of Emission Unit	Type Conveyor or Transfer Point	Material Handled [Note nominal size of material transferred (e.g. ¾" x 0)]	Material Conveying or Transfer Rate		Dust Control Measures Applied	Approximate Material Moisture Content (%)
			Max. TPH	Maximum TPY		
IMF04*	BC		Claimed Confidential	Claimed Confidential	Fabric Filter	
IMF12	BC		Claimed Confidential	Claimed Confidential	Fabric Filter	
IMF14	BC		Claimed Confidential	Claimed Confidential	Fabric Filter	
IMF15	BC		Claimed Confidential	Claimed Confidential	Fabric Filter	
IMF16	BC		Claimed Confidential	Claimed Confidential	Fabric Filter	
IMF11	BC		Claimed Confidential	Claimed Confidential	Fabric Filter	
IMF13*	TP		Claimed Confidential	Claimed Confidential	Fabric Filter	
B210	TP – Delivery to Stockpile		Claimed Confidential	Claimed Confidential	3 Sided Enclosure with Cover	
B230*	TP – Coal Milling Unloading to Bunker		Claimed Confidential	Claimed Confidential	3 Sided Enclosure with Cover	
B215	TP		Claimed Confidential	Claimed Confidential	3 Sided Enclosure with Cover	
B231*	TP		Claimed Confidential	Claimed Confidential	3 Sided Enclosure with Cover	
RM_REJ	TP		Claimed Confidential	Claimed Confidential	4 Sided Rubber Drop Guards	
S-REJ	TP		Claimed Confidential	Claimed Confidential	4 Sided Rubber Drop Guards	
B170	TP – Drop to Pit Waste from Portable Crusher		Claimed Confidential	Claimed Confidential	3 Sided Enclosure	
B235*	BC – To Coal Mill TP – Hopper to Feed Bin		Claimed Confidential	Claimed Confidential	Enclosed Building/ Fabric Filter	

Crushing and Screening						
ID of Emission Unit	B170	IMF17/IMF18 Crusher				
Type Crusher or Screen						
Material Sized						
Material Sized Throughput:						
Tons/hr	Claimed Confidential	Claimed Confidential				
Tons/yr	Claimed Confidential	Claimed Confidential				
Material sized from/to						
Typical moisture content as crushed or screened (%)	Claimed Confidential	Claimed Confidential				
Dust control methods applied						
Stack Parameters:						
Height (ft)						
Diameter (ft)						
Volume (ACFM)						
Temp (°F)	Ambient					
Maximum operating schedule:						
Hour/day	12	24				
Day/year	45	365				
Hour/year	540	8760				
Approximate Percentage of Operation from:						
Jan – Mar	25	25				
April – June	25	25				
July – Sept	25	25				
Oct – Dec	25	25				
Maximum Particulate (PM ₁₀) Emissions:						
LB/HR	0.36	0.04				
Ton/Year	0.10	0.17				

List emission sources with request information:

ID of Emission Unit	Type of Emission Unit and Use	Operating Schedule		Max. Amount of Stone Input to Emission (lb/hr)	Crushed or Screened From/To (size)	Date of Emission Unit was Manufacture
		Actual (hrs/yr)	Design (hrs/yr)			

List emission sources with request information:

ID of Emission Unit	Maximum expected emissions from Emission Unit without Air Pollution Control Equipment				
	PM ₁₀ (lbs/hr)	SO ₂ (lbs/hr)	CO (lbs/hr)	NO _x (lbs/hr)	VOC (lbs/hr)

ID of Emission Unit	Maximum expected emissions from Emission Unit without Air Pollution Control Equipment				
	PM ₁₀ (tons/yr)	SO ₂ (tons/yr)	CO (tons/yr)	NO _x (tons/yr)	VOC (tons/yr)

Please fill out a separate Air Pollution Control Device Sheet for each Emission Unit equipped with an air pollution control system.

What type of stone will be quarried at this site?

NA

How will it be quarried?

- Sawing
- Blasting
- Other, Specify:

If blasting is checked, complete the following:

- Frequency of blasting:
- What method of air pollution control will be employed during drilling and blasting?

*Denotes a source that does not meet the definition of nonmetallic mineral. Information provided for the coal material process to support the application review process.

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Attachment M

Attachment M
Air Pollution Control Device Sheet
 (AFTERBURNER SYSTEM)

Control Device ID No. (must match Emission Units Table): **CO-AB – The afterburner is routed through HE01.**

Equipment Information

1. Manufacturer: TBD Model No.	2. <input type="checkbox"/> Thermal Energy Recovery <input checked="" type="checkbox"/> Recuperative (Conventional) <input type="checkbox"/> Catalytic
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. Combustion chamber dimensions: Length: TBD ft Diameter: TBD ft Cross-sectional area: TBD ft ²	5. Stack Dimensions: Height: 213.25 ft Diameter: 12.96 ft
6. Combustion (destruction) efficiency: Estimated: 95 % Minimum guaranteed: 95 %	7. Retention or residence time of materials in combustion chamber: Maximum: TBD sec Minimum: TBD sec
8. Throat diameter: TBD ft	9. Combustion Chamber Volume: TBD ft ³
10. Fuel used in burners: <input checked="" type="checkbox"/> Natural Gas <input type="checkbox"/> Fuel Oil, Number: <input type="checkbox"/> Other, specify:	11. Burners per afterburner: Number of burners: Claimed Confidential BTU/hr for burner: Claimed Confidential
12. Fuel heating value of natural gas: 1026 BTU/scf	13. Flow rate of natural gas: Claimed Confidential ft ³ /min
14. Is a catalyst material used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, catalyst material used:	15. Expected frequency of catalyst replacement: yr(s)
	16. Date catalyst was last replaced: Month/Year:
17. Space Velocity of the catalyst material used: 1/hour	18. Catalyst area: ft ²
	19. Volume of catalyst bed: ft ³
20. Minimum loading: Maximum loading:	21. Temperature catalyst bed inlet: °F Temperature catalyst bed outlet: °F
22. Explain degradation or performance indicator criteria determining catalyst replacement:	
23. Heat exchanger used? <input type="checkbox"/> Yes <input type="checkbox"/> No Describe heat exchanger:	24. Heat exchanger surface area? ft ²
	25. Average thermal efficiency: %
26. Temperature of gases: After preheat: °F Before preheat: °F	
27. Dilution air flow rate: ft ³ /minute	

28. Describe method of gas mixing used:

Waste Gas (Emission Stream) to be Burned

29.	Name	Quantity Grains of H ₂ S/100 ft ²	Quantity-Density (LB/hr, ft ³ /hr, etc)	Source of Material

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

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

32. Afterburner operating parameters:	During maximum operation of feeding unit(s)	During typical operation of feeding unit(s)	During minimum operation of feeding unit(s)
Combustion chamber temperature in °F		1472	
Emission stream gas temperature in °F		482	
Combined gas stream entering catalyst bed in			
Flue stream leaving the catalyst bed			
Emission stream flow rate (scfm)		Claimed Confidential	
Efficiency (VOC Reduction)	%	95 %	%
Efficiency (Other; specify contaminant)	%	%	%

33. Inlet Emission stream parameters:

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

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

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

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

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

37. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
38. Describe the collection material disposal system:	
39. Have you included Afterburner Control Device in the Emissions Points Data Summary Sheet?	
40. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan in Attachment O.
MONITORING: RECORDKEEPING: REPORTING: TESTING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device. Please describe the proposed recordkeeping that will accompany the monitoring. Please describe any proposed emissions testing for this process equipment on air pollution control device. Please describe any proposed emissions testing for this process equipment on air pollution control device.
41. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.	
42. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
95% minimum control efficiency	
43. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **De-NOx**

Equipment Information

1. Manufacturer: Model No.	2. Control Device Name: De-NOx System associated with Melting Furnace (IMF01) Type: Selective Non-Catalytic Reduction (SNCR) by Ammonia Injection
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume:	SCFM 10. Capacity:
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal.	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system:	
29. Have you included <i>Other Collectores Control Device</i> in the Emissions Points Data Summary Sheet?	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device.	RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.	TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

**Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)**

Control Device ID No. (must match Emission Units Table): **De-SOx**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: De-SOx Unit associated with Melting Furnace Baghouse (IMF01-BH) Type: Sorbent Injection System
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 21,413.73 SCFM	10. Capacity:
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal.	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input checked="" type="checkbox"/> SO _x <input type="checkbox"/> Odor <input type="checkbox"/> Particulate (type): <input checked="" type="checkbox"/> Other – H ₂ SO ₄ , HF, HCl				
17. Inlet gas velocity: _____ ft/sec	18. Pollutant specific gravity:			
19. Gas flow into the collector: 21,413.73 ACF @ 301.73 °F and PSIA	20. Gas stream temperature: Inlet: 301.73 °F Outlet: 301.73 °F			
21. Gas flow rate: Design Maximum: 21,413.73 ACFM Average Expected: _____ ACFM	22. Particulate Grain Loading in grains/scf: Inlet: _____ Outlet: _____			
23. Emission rate of each pollutant (specify) into and out of collector:				
Pollutant	IN Pollutant	Emission Capture Efficiency %	OUT Pollutant	Control Efficiency %
	lb/hr grains/acf		lb/hr grains/acf	
SO₂			33.63	>80%
H₂SO₄			3.74	>80%
HF			0.37	>80%
HCl			0.29	>80%
24. Dimensions of stack: Height 213.25 ft. Diameter 3.12 ft.				
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.				

Particulate Distribution

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system: Spent sorbent is sent to the Spent Sorbent Silo (IMF09) before being trucked off-site for disposal.	
29. Have you included <i>Other Collectors Control Device</i> in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan in Attachment O.
MONITORING: RECORDKEEPING: REPORTING: TESTING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device. Please describe the proposed recordkeeping that will accompany the monitoring. Please describe any proposed emissions testing for this process equipment on air pollution control device. Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. SO₂ – >80% efficiency, meets BACT of 33.63 lb/hr H₂SO₄ – >80% efficiency, meets BACT of 3.74 lb/hr	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
(ELECTROSTATIC PRECIPITATOR)

Control Device ID No. (must match Emission Units Table): **HE01****Equipment Information**

1. Manufacturer: TBD Model No.	2. Type: <input checked="" type="checkbox"/> Wet <input type="checkbox"/> Dry <input type="checkbox"/> Single-stage <input type="checkbox"/> Two-stage
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. Guaranteed collection efficiency: Minimum:	5. Type of particulate controlled: PM₁₀ and PM_{2.5}

Gas Stream Characteristics

6. Particulate which will be emitted from outlet of precipitator: Total PM₁₀ – 21.21 lb/hr Total PM_{2.5} – 19.22 lb/hr	
7. Gas flow rate into collector: Design maximum: 459,222 acfm at 183.2 °F Average expected: 369,529 acfm at 183.2 °F	8. Gas Stream Temperature: Inlet: 183.2 °F Outlet: 98.6 °F
9. Pressure Drop: 3 in. H₂O (750 Pa)	10. Particulate Grain Loading in grains/scf.: Inlet: °F Outlet: °F
11. Gas velocity through precipitator: 49.90 ft/sec	
12. Percent moisture of gas stream: Maximum: % Typical: %	13. Water vapor content of effluent stream: 0.09 lb water/lb dry air
14. Density of gas stream: lb/ACF	15. Viscosity of gas stream: lb/sec-ft
16. Fan requirements: TBD HP ft ³ /min	17. Gas stream residence time or treatment time: sec.
18. Particulate to be collected: Type: Resistivity: ohm-cm Specific Gravity:	19. Value of drift velocity, w, used for a particle with a diameter of one micron: ft/sec
20. What equation was used to determine theoretical efficiency? Write the equation below:	
21. Dimensions of stack: Diameter 12.96 ft Height 213.25 ft	

Precipitator Characteristics	
22. Collecting electrodes: Type of collecting electrodes: <input type="checkbox"/> Vee plate <input type="checkbox"/> Opzel plate <input type="checkbox"/> Other, specify Number: Vertical height: ft Total area of active collecting surface: ft²	23. Discharge electrodes: Type of discharge electrodes: Number: Effective length of each electrode: ft Wire spacing in direction of gas flow: ft
24. Spacing between collecting and discharge electrodes: ft	
25. Collecting rappers: Type of rappers: Number of rappers: Time interval between raps of the same rappers: sec Total time for one complete rapping cycle: sec	26. Discharge rappers: Type of rappers: Number of rappers: Time interval between raps of the same rappers: sec Total time for one complete rapping cycle: sec
27. Plate cleaning system: <input type="checkbox"/> Rapping <input type="checkbox"/> Water spray washing <input type="checkbox"/> Other, specify	
28. Sectionalization and power requirements: Number of fields: Current density on wires: mA/ft Number of bus sections: Total power requirements: kW Total: Field strengths: In series: Charging: KV/in In parallel: Collecting: KV/in Number of gas passages: Sparking Voltage: volts Cross-sectional area per gas passages: Sparking rate (optimum): no./sec Applied voltage (peak): Proposed power supply: Type rectifiers: Number of Transformers: How would the loss of one field affect the performance of the precipitator?	

Particle Distribution

29. Complete the table:	Particle Size Distribution at Inlet to Collector	Fraction Efficiency of Collector
Particulate Size Range (microns)	Weight % for Size Range	Weight % for Size Range
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		

20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		
30. Supply curve showing the expected collection efficiency versus content of coal burned over a range of 0.4% to 5% sulfur (if applicable).		
31. Supply curve showing the collection efficiency versus gas volume from 90 to 130 percent of design rating of precipitator.		
32. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):		
33. Describe the collection material disposal system:		
34. Have you included <i>Electrostatic Precipitator Control Device</i> in the Emissions Points Data Summary Sheet? Yes		
35. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.		
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.	
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device.	
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.	
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.	
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.	
36. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.		

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

PM₁₀ – 90% efficiency

PM_{2.5} – 90% efficiency

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

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **IMF21-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Charging Building Vacuum Cleaning Filter Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 315.8 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. N/A	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO _x <input type="checkbox"/> Odor <input checked="" type="checkbox"/> Particulate (type): PM₁₀ and PM_{2.5} <input type="checkbox"/> Other						
17. Inlet gas velocity: 29.52 ft/sec			18. Pollutant specific gravity:			
19. Gas flow into the collector: 315.8 ACF @ 103.73 °F and PSIA			20. Gas stream temperature: Inlet: 103.73 °F Outlet: 103.73 °F			
21. Gas flow rate: Design Maximum: 315.8 ACFM Average Expected: ACFM			22. Particulate Grain Loading in grains/scf: Inlet: Outlet: PM₁₀ – 0.002 gr/scf PM_{2.5} – 0.001 gr/scf			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
PM₁₀				0.01		>99%
PM_{2.5}				<0.01		>99%
24. Dimensions of stack: Height 9.84 ft. Diameter 0.49 ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

Particulate Distribution

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device. RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring. REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device. TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.	
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – > 99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **IMF04-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Coal Conveyor Transition Point Filter (B231 to B235) Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 1,137.0 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal.	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): NA	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – > 99% efficiency typical PM_{2.5} – > 99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

**Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)**

Control Device ID No. (must match Emission Units Table): **IMF25-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Coal Feed Tank Filter Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 758.23 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. N/A	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device. RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring. REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device. TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.	
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **IMF13-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Coal Conveyor Transition Point (B231 to B235) Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 1,137.0 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. NA	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): NA	
28. Describe the collection material disposal system: 	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – > 99% efficiency typical PM_{2.5} – > 99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant. 	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty. 	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **IMF06-FF**

Equipment Information

1. Manufacturer: Model No.	2. Control Device Name: Coal Milling De-dusting Filter Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 6,316.73 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. N/A	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO _x <input type="checkbox"/> Odor <input checked="" type="checkbox"/> Particulate (type): PM₁₀ and PM_{2.5} <input type="checkbox"/> Other						
17. Inlet gas velocity: 65.62 ft/sec			18. Pollutant specific gravity:			
19. Gas flow into the collector: 6,316.73 ACF @ 67.73 °F and PSIA			20. Gas stream temperature: Inlet: 67.73 °F Outlet: 67.73 °F			
21. Gas flow rate: Design Maximum: 6,316.73 ACFM Average Expected:			22. Particulate Grain Loading in grains/scf: Inlet: Outlet: PM₁₀ – 0.004 gr/scf PM_{2.5} – 0.002 gr/scf			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
PM₁₀				0.22		>99%
PM_{2.5}				0.11		>99%
24. Dimensions of stack: Height 65.62 ft. Diameter 1.44 ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

Particulate Distribution

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device. RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring. REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device. TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.	
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **IMF03A-FF, IMF03B-FF, and IMF03C-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Coal Storage Silo Filters Type: Fabric Filters
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 758.0 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. NA	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO _x <input type="checkbox"/> Odor <input checked="" type="checkbox"/> Particulate (type): PM₁₀ and PM_{2.5} <input type="checkbox"/> Other						
17. Inlet gas velocity: 9.35 ft/sec			18. Pollutant specific gravity:			
19. Gas flow into the collector: 758.0 ACF @ 67.73 °F and PSIA			20. Gas stream temperature: Inlet: 67.73 °F Outlet: 67.73 °F			
21. Gas flow rate: Design Maximum: 758.0 ACFM Average Expected:			22. Particulate Grain Loading in grains/scf: Inlet: Outlet: PM₁₀ – 0.002 gr/scf PM_{2.5} – 0.001 gr/scf			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
PM₁₀				0.01		> 99%
PM_{2.5}				0.01		> 99%
24. Dimensions of stack: Height 72.18 ft. Diameter 1.31 ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

Particulate Distribution

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): NA	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan in Attachment O.
MONITORING: RECORDKEEPING: REPORTING: TESTING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device. Please describe the proposed recordkeeping that will accompany the monitoring. Please describe any proposed emissions testing for this process equipment on air pollution control device. Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – > 99% efficiency typical PM_{2.5} – > 99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **RNFE4-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Drying Oven 1 Filter Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 3,158.4 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal.	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO _x <input type="checkbox"/> Odor <input checked="" type="checkbox"/> Particulate (type): PM₁₀ and PM_{2.5} <input type="checkbox"/> Other						
17. Inlet gas velocity: _____ ft/sec			18. Pollutant specific gravity:			
19. Gas flow into the collector: _____ °F and _____ PSIA 3,158.4 ACF @			20. Gas stream temperature: Inlet: 319.73 °F Outlet: 319.73 °F			
21. Gas flow rate: Design Maximum: 3,158.4 ACFM Average Expected: _____ ACFM			22. Particulate Grain Loading in grains/scf: Inlet: _____ Outlet: PM₁₀ – 0.0015 gr/scf PM_{2.5} – 0.0008 gr/scf			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
PM₁₀				0.04		> 99%
PM_{2.5}				0.02		> 99%
24. Dimensions of stack: Height 39.37 ft. Diameter 1.64 ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

Particulate Distribution

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): NA	
28. Describe the collection material disposal system: 	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant. 	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty. 	

**Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)**

Control Device ID No. (must match Emission Units Table): **RNFE6-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Drying Oven 2&3 Filter Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 7,580.1 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal.	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO _x <input type="checkbox"/> Odor <input checked="" type="checkbox"/> Particulate (type): PM₁₀ and PM_{2.5} <input type="checkbox"/> Other						
17. Inlet gas velocity: _____ ft/sec			18. Pollutant specific gravity:			
19. Gas flow into the collector: _____ °F and _____ PSIA 7,580.1 ACF @			20. Gas stream temperature: Inlet: 319.73 °F Outlet: 319.73 °F			
21. Gas flow rate: Design Maximum: 7,580.1 ACFM Average Expected: _____ ACFM			22. Particulate Grain Loading in grains/scf: Inlet: _____ Outlet: PM₁₀ – 0.001 gr/scf PM_{2.5} – 0.0005 gr/scf			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
PM₁₀				0.06		> 99%
PM_{2.5}				0.03		> 99%
24. Dimensions of stack: Height 49.21 ft. Diameter 2.62 ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

Particulate Distribution

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): NA	
28. Describe the collection material disposal system: 	
29. Have you included <i>Other Collectors Control Device</i> in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan in Attachment O.
MONITORING: RECORDKEEPING: REPORTING: TESTING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device. Please describe the proposed recordkeeping that will accompany the monitoring. Please describe any proposed emissions testing for this process equipment on air pollution control device. Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant. 	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty. 	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **IMF07A-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Filter Fines Day Silo Filter Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 790.0 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. N/A	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO _x <input type="checkbox"/> Odor				
<input checked="" type="checkbox"/> Particulate (type): PM₁₀ and PM_{2.5} <input type="checkbox"/> Other				
17. Inlet gas velocity: 9.74 ft/sec	18. Pollutant specific gravity:			
19. Gas flow into the collector: 790.0 ACF @ 67.73 °F and PSIA	20. Gas stream temperature: Inlet: 67.73 °F Outlet: 67.73 °F			
21. Gas flow rate: Design Maximum: 790.0 ACFM Average Expected: ACFM	22. Particulate Grain Loading in grains/scf: Inlet: Outlet: PM₁₀ – 0.002 gr/scf PM_{2.5} – 0.001 gr/scf			
23. Emission rate of each pollutant (specify) into and out of collector:				
Pollutant	IN Pollutant	Emission Capture Efficiency %	OUT Pollutant	Control Efficiency %
	lb/hr	grains/acf	lb/hr	grains/acf
PM₁₀			0.01	>99%
PM_{2.5}			<0.01	>99%
24. Dimensions of stack: Height 72.18 ft. Diameter 1.31 ft.				
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.				

Particulate Distribution

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **IMF10-FF**

Equipment Information

1. Manufacturer: Model No.	2. Control Device Name: Filter Fines Receiving Silo Filter Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 758.0 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. N/A	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system:	
29. Have you included <i>Other Collectors Control Device</i> in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **IMF12-FF, IMF14-FF, IMF15-FF, IMF11-FF and IMF16-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Conveyor Transition Point Filters Type: Fabric Filters
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 1,037.0 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. N/A	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device.	RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.	TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **CM10-FF and CM11-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Recycle Plant Building Vent 1 and 2 Filters Type: Fabric Filters
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 18,950.20 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. NA	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO _x <input type="checkbox"/> Odor <input checked="" type="checkbox"/> Particulate (type): PM₁₀ and PM_{2.5} <input type="checkbox"/> Other						
17. Inlet gas velocity: 39.93 ft/sec			18. Pollutant specific gravity:			
19. Gas flow into the collector: 18,950.20 ACF @ 103.73 °F and PSIA			20. Gas stream temperature: Inlet: 103.73 °F Outlet: 103.73 °F			
21. Gas flow rate: Design Maximum: 18,950.20 ACFM Average Expected: ACFM			22. Particulate Grain Loading in grains/scf: Inlet: Outlet: PM₁₀ – 0.004 gr/scf PM_{2.5} – 0.002 gr/scf			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
PM₁₀				0.66		>99%
PM_{2.5}				0.33		>99%
24. Dimensions of stack: Height 49.21 ft. Diameter 3.28 ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

Particulate Distribution

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

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

28. Describe the collection material disposal system:
NA

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

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

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

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
PM₁₀ – >99% efficiency typical
PM_{2.5} – >99% efficiency typical

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

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

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **CM08-FF and CM09-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Recycle Plant Building Vent 3 and 4 Filters Type: Fabric Filters
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 1,597.18 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. NA	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **IMF07B-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Second Energy Materials Silo Filter Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 790.0 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. N/A	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO _x <input type="checkbox"/> Odor <input checked="" type="checkbox"/> Particulate (type): PM₁₀ and PM_{2.5} <input type="checkbox"/> Other						
17. Inlet gas velocity: 9.74 ft/sec			18. Pollutant specific gravity:			
19. Gas flow into the collector: 790.0 ACF @ 67.73 °F and PSIA			20. Gas stream temperature: Inlet: 67.73 °F Outlet: 67.73 °F			
21. Gas flow rate: Design Maximum: 790.0 ACFM Average Expected:			22. Particulate Grain Loading in grains/scf: Inlet: Outlet: PM₁₀ – 0.002 gr/scf PM_{2.5} – 0.001 gr/scf			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
PM₁₀				0.01		>99%
PM_{2.5}				<0.01		>99%
24. Dimensions of stack: Height 72.18 ft. Diameter 1.31 ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

Particulate Distribution

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **IMF08-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Sorbent Silo Filter Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 758.0 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. N/A	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO _x <input type="checkbox"/> Odor <input checked="" type="checkbox"/> Particulate (type): PM₁₀ and PM_{2.5} <input type="checkbox"/> Other						
17. Inlet gas velocity: 9.35 ft/sec			18. Pollutant specific gravity:			
19. Gas flow into the collector: 758.0 ACF @ 67.73 °F and PSIA			20. Gas stream temperature: Inlet: 67.73 °F Outlet: 67.73 °F			
21. Gas flow rate: Design Maximum: 758.0 ACFM Average Expected:			22. Particulate Grain Loading in grains/scf: Inlet: Outlet: PM₁₀ – 0.002 gr/scf PM_{2.5} – 0.001 gr/scf			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
PM₁₀				0.01		>99%
PM_{2.5}				<0.01		>99%
24. Dimensions of stack: Height 72.18 ft. Diameter 1.31 ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

Particulate Distribution

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device. RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring. REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device. TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.	
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **IMF09-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Spent Sorbent Silo Filter Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 758.0 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. N/A	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO _x <input type="checkbox"/> Odor <input checked="" type="checkbox"/> Particulate (type): PM₁₀ and PM_{2.5} <input type="checkbox"/> Other						
17. Inlet gas velocity: 9.35 ft/sec			18. Pollutant specific gravity:			
19. Gas flow into the collector: 758.0 ACF @ 67.73 °F and PSIA			20. Gas stream temperature: Inlet: 67.73 °F Outlet: 67.73 °F			
21. Gas flow rate: Design Maximum: 758.0 ACFM Average Expected: ACFM			22. Particulate Grain Loading in grains/scf: Inlet: Outlet: PM₁₀ – 0.002 gr/scf PM_{2.5} – 0.001 gr/scf			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
PM₁₀				0.01		>99%
PM_{2.5}				<0.01		>99%
24. Dimensions of stack: Height 72.18 ft. Diameter 1.31 ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

Particulate Distribution

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency, meets BACT of 0.002 gr/scf PM_{2.5} – >99% efficiency, meets BACT of 0.001 gr/scf	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

Attachment M
Air Pollution Control Device Sheet
 (OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): **IMF09-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Spent Sorbent Silo Filter Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 758.0 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. N/A	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO _x <input type="checkbox"/> Odor <input checked="" type="checkbox"/> Particulate (type): PM₁₀ and PM_{2.5} <input type="checkbox"/> Other						
17. Inlet gas velocity: 9.35 ft/sec			18. Pollutant specific gravity:			
19. Gas flow into the collector: 758.0 ACF @ 67.73 °F and PSIA			20. Gas stream temperature: Inlet: 67.73 °F Outlet: 67.73 °F			
21. Gas flow rate: Design Maximum: 758.0 ACFM Average Expected:			22. Particulate Grain Loading in grains/scf: Inlet: Outlet: PM₁₀ – 0.002 gr/scf PM_{2.5} – 0.001 gr/scf			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
PM₁₀				0.01		>99%
PM_{2.5}				<0.01		>99%
24. Dimensions of stack: Height 72.18 ft. Diameter 1.31 ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

Particulate Distribution

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan 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 or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

**Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)**

Control Device ID No. (must match Emission Units Table): **RNFE5-FF**

Equipment Information

1. Manufacturer: TBD Model No.	2. Control Device Name: Spraying Cabin Filter Type: Fabric Filter
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected:	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 6,316.7 SCFM	10. Capacity: TBD
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal.	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical	
Pressure (mmHg):			
Heat Content (BTU/scf):			
Oxygen Content (%):			
Moisture Content (%):			
Relative Humidity (%):			

16. Type of pollutant(s) controlled: <input type="checkbox"/> SO _x <input type="checkbox"/> Odor <input checked="" type="checkbox"/> Particulate (type): PM₁₀ and PM_{2.5} <input type="checkbox"/> Other						
17. Inlet gas velocity: _____ ft/sec			18. Pollutant specific gravity:			
19. Gas flow into the collector: _____ °F and _____ PSIA 6,316.7 ACF @			20. Gas stream temperature: Inlet: 103.73 °F Outlet: 103.73 °F			
21. Gas flow rate: Design Maximum: 6,316.7 ACFM Average Expected: _____ ACFM			22. Particulate Grain Loading in grains/scf: Inlet: _____ Outlet: PM₁₀ – 0.0081 gr/scf PM_{2.5} – 0.0041 gr/scf			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
PM₁₀				0.44		> 99%
PM_{2.5}				0.22		> 99%
24. Dimensions of stack: Height 98.42 ft. Diameter 1.64 ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

Particulate Distribution

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): NA	
28. Describe the collection material disposal system:	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet? Yes	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: See proposed monitoring plan in Attachment O.	RECORDKEEPING: See proposed recordkeeping plan in Attachment O.
REPORTING: See proposed reporting plan in Attachment O.	TESTING: See proposed testing plan in Attachment O.
MONITORING: RECORDKEEPING: REPORTING: TESTING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device. Please describe the proposed recordkeeping that will accompany the monitoring. Please describe any proposed emissions testing for this process equipment on air pollution control device. Please describe any proposed emissions testing for this process equipment on air pollution control device.
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

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

Filterable PM₁₀ and PM_{2.5}

23. Is there any SO₃ in the emission stream? No Yes SO₃ content: _____ ppmv

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

Pollutant	IN		OUT	
	lb/hr	grains/acf	lb/hr	grains/acf
Filterable PM₁₀			0.12	
Filterable PM_{2.5}			0.06	

25. Complete the table:

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

26. How is filter monitored for indications of deterioration (e.g., broken bags)?

- Continuous Opacity
- Pressure Drop
- Alarms-Audible to Process Operator
- Visual opacity readings, Frequency:
- Other, specify:

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

28. Describe any filter seeding being performed:

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

30. Describe the collection material disposal system:

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

<p>32. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.</p>	
<p>MONITORING: See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING: See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING: See proposed reporting plan in Attachment O.</p>	<p>TESTING: See proposed testing plan in Attachment O.</p>
<p>MONITORING: RECORDKEEPING: REPORTING: TESTING:</p>	<p>Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device. Please describe the proposed recordkeeping that will accompany the monitoring. Please describe any proposed emissions testing for this process equipment on air pollution control device. Please describe any proposed emissions testing for this process equipment on air pollution control device.</p>
<p>33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.</p>	
<p>34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.</p> <p>PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical</p>	
<p>35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.</p>	

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

Filterable PM, PM₁₀, PM_{2.5}

23. Is there any SO₃ in the emission stream? No Yes SO₃ content: _____ ppmv

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

Pollutant	IN		OUT	
	lb/hr	grains/acf	lb/hr	grains/acf
Filterable PM₁₀			0.34	
Filterable PM_{2.5}			0.17	
PM_{HAPs}			0.34	

25. Complete the table:

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

26. How is filter monitored for indications of deterioration (e.g., broken bags)?

- Continuous Opacity
- Pressure Drop
- Alarms-Audible to Process Operator
- Visual opacity readings, Frequency:
- Other, specify:

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

28. Describe any filter seeding being performed:

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

30. Describe the collection material disposal system:

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

<p>32. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.</p>	
<p>MONITORING: See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING: See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING: See proposed reporting plan in Attachment O.</p>	<p>TESTING: See proposed testing plan in Attachment O.</p>
<p>MONITORING: RECORDKEEPING: REPORTING: TESTING:</p>	<p>Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device. Please describe the proposed recordkeeping that will accompany the monitoring. Please describe any proposed emissions testing for this process equipment on air pollution control device. Please describe any proposed emissions testing for this process equipment on air pollution control device.</p>
<p>33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.</p>	
<p>34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.</p> <p>PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical</p>	
<p>35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.</p>	

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

PM₁₀, PM_{2.5}, and PM_{HAPs}

23. Is there any SO₃ in the emission stream? No Yes SO₃ content: ppmv

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

Pollutant	IN		OUT	
	lb/hr	grains/acf	lb/hr	grains/acf
Filterable PM₁₀			0.77	
Filterable PM_{2.5}			0.77	
PM_{HAPs}			0.77	

25. Complete the table:

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

26. How is filter monitored for indications of deterioration (e.g., broken bags)?

- Continuous Opacity
- Pressure Drop
- Alarms-Audible to Process Operator
- Visual opacity readings, Frequency:
- Other, specify:

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

28. Describe any filter seeding being performed:

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

30. Describe the collection material disposal system:

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

<p>32. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.</p>	
<p>MONITORING: See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING: See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING: See proposed reporting plan in Attachment O.</p>	<p>TESTING: See proposed testing plan in Attachment O.</p>
<p>MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.</p> <p>RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.</p> <p>REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.</p> <p>TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.</p>	
<p>33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.</p>	
<p>34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.</p> <p>PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical</p>	
<p>35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.</p>	

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

Filterable PM₁₀, Filterable PM_{2.5}, PM_{HAPS}

23. Is there any SO₃ in the emission stream? No Yes SO₃ content: _____ ppmv

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

Pollutant	IN		OUT	
	lb/hr	grains/acf	lb/hr	grains/acf
Filterable PM₁₀			8.22	
Filterable PM_{2.5}			7.47	

25. Complete the table:

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

26. How is filter monitored for indications of deterioration (e.g., broken bags)?

- Continuous Opacity
- Pressure Drop
- Alarms-Audible to Process Operator –Required by MACT
- Visual opacity readings, Frequency:
- Other, specify:

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

28. Describe any filter seeding being performed:

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

30. Describe the collection material disposal system:

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

<p>32. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.</p>	
<p>MONITORING:</p> <p>See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING:</p> <p>See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING:</p> <p>See proposed reporting plan in Attachment O.</p>	<p>TESTING:</p> <p>See proposed testing plan in Attachment O.</p>
<p>MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.</p>	<p>RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.</p>
<p>REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.</p>	<p>TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.</p>
<p>33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.</p>	
<p>34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.</p> <p>PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical</p>	
<p>35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.</p>	

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

Filterable PM₁₀, PM_{2.5}, and PM_{HAPs}

23. Is there any SO₃ in the emission stream? No Yes SO₃ content: _____ ppmv

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

Pollutant	IN		OUT	
	lb/hr	grains/acf	lb/hr	grains/acf
Filterable PM ₁₀			0.22	
Filterable PM _{2.5}			0.22	
PM _{HAPs}			0.22	

25. Complete the table:

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

26. How is filter monitored for indications of deterioration (e.g., broken bags)?

- Continuous Opacity
- Pressure Drop
- Alarms-Audible to Process Operator
- Visual opacity readings, Frequency:
- Other, specify:

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

28. Describe any filter seeding being performed:

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

30. Describe the collection material disposal system:

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

<p>32. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.</p>	
<p>MONITORING: See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING: See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING: See proposed reporting plan in Attachment O.</p>	<p>TESTING: See proposed testing plan in Attachment O.</p>
<p>MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device. RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring. REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device. TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.</p>	
<p>33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant. The vacuum cleaning baghouse is a maintenance source that is not capturing emissions from an emission unit. Capture is not applicable to this source.</p>	
<p>34. Manufacturer's Guaranteed Control Efficiency for each air pollutant. PM₁₀ – >99% efficiency typical PM_{2.5} – >99% efficiency typical</p>	
<p>35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.</p>	

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

Filterable PM₁₀ and PM_{2.5}

23. Is there any SO₃ in the emission stream? No Yes SO₃ content: _____ ppmv

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

Pollutant	IN		OUT	
	lb/hr	grains/acf	lb/hr	grains/acf
Filterable PM₁₀			0.22	
Filterable PM_{2.5}			0.11	

25. Complete the table:

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

26. How is filter monitored for indications of deterioration (e.g., broken bags)?

- Continuous Opacity
- Pressure Drop
- Alarms-Audible to Process Operator
- Visual opacity readings, Frequency:
- Other, specify:

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

28. Describe any filter seeding being performed:

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

30. Describe the collection material disposal system:

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

<p>32. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.</p>	
<p>MONITORING: See proposed monitoring plan in Attachment O.</p>	<p>RECORDKEEPING: See proposed recordkeeping plan in Attachment O.</p>
<p>REPORTING: See proposed reporting plan in Attachment O.</p>	<p>TESTING: See proposed testing plan in Attachment O.</p>
<p>MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.</p> <p>RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.</p> <p>REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.</p> <p>TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.</p>	
<p>33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.</p>	
<p>34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.</p> <p>PM₁₀ – >99% efficiency PM_{2.5} – >99% efficiency</p>	
<p>35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.</p>	

Attachment N

Attachment N
Emission Calculations

Please see the emission calculations for the RAN facility as *Appendix A* of this permit application submittal.

Attachment O

Roxol USA Inc.
 Hanson, West Virginia
 BACT Summary, Proposed Compliance Demonstration, & Federal State/ Regulatory Limits

Unit Process	Source ID	Source Description	Pollutant	US		METRC		Proposed BACT Control Type	Proposed Compliance Demonstration	Federal/State Regulatory Emission Standard		
				Proposed BACT Emission Limit	Proposed BACT Emission Limit	Proposed BACT Emission Limit	Proposed BACT Emission Limit			Standard	Limit	UOM
				Limit	UOM	Limit	UOM					
Facility Wide			CO2e	152,935	lb/yr 12-month rolling total	136,740	lb/yr 12-month rolling total	Good operation & maintenance for energy efficiency	Recordkeeping	-	-	-
Minimox Line												
Minimox Line			CO2e	135,517	lb/yr 12-month rolling total	123,030	lb/yr 12-month rolling total	Good operation & maintenance for energy efficiency	Recordkeeping	-	-	-
Material Handling Equipment	RMS	Raw Material Stockpile	PM10/PM2.5 (Residue)					Partial Enclosures & Good Housekeeping Practices	Recordkeeping	-	-	-
	B215	Raw Material Loading Hopper (B215)						Partial Enclosures & Good Housekeeping Practices	Recordkeeping	-	-	-
	RM_REJ	Raw Material Reject Collection Bin						No add-on controls	Initial and 1.5 yr VE	NSPS OOO	7%	opacity
	R_REJ2	Sieve Reject Collection Bin						No add-on controls	Initial and 1.5 yr VE	NSPS OOO	7%	opacity
	B170	Melting Furnace Portable Crusher & Storage						Operational limit and good housekeeping practices	Recordkeeping	45CSR7	20%	opacity
	R4_RM	Raw Material Paved Hot Roads						Good housekeeping practices	Recordkeeping	45CSR7	-	-
	R4_CM	TEL - Cool/PET Coke from Bunkers to Feed Hopper (for Milling)						Good housekeeping practices	Recordkeeping	45CSR7	-	-
	R9_FP	Finished Product Paved Haul Road						Good housekeeping practices	Recordkeeping	45CSR7	-	-
B210	Raw Material Storage (B210)	Partial Enclosures & Good Housekeeping Practices	Recordkeeping	-	-	-						

Roxul USA Inc.
 Ranson, West Virginia
 BACT Summary, Proposed Compliance Demonstration, & Federal State/ Regulatory Limits

Unit Process	Source ID	Source Description	Pollutant	US		METRIC		Proposed BACT Control Type	Proposed Compliance Demonstration	Federal/State Regulatory Emission Standard		
				Proposed BACT Emission Limit		Proposed BACT Emission Limit				Standard	Limit	UOM
				Limit	UOM	Limit	UOM					
Material Handling Vents	IMF03	Three (3) Coal Storage Silos	PM ₁₀ (filterable)	0.04	lb/hr	0.02	kg/hr	Bin Vent Filter	Recordkeeping	45CSR7	NA	opacity
			PM _{2.5} (filterable)	0.02		0.01						
	IMF07	Two (2) Storage Silos (Filter Fines Day/ Secondary Energy Materials)	PM ₁₀ (filterable)	0.03	lb/hr	0.01	kg/hr	Bin Vent Filter	Initial and 15 yr VE	NSPS 000	7%	opacity
			PM _{2.5} (filterable)	0.01		0.005-03						
	IMF08	Sorbent Silo	PM ₁₀ (filterable)	0.01	lb/hr	0.005-03	kg/hr	Bin Vent Filter	Recordkeeping	45CSR7	NA	opacity
			PM _{2.5} (filterable)	0.01E-03		3.00E-03						
	IMF09	Spend Sorbent Silo	PM ₁₀ (filterable)	0.01	lb/hr	0.005-03	kg/hr	Bin Vent Filter	Recordkeeping	45CSR7	NA	opacity
			PM _{2.5} (filterable)	0.01E-03		3.00E-03						
	IMF10	Filter Fines Receiving Silo	PM ₁₀ (filterable)	0.01	lb/hr	0.005-03	kg/hr	Bin Vent Filter	Initial and 15 yr VE	NSPS 000	7%	opacity
			PM _{2.5} (filterable)	0.01E-03		3.00E-03						
	IMF11	Conveyor Transition Point (B215 to B220)	PM ₁₀ (filterable)	0.01	lb/hr	0.01	kg/hr	Fabric Filter	Initial Stack Test (M5) and NSPS Monitoring (e.g., quarterly 30-minute VE)	NSPS 000	0.014	grime
			PM _{2.5} (filterable)	0.01		4.50E-03						
	IMF12	Conveyor Transition Point (B210 to B220)	PM ₁₀ (filterable)	0.01	lb/hr	0.01	kg/hr	Fabric Filter	Initial Stack Test (M5) and NSPS Monitoring (e.g., quarterly 30-minute VE)	NSPS 000	0.014	grime
			PM _{2.5} (filterable)	0.01		4.50E-03						
	IMF14	Conveyor Transition Point (B220 No. 1)	PM ₁₀ (filterable)	0.02	lb/hr	0.01	kg/hr	Fabric Filter	Initial Stack Test (M5) and NSPS Monitoring (e.g., quarterly 30-minute VE)	NSPS 000	0.014	grime
			PM _{2.5} (filterable)	0.01		4.50E-03						
	IMF15	Conveyor Transition Point (B220 No. 2)	PM ₁₀ (filterable)	0.02	lb/hr	0.01	kg/hr	Fabric Filter	Initial Stack Test (M5) and NSPS Monitoring (e.g., quarterly 30-minute VE)	NSPS 000	0.014	grime
			PM _{2.5} (filterable)	0.01		4.50E-03						
	IMF16	Conveyor Transition Point (B220 to B300)	PM ₁₀ (filterable)	0.02	lb/hr	0.01	kg/hr	Fabric Filter	Initial Stack Test (M5) and NSPS Monitoring (e.g., quarterly 30-minute VE)	NSPS 000	0.014	grime
			PM _{2.5} (filterable)	0.01		4.50E-03						
IMF17	Charging Material Handling Building Vent 1	PM ₁₀ (filterable)	0.05	lb/hr	0.01	kg/hr	No add-on controls	Initial VE and NSPS Monitoring (e.g., quarterly 30-minute VE)	NSPS 000	7%	opacity	
		PM _{2.5} (filterable)	0.01		4.50E-03							
IMF18	Charging Material Handling Building Vent 2	PM ₁₀ (filterable)	0.02	lb/hr	0.01	kg/hr	No add-on controls	Initial VE and NSPS Monitoring (e.g., quarterly 30-minute VE)	NSPS 000	7%	opacity	
		PM _{2.5} (filterable)	0.01		4.50E-03							
IMF19	Coal Feed Tare	PM ₁₀ (filterable)	0.01	lb/hr	0.005-03	kg/hr	Bin Vent Filter	Recordkeeping	45CSR7	20%	opacity	
		PM _{2.5} (filterable)	0.01E-03		3.00E-03							
IMF21	Charging Building Vacuum Cleaning Filter	PM ₁₀ (filterable)	5.51E-03	lb/hr	2.50E-03	kg/hr	Fabric Filter	Recordkeeping	45CSR7	20%	opacity	
		PM _{2.5} (filterable)	2.71E-03		1.25E-03							
CM00	Recycle Plant Building Vent 1	PM ₁₀ (filterable)	0.66	lb/hr	0.30	kg/hr	Fabric Filter	Recordkeeping	45CSR7	20%	opacity	
		PM _{2.5} (filterable)	0.33		0.15							
CM11	Recycle Plant Building Vent 2	PM ₁₀ (filterable)	0.66	lb/hr	0.30	kg/hr	Fabric Filter	Recordkeeping	45CSR7	20%	opacity	
		PM _{2.5} (filterable)	0.33		0.15							
CM08	Recycle Plant Building Vent 3	PM ₁₀ (filterable)	0.96	lb/hr	0.03	kg/hr	Fabric Filter	Recordkeeping	45CSR7	20%	opacity	
		PM _{2.5} (filterable)	0.53		0.01							
CM09	Recycle Plant Building Vent 4	PM ₁₀ (filterable)	0.66	lb/hr	0.03	kg/hr	Fabric Filter	Recordkeeping	45CSR7	20%	opacity	
		PM _{2.5} (filterable)	0.33		0.01							

Roxul USA Inc.
 Ranson, West Virginia
 BACT Summary, Proposed Compliance Demonstration, & Federal State/Regulatory Limits

Unit Process	Source ID	Source Description	Pollutant	US		METRIC		Proposed BACT Control Type	Proposed Compliance Demonstration	Federal/State Regulatory Emission Standard		
				Proposed BACT Emission Limit	DOM	Proposed BACT Emission Limit	DOM			Standard	Limit	DOM
Mixing	MF24	Pre-heat Burner	PM ₁₀ /PM _{2.5} (filterable and condensable)	---	---	---	---	Good combustion practices, use of natural gas, low-NOx burner	Recordkeeping, Compliance with NESHAP DDDDD (annual time-avg)	---	---	---
			PM (filterable)	---	---	---	---					
			VOC	---	---	---	---					
			CO	84 lb/MMBtu	---	1,348 kg/MMBtu ^h	---					
			SO _x	---	---	---	---					
	NOx	80 ppmvd @ 3% O ₂	---	50 ppmvd @ 3% O ₂	---							
	HAP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NESHAP DDDDD	N/A	N/A	
	MF01	Mixing Furnace	PM (filterable)	2.32 lb/hr	---	1.00 kg/hr	---	Highflow	Initial Stack Testing and Operation of Bag Leak Detection System (NESHAP DDD)	---	---	---
			PM ₁₀ (filterable and condensable)	8.22 lb/hr	---	3.75 kg/hr	---					
			PM _{2.5} (filterable and condensable)	7.47 lb/hr	---	3.38 kg/hr	---					
			VOC	51.08 lb/yr	---	46.34 lb/yr	---					
			CO	lb/hr based on 30-11.21 day rolling average	---	kg/hr based on 30-5.08 day rolling average	---					
			SO _x	lb/hr based on 30-33.63 day rolling average	---	kg/hr based on 30-15.29 day rolling average	---					
			H ₂ SO ₄	2.74 lb/hr	---	1.70 kg/hr	---					
			NO _x	lb/hr based on 30-37.37 day rolling average	---	kg/hr based on 30-16.98 day rolling average	---					
COE			---	---	---	---						
H ₂			N/A	N/A	N/A	N/A	N/A					
NESHAP DDD	0.035	lb/short ton met										
NESHAP DDD	0.012	lb/short ton met										
Cooling Towers	MF02	Mixing Furnace Cooling Tower	PM ₁₀ /PM _{2.5} (filterable)	0.001 % dwt loss	---	0.001 % dwt loss	---	High-Efficiency DFB Eliminators	Recordkeeping of Design Specification	---	---	---
	MF02	Water Cooling Tower	PM ₁₀ /PM _{2.5} (filterable)	0.001 % dwt loss	---	0.001 % dwt loss	---	High-Efficiency DFB Eliminators	Recordkeeping of Design Specification	---	---	---
Haze Apparatus	CM12	Flux Application Vent 1	VOC	16.50 lb/yr (12-month rolling total)	---	16.50 kg/yr (12-month rolling total)	---	Good work practices and Compliance with NESHAP JJJJ (e.g., use of compliant coating)	Compliance with NESHAP JJJJ (Recordkeeping)	---	---	---
	CM11	Flux Application Vent 2	HAP	N/A	N/A	N/A	N/A					

Roxul USA Inc.
 Ramon, West Virginia
 BACT Summary, Proposed Compliance Demonstration, & Federal State/ Regulatory Limits

Unit/Process	Source ID	Source Description	Pollutant	US		METRIC		Proposed BACT Control Type	Proposed Compliance Demonstration	Federal/State Regulatory Emission Standard		
				Proposed BACT Emission Limit		Proposed BACT Emission Limit				Standard	Limit	UOM
				Limit	UOM	Limit	UOM					
WESP	HE01	Gutter Exhaust, Spraying Chamber, Curing Oven, Curing Oven Hoods, Cooling Zone	PM ₁₀ (filterable)	21.21 lb/hr		0.82 kg/hr		Wet Electrostatic Precipitator	Initial Stack Testing	45CSR7	20%	opacity
			PM ₁₀ (filterable and condensable)	21.21 lb/hr		0.82 kg/hr						
			PM _{2.5} (filterable and condensable)	18.22 lb/hr		0.72 kg/hr						
			VOC	78.02 lb/hr		35.39 kg/hr		Abatement (Curing Oven); No add-on control for Spraying Chamber/Cooling Zone	Spraying Chamber/Curing Oven: Compliance with NESHAP DDD (Initial Stack Testing, Monitoring of Abatement Temperature, Recordkeeping)			
			CO	1.82 lb/hr		0.82 kg/hr		No add-on controls	N/A			
			SO ₂									
Part of WESP	Part of 4801	Completed Collection/Curing Operations	Formaldehyde					N/A	Compliance with NESHAP DDD (Initial Stack Testing, Monitoring of Abatement Temperature, Recordkeeping)	NESHAP DDD	2.4	lb/short ton melt
			Phenol	N/A	N/A	N/A	N/A					
			Methanol									
CE01	CE02	De-dusting Baghouse	PM ₁₀ (filterable)	1.54 lb/hr		0.70 kg/hr		Baghouse	Initial Stack Testing	45CSR7	20%	opacity
		Vacuum Cleaning Baghouse	PM ₁₀ (filterable)	0.77		0.35		Baghouse	Recordkeeping	45CSR7	20%	opacity
Product Marking	V-MARK	Wrapping	PM ₁₀ /PM _{2.5} (filterable and condensable)					Use of natural gas	Recordkeeping of Design Specification			
			PM (filterable)									
			VOC									
			CO									
			SO ₂									
			NO _x									
		mixing	VOC	lb/yr: 12-month: 9.45; rolling total		kg/yr: 12-month: 8.60; rolling total		Good work practices	Recordkeeping			

Roxul USA Inc.
 Ramon, West Virginia
 BACT Summary, Proposed Compliance Demonstration, & Federal State/ Regulatory Limits

Unit Process	Source ID	Source Description	Pollutant	US		MEFBC		Proposed BACT Control Type	Proposed Compliance Demonstration	Federal/State Regulatory Emission Standard		
				Proposed BACT Emission Limit		Proposed BACT Emission Limit				Standard	Limit	UOM
				Limit	UOM	Limit	UOM					
RockOn Line												
RockOn Line			CO ₂	ton/yr 12-month rolling total 14,326	ton/yr 12-month rolling total 12,917			Good operation & maintenance & energy efficiency	Recordkeeping			
			PM (filterable)	0.01 lb/hr	4,200-02 kg/yr							
			PM ₁₀ (filterable and condensable)	0.01 lb/hr	0.01 kg/hr			No add-on controls	Recordkeeping	45CSR7	20%	opacity
			PM _{2.5} (filterable and condensable)	0.01 lb/hr	0.30E-03 kg/hr							
			PM (filterable)	0.01 lb/hr	4,200-02 kg/yr							
			PM ₁₀ (filterable and condensable)	0.02 lb/hr	0.01 kg/hr			No add-on controls	Recordkeeping	45CSR7	20%	opacity
			PM _{2.5} (filterable and condensable)	0.01 lb/hr	0.30E-03 kg/hr							
			VOC	ton/yr 12-month rolling total 7.48	ton/yr 12-month rolling total 6.78			Maximum VOC Content	Recordkeeping			
				53 gal/yr	53 gal/yr							
			VOC	ton/yr 12-month rolling total 30.69	ton/yr 12-month rolling total 27.64			Maximum VOC Content	Recordkeeping			
				8.67 gal/yr	8.67 gal/yr							
			PM (filterable)	0.06 lb/hr	0.03 kg/hr							
			PM ₁₀ (filterable and condensable)	0.12 lb/hr	0.05 kg/hr			Good combustion practices and use of natural gas	Recordkeeping	45CSR7	20%	Opacity
			PM _{2.5} (filterable and condensable)	0.09 lb/hr	0.04 kg/hr							
			CO	84 lb/MMBtu	1.34E kg/MMBtu							
			SO _x	-	-							
			NO _x	100 lb/MMBtu	1.60E kg/MMBtu							
			PM (filterable)	0.06 lb/hr	0.03 kg/hr							
			PM ₁₀ (filterable and condensable)	0.12 lb/hr	0.05 kg/hr			Good combustion practices and use of natural gas	Recordkeeping	45CSR7	20%	Opacity
			PM _{2.5} (filterable and condensable)	0.09 lb/hr	0.04 kg/hr							
			CO	84 lb/MMBtu	1.34E kg/MMBtu							
			SO _x	-	-							
			NO _x	100 lb/MMBtu	1.60E kg/MMBtu							
			PM (filterable)	0.04 lb/hr	0.02 kg/hr							
			PM ₁₀ (filterable and condensable)	0.08 lb/hr	0.04 kg/hr			Particulate filter, good combustion practices, and use of natural gas	Recordkeeping	45CSR7	20%	opacity
			PM _{2.5} (filterable and condensable)	0.06 lb/hr	0.03 kg/hr							
			CO	84 lb/MMBtu	1.34E kg/MMBtu			Good combustion practices and use of natural gas				
			SO _x	-	-							
			NO _x	100 lb/MMBtu	1.60E kg/MMBtu							

Royal USA Inc.
 Ranson, West Virginia
 BACT Summary, Proposed Compliance Demonstration, & Federal State/ Regulatory Limits

Unit Process	Source ID	Source Description	Pollutant	US		METRIC		Proposed BACT Control Type	Proposed Compliance Demonstration	Federal/State Regulatory Emission Standard		
				Proposed BACT Emission Limit		Proposed BACT Emission Limit				Standard	Limit	UOM
				Limit	UOM	Limit	UOM					
RFNE3	Drying Oven 2 & 3		PM (filterable)	0.05 lb/hr		0.23 kg/hr		Particulate filter, good combustion practices, and use of natural gas	Recordkeeping	45CSR7	20%	opacity
			PM ₁₀ (filterable and condensable)	0.13 lb/hr		0.06 kg/hr						
			PM _{2.5} (filterable and condensable)	0.29 lb/hr		0.04 kg/hr						
			CO	88 lb/MMscf		1.345 kg/MMscf						
			SO _x	100 lb/MMscf		1.602 kg/MMscf						
RFNE5	Spray Paint Cabin		PM (filterable)	0.44 lb/hr		0.20 kg/hr		Fines/late Filter	Recordkeeping	45CSR7	20%	opacity
			PM ₁₀ (filterable and condensable)	0.86 lb/hr		0.40 kg/hr						
			PM _{2.5} (filterable and condensable)	0.80 lb/hr		0.36 kg/hr						
RFNE7	Cooling Zone		PM (filterable)	0.10 lb/hr		0.04 kg/hr		No add-on controls	N/A			
			PM ₁₀ (filterable and condensable)	0.16 lb/hr		0.06 kg/hr						
RFNE8	De-dusting Baghouse		PM ₁₀ (filterable)	0.34 lb/hr		0.15 kg/hr		Baghouse	Recordkeeping	45CSR7	20%	opacity
			PM _{2.5} (filterable)	0.17 lb/hr		0.08 kg/hr						
Other Facility-wide Sources												
CAM3	Natural Gas Boiler 1		PM ₁₀ /PM _{2.5} (filterable and condensable)					Good combustion practices, use of natural gas, low-NOx burner	Recordkeeping, Compliance with NESHAP DDDDD (thermal time-up)			
			PM (filterable)									
			VOC									
			CO	84 lb/MMscf		1.348 kg/MMscf						
			SO _x									
			NO _x	30 ppmvd @ 3% O ₂	N/A	30 ppmvd @ 3% O ₂	N/A					
			HAP	N/A	N/A	N/A	N/A					
CAM4	Natural Gas Boiler 2		PM ₁₀ /PM _{2.5} (filterable and condensable)					Good combustion practices, use of natural gas, low-NOx burner	Recordkeeping, Compliance with NESHAP DDDDD (thermal time-up)			
			PM (filterable)									
			VOC									
			CO	84 lb/MMscf		1.348 kg/MMscf						
			SO _x									
			NO _x	30 ppmvd @ 3% O ₂	N/A	30 ppmvd @ 3% O ₂	N/A					
			HAP	N/A	N/A	N/A	N/A					
RFNE10	RFN (Busing Heat)		PM ₁₀ /PM _{2.5} (filterable and condensable)					Good combustion practices, use of natural gas, low-NOx burner	Recordkeeping, Compliance with NESHAP DDDDD (thermal time-up)			
			PM (filterable)									
			VOC									
			CO	84 lb/MMscf		1.348 kg/MMscf						
			SO _x									
			NO _x	30 ppmvd @ 3% O ₂	N/A	30 ppmvd @ 3% O ₂	N/A					
			HAP	N/A	N/A	N/A	N/A					
E3F1	Emergency Fire Pump Engine		PM (filterable)	0.30 g/hr		0.20 g/hr		Compliance with NPSIS Subject III purchase of certified engine, use of ultra low sulfur diesel	Compliance with NPSIS Subpart III (Recordkeeping)			
			PM ₁₀ /PM _{2.5} (filterable and condensable)									
			VOC									
			CO	3.5 g/hr		3.5 g/hr						
			SO _x									
			NO _x +NH ₃	4.0 g/hr		4.0 g/hr						
			HAP	N/A	N/A	N/A	N/A					
1-C3	Facility-wide Vent		VOC					Good operating practices	Recordkeeping			

Roxul USA Inc.
 Reason, West Virginia
 BACT Summary, Proposed Compliance Demonstration, & Federal State/ Regulatory Limits

Unit Process	Source ID	Source Description	Pollutant	US		METRIC		Proposed BACT Control Type	Proposed Compliance Demonstration	Federal/State Regulatory Emission Standard		
				Proposed BACT Emission Limit	UOM	Proposed BACT Emission Limit	UOM			Standard	Limit	UOM
Coal Milling												
	IMF05	Coal Mill Burner & Blasthouse	PM (filterable)	0.12 lb/hr		0.06 kg/hr		Fabric Filter, good combustion practices, and use of natural gas	Recordkeeping	45CSR7	20%	opacity
			PM ₁₀ (filterable and coarsest)	0.32 lb/hr		0.14 kg/hr						
			PM _{2.5} (filterable and condensable)	0.28 lb/hr		0.12 kg/hr						
			VOC	0.41 lb/hr		0.19 kg/hr						
			CO	84 lb/MMBtu		1.346 kg/MMBtu						
			NO _x	60 ppmvd @ 3% O ₂		60 ppmvd @ 3% O ₂						
	IMF00	Coal Milling De-Dusting Baghouse	PM/PM ₁₀ (filterable)	0.22 lb/hr		0.10 kg/hr	Fabric Filter	Recordkeeping	45CSR7	20%	opacity	
			PM _{2.5} (filterable)	0.11		0.05						
Coal Milling Material Handling Pkg.	B231	Coal Loading Hopper										
	B235	Coal Milling Building	PM/PM ₁₀ /PM _{2.5} (filterable)				Partial Enclosures & Good Housekeeping Practices	Recordkeeping				
	B230	Coal Unloading										
IMF04	Coal Conveyor Transition Point (B231 to B235)	Coal Conveyor Transition Point (B231 to B235)	PM/PM ₁₀ (filterable)	0.02 lb/hr		0.01 kg/hr	Fabric Filter	Recordkeeping	45CSR7	20%	opacity	
			PM _{2.5} (filterable)	0.01		4.50E-03						
IMF13	Coal Conveyor Transition Point (B231 to B235)	Coal Conveyor Transition Point (B231 to B235)	PM/PM ₁₀ (filterable)	0.02 lb/hr		0.01 kg/hr	Fabric Filter	Recordkeeping	45CSR7	20%	opacity	
			PM _{2.5} (filterable)	0.01		4.50E-03						

Attachment P

AIR QUALITY PERMIT NOTICE Notice of Application

Notice is given that Roxul USA, Inc. has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a PSD Construction Permit for a mineral wool insulation manufacturing facility to be located at 365 Granny Smith Lane, Kearneysville, WV 25430. The latitude and longitude coordinates are: 39.37754, -77.87844.

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be:

Nitrogen Oxides (NO_x): 239 tons per year
Sulfur Dioxide (SO₂): 148 tons per year
Carbon Monoxide (CO): 74.1 tons per year
Volatile Organic Compounds (VOCs): 472 tons per year
Filterable Particulate Matter (PM_{fil}): 130 tons per year
Particulate Matter <10 microns (PM₁₀): 154 tons per year
Particulate Matter <2.5 microns (PM_{2.5}): 134 tons per year
Carbon Dioxide Equivalents (CO_{2e}): 153,000 tons per year
Sulfuric Acid Mist (H₂SO₄): 16.4 tons per year
Lead (Pb): <0.01 tons per year
Total Hazardous Air Pollutants (HAPs): 393 tons per year
Mineral Fiber HAPs: 113 tons per year
Methanol (CH₄O): 104 tons per year
Phenol (C₆H₅O): 98.9 tons per year
Formaldehyde (HCHO): 67.6 tons per year
Carbonyl Sulfide (COS): 1.7 tons per year
Hydrogen Fluoride (HF): 1.7 tons per year
Hydrochloric Acid (HCL): 1.3 tons per year
Hexane (C₆H₁₄): 0.3 tons per year
Benzene (C₆H₆): 0.1 tons per year

Startup of operation is planned to begin on or about October 2019. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the 22th day of November, 2017.

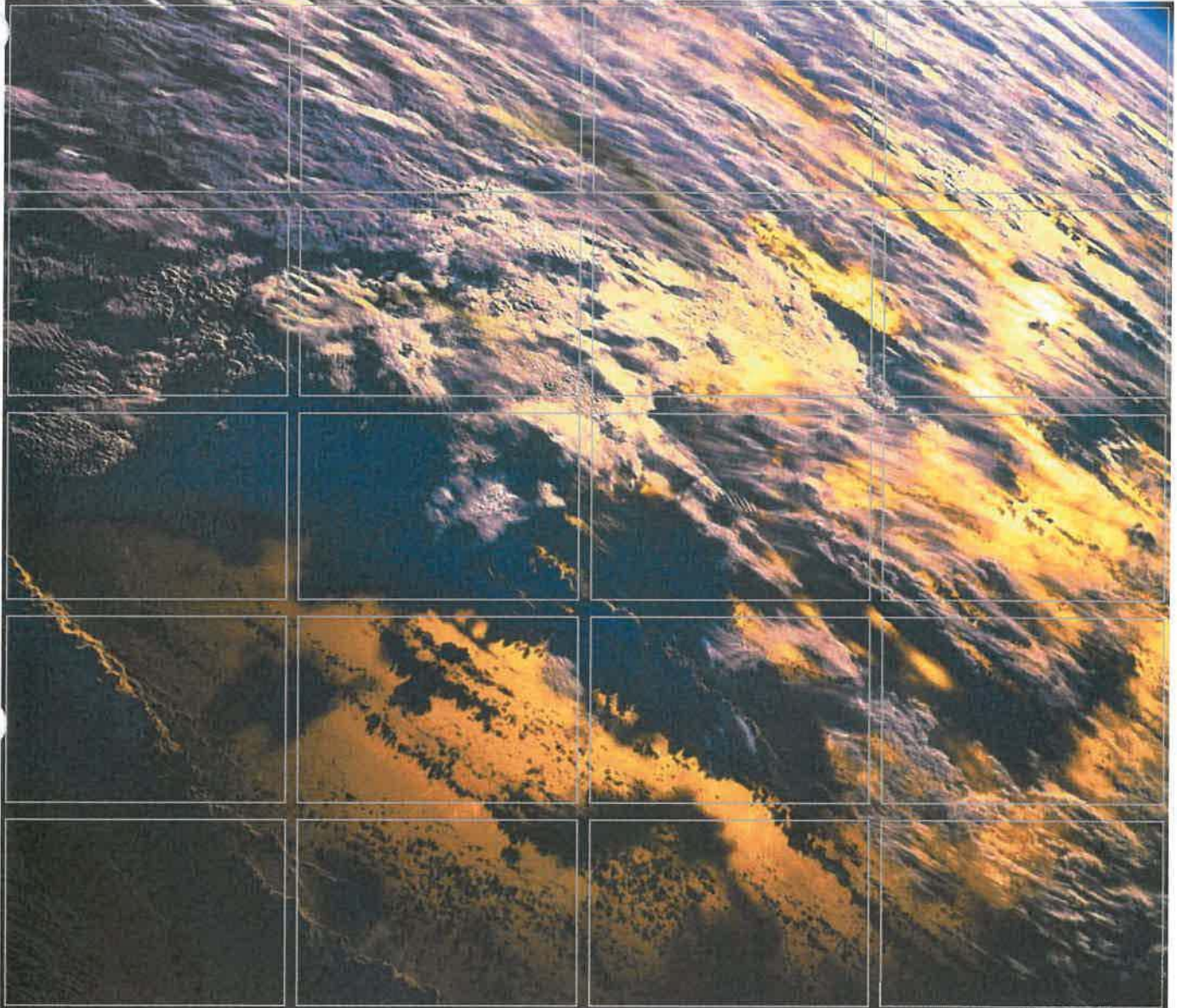
By: Roxul USA, Inc.
Ken Cammarato
Vice President and General Legal Counsel
4594 Cayce Road
Byhalia, MS 38611

Attachment Q

Air Modeling Results and Protocols
Appendix C

November 2017
Project No. 0408003

Environmental Resources Management
204 Chase Drive
Hurricane, West Virginia 25526
304-757-4777



ROXUL USA, Inc.
New Source Review
Air Quality Modeling Protocol

Jefferson County, West Virginia

November 2017

Environmental Resources Management
204 Chase Drive
Hurricane, WV 25526
www.erm.com

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1.0 INTRODUCTION

ROXUL USA Inc., (Roxul) submits this air quality modeling protocol to support an air quality permit to construct application that is being submitted to the West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality (WVDAQ, or The Department). The application is being submitted to authorize the development of a new mineral wool production facility in Jefferson County, West Virginia. A general area map showing the proposed location of the facility is provided in Figure 1-1 of this protocol.

1.1 PROJECT OVERVIEW

Roxul proposes to construct, install, and operate a new mineral wool insulation manufacturing facility (Project). The Project will consist of a 460,000-square-foot manufacturing facility on an estimated 130 acres site in the city of Ranson in Jefferson County, West Virginia. The plant will produce stone wool insulation for building insulation, customized solutions for industrial applications, acoustic ceilings and other applications.

1.2 OVERVIEW OF METHODOLOGY

Table 1-1 provides a summary of the attainment status of Jefferson County, WV with respect to the National Ambient Air Quality Standards (NAAQS). The attainment status determines which regulatory programs new major sources or modifications to existing sources must address in the process of obtaining an air quality construction permit. Table 1-2 provides a summary of the regulatory program(s) that must be addressed for each regulated compound that will be emitted by the Project. It should be noted that these are preliminary emissions estimates only. Compounds with emission levels that trigger Non-attainment New Source Review (NNSR) requirements are subject to additional control (Lowest Achievable Emission Rate, LAER) and emissions offset requirements but do not require air quality dispersion modeling to assess compliance with the NAAQS. Requirements of the Prevention of Significant Deterioration (PSD) program must be addressed for major sources locating in attainment areas, for each compound having emissions greater than the significant emission rate (SER).

Table 1-1 Attainment Status of Jefferson County, West Virginia

Compound	Attainment Status
SO ₂ (annual)	Attainment
SO ₂ (1-hr)	Attainment
CO	Attainment
Pb	Attainment
O ₃ (1-hr)	Attainment
PM ₁₀	Attainment
NO ₂ (annual)	Attainment
NO ₂ (1-hr)	Attainment
O ₃ (8-hr)	Attainment
PM _{2.5} (annual)	Attainment
PM _{2.5} (24-hr)	Attainment

- Data obtained from EPA Green Book
https://www3.epa.gov/airquality/greenbook/anayo_wv.html

Applicability of the PSD program for the proposed Project is determined by evaluating whether potential emissions exceed new major source thresholds and SERs for each PSD regulated compound. The proposed project will be a new major source due to potential VOC emissions in excess of 250 tons per year.

Table 1-2 Applicability of Regulatory Air Programs to the Project

Compound	Preliminary Project Potential Emissions (tons/year)	PSD SER (tons/year)	NNSR Threshold	PSD Review Req'd?	NNSR Req'd?
NO _x	241	40	NA	Yes	No
CO	153	100	NA	Yes	No
SO ₂	163	40	100	Yes	No
PM ₁₀	156	15	NA	Yes	No
PM _{2.5}	111	Primary PM _{2.5} : 10 NO _x : 40 SO ₂ : 40	NA	Yes	No
O ₃	NO _x : 241 VOC: 580	NO _x : 40 VOC: 40	NA	Yes	No
Lead	0.004	0.6	NA	No	No
H ₂ SO ₄	17	7	NA	Yes	NA

NNSR does not apply, because Jefferson County, WV is in attainment for all regulated pollutants. Therefore, dispersion modeling will be performed for the compounds above that are subject to PSD review to assess the ambient air impacts resulting from the emissions of these compounds due to the Project, with the exception of VOC, which is a precursor to ozone formation and is not

modeled. The modeling analysis will address compliance with the NAAQS and PSD Increments, as applicable. The modeling analyses described in this protocol will conform to Appendix W of 40 CFR Part 51 (Guideline on Air Quality Models). The key elements of the modeling analysis will include:

- Use of the latest version of the regulatory dispersion model and supporting programs: AERMOD (version 16216r), AERMET (version 16216), AERMINUTE (version 15272), AERMAP (version 11103), AERSURFACE (version 13016), and BPIPRM (version 04274);
- Use of input meteorological data from EMV Regional Airport, Shepherd Field (KMRB, WBAN: 13734), located approximately 10 kilometers (km) to the west of the Project;
- Use of upper air data from Dulles Airport, MD (WBAN: 93734);
- Application of the latest version of AERSURFACE as recommended in the EPA AERMOD Implementation Guidance (EPA 2016);
- Utilize the surface friction velocity adjustment (ADJ_U*) option in AERMET;
- Develop a comprehensive receptor grid designed to identify maximum modeled concentrations;
- Utilize the Ambient Ratio Method 2 (ARM2) option in AERMOD to characterize NO₂ from modeled concentrations of NO_x;
- Utilize the Tier III NO₂ modeling method PVMRM in AERMOD, if necessary;
- In accordance with PSD requirements, determine whether emissions from the Project that are subject to PSD will have an effect on growth, soils, vegetation, and visibility in the vicinity of the Project;
- Compare maximum predicted impacts to relevant Significant Impact Levels (SILs) and Significant Monitoring Concentrations (SMCs) to determine if additional modeling or monitoring could be required;
- Demonstrate that allowable emissions from the proposed facility would not cause or contribute to air pollution in violation of any National Ambient Air Quality Standard (NAAQS) or PSD increment.

2.0 *PROJECT EMISSIONS AND SOURCE CHARACTERIZATION*

2.1 *PROJECT DESCRIPTION*

Roxul proposes to construct, install, and operate a new mineral wool insulation facility (Project). The Project site is located in Jefferson County, WV. The general location of the facility is provided on the regional map shown in Figure 1-1. A preliminary plot plan of the proposed Project is presented in Figure 1-2.

Figure 1-1 Roxul, Jefferson County, WV – Regional Map

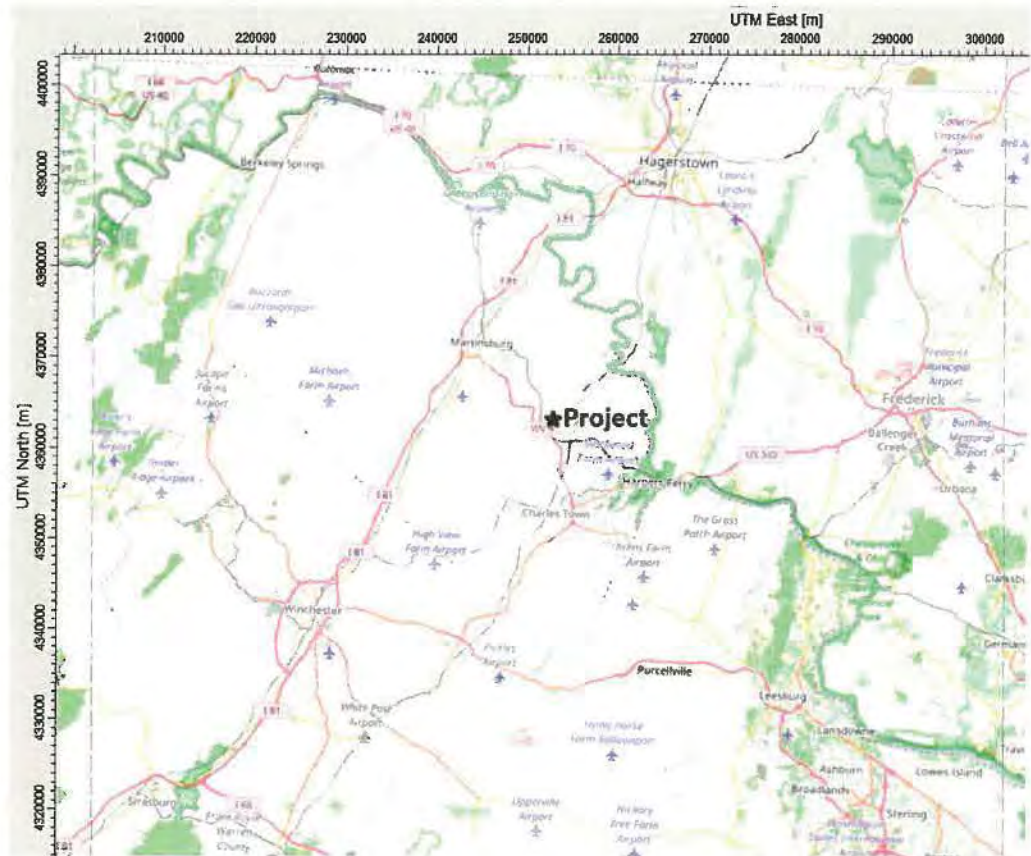
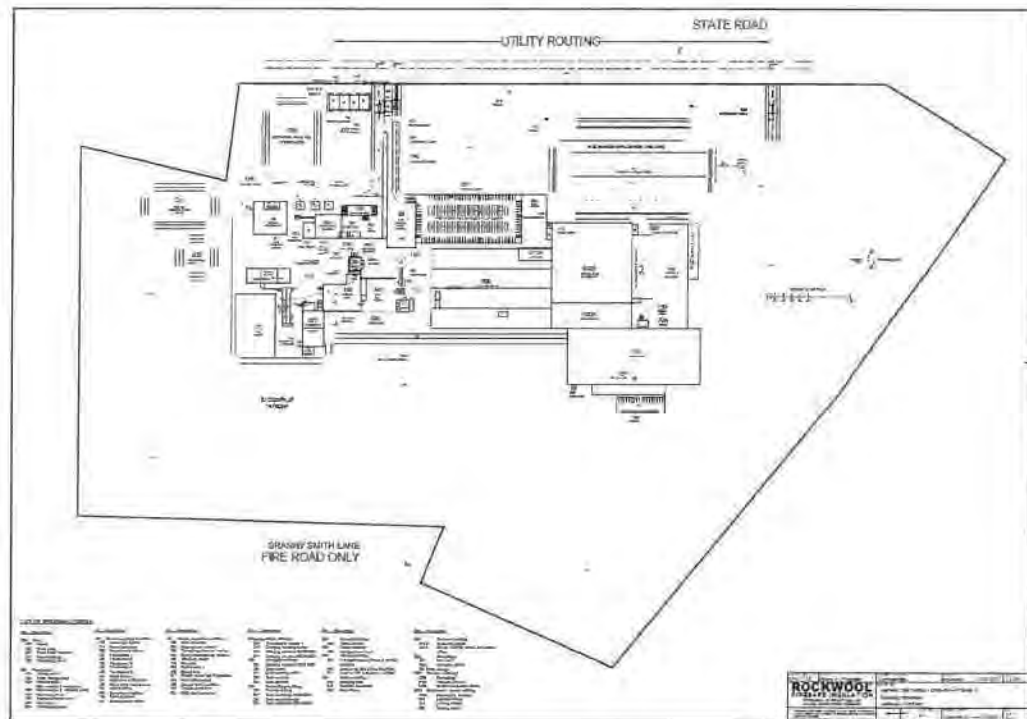


Figure 1-2 Preliminary Facility Layout



2.2

PROJECT SOURCES

A detailed list of emission rates and source parameters would be provided in the air quality modeling report supporting the new source application. An overview of the emission sources associated with the Project are as follows:

- One Mineral Wool Line including,
 - Raw Material Handling Sources (e.g., material unloading, storage silos, conveyor transfer points, portable crusher),
 - One (1) Melting Furnace, Spinning Chamber, Curing Oven, and Cooling Zone,
 - Dust control baghouses, and
 - Storage tanks,
- Coal Milling operations;
- One Rockfon Line including paint application, drying ovens, and dust control baghouse;

- Miscellaneous utilities or other facility-wide sources (boilers, heaters, cooling towers, portable crusher, fire pump, fuel storage, etc.); and
- Paved Haul Roads.

Mineral wool production technology uses processes which can be described with a linear relationship between the amount of processed material and the mass of generated pollutants. This linear mass-based relationship can be expressed with proportionality between operational loads and pollutant emission rates, i.e., higher loads generate higher emission rates. For the exhaust (emission point) from the furnace some pollutants are related to a constant air flow and as such independent of load. Roxul conservatively assumes in the emission calculations that the facility would operate on 100% load at all times.

The second aspect of the variable load conditions is related to the provisions for dispersion of the emitted gasses. The flow rate of gasses passing through the furnace is governed by fans with specific air flow requirements due to the nature of production. In order to achieve the required product characteristics, constant airflow and temperature are needed. Therefore during the steady-state operations, stack exhaust flow rates and temperature are maintained approximately constant. Therefore, Roxul is not proposing to model varying load conditions since maximum emissions occur at maximum load conditions and stack parameters are maintained at consistent levels.

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.

2.3

BUILDING WAKE EFFECTS

The EPA's Building Profile Input Program (BPIP), Version 04274 will be used to calculate downwash effects for the modeled emission sources. Building, structure, and tank configurations and locations relative to the modeled sources will be obtained from engineering drawings of the planned facility and input into BPIP. Construction of facility stacks will not exceed the greater of the GEP formula height calculated by BPIP or 65 m (213 feet).

3.0 *MODELING METHODOLOGY*

3.1 *MODEL SELECTION AND APPLICATION*

The latest version of EPA's AERMOD model (version 16216r) will be used for predicting ambient impacts for each modeled compound. Regulatory default options will be used in the analysis, except as specified in this protocol. An overview of the various air quality modeling analyses that will utilize AERMOD are described in the following sections.

3.1.1 *Project Only Modeling Analysis*

This section summarizes the model inputs and procedures to be used to conduct the Project-only air quality impact analysis for the Project. Specifically, the following analyses are addressed in this section:

- Refined single-source modeling to compare maximum predicted impacts to EPA SILs; and
- Comparison of refined single-source impacts to EPA SMCs to determine if a preconstruction monitoring waiver request is justified.

As discussed in section 3.1.3, for those pollutant impacts that are demonstrated to be less than applicable SILs, no further analysis will be required because these pollutants impacts will be presumed to not cause or contribute significantly to any modeled violations of a NAAQS or PSD Increment. Where impacts are predicted to exceed SILs, additional refined modeling is required to demonstrate that the cumulative impact of the Project and other potentially interacting sources plus background will not cause or contribute to any violation of any NAAQS and PSD Increment.

Section 3.1.3 addresses the cumulative (multi-source) impact analysis procedures to be used, if necessary, to demonstrate that the combined impacts of pollutants from Project and nearby sources will not cause or contribute to air pollution in violation of any NAAQS or PSD Increment. The Class I Area impact analysis is addressed in Section 3.11 and the other air quality analyses (visibility impairment, soils and vegetation impacts, and associated growth analysis) are summarized in Section 3.7.3.

For purposes of presentation of all modeling results, it should be noted that all modeled concentrations will not be rounded or truncated, in accordance with EPA policy, when compared to applicable SILs, NAAQS, or PSD Increments.

3.1.2 *Significant Impact Analysis*

3.1.2.1 *Justification of the Use of Significant Impact Levels (SILs)*

The EPA has historically cautioned states that the use of a SIL may not be appropriate when a substantial portion of any NAAQS or PSD Increment is known to be consumed. Therefore, justification of the use of SILs is recommended in support of the PSD review record. Based on preliminary modeling, it is expected that cumulative impact modeling involving nearby sources will be required. However, it may be necessary to demonstrate that the Project is not contributing significantly to any modeled violations of NAAQS or PSD Increments. To provide justification with respect to the use of SILs in the NAAQS analysis, the differences between the NAAQS and background concentrations determined to be representative of the Project impact area (see Section 3.5 of this protocol) for applicable pollutants and averaging periods were compared to the applicable SIL values. The comparison summarized in Table 3-1 shows that the differences in this case between the NAAQS and background concentrations are much higher than the corresponding SILs. Therefore, these differences are sufficient for WVDAQ to conclude that a modeled impact less than the SIL for each of the applicable pollutants will not cause or contribute to a violation of the NAAQS.

Table 3-1 Comparison of NAAQS, Representative Background Concentrations, and SILs ($\mu\text{g}/\text{m}^3$)

Pollutant	Averaging Period	NAAQS	Representative Background/Design Concentration	Difference Between NAAQS and Design Concentration	SIL
PM ₁₀	24-Hour	150	24	126	5
PM _{2.5}	24-Hour	35	14.3	20.7	1.2
	Annual	12	5.7	6.3	0.2
NO ₂	1-Hour	188	33.2	154.8	7.5
	Annual	100	9.4	90.6	1
SO ₂	1-Hour	196	39.5	156.5	7.8
	3-Hour	1,300	39.5	1,260	25
	24-Hour	365	17.5	347.5	5
	Annual	80	3.2	76.8	1
CO	1-Hour	40,000	458	39,542	2,000
	8-Hour	10,000	344	9,656	500

3.1.2.2 *Significant Impact Analysis Modeling Procedures*

The significance analysis involves refined modeling to determine maximum ambient impacts from the Project in comparison to pollutant-specific SILs. The results of the significance analysis determine the need for further modeling including nearby sources to evaluate compliance with NAAQS and PSD Increments. All Project sources listed in Section 2.2 will be included in the refined modeling

The Emergency Fire Pump will assume 100 hour of operation per year for testing and readiness purposes. As an intermittent source it would not be included in the 1-hour NO₂ and SO₂ analyses as recommended by EPA (EPA Memorandum March 16, 2011).

For the 8-hr CO and 24-hr PM₁₀/PM_{2.5} analyses, the Emergency Fire Pump will be modeled assuming emission rates conservatively based on an operational schedule of 1/2 hour per day.

The results of the refined modeling of Project sources will be compared to the SILs in order to conservatively estimate the significant impact area for each pollutant and averaging period. It should be noted that highest first-highest (H1H) model design concentrations for all short term averages will be compared to the applicable SILs. Additionally, it should be noted that for 1-hr NO₂, 24-hr PM_{2.5}, and annual PM_{2.5} pollutant and averaging period combinations, the relevant model design value is the H1H value averaged over five (5) years per receptor. The applicable Class II Area SILs used for this analysis are summarized in Table 3-1 and Table 3-2 in Sections 3.1.2.1 and 3.2, respectively.

A pre-construction ambient air monitoring waiver must be requested in order for a facility subject to PSD review to be exempt from preconstruction ambient air monitoring requirements. A waiver may be considered based on the modeled impacts of the Project when compared to the SMCs in 40 CFR Part 52.21. The applicable SMCs are summarized in Table 3-2 in Section 3.2. If a project cannot be exempted from preconstruction monitoring based on modeling results, then the applicant may propose for the reviewing authority's consideration for the use of existing monitoring data if appropriate justification is provided.

Roxul proposes the use of representative regional background data to satisfy this requirement as necessary. Justification of the representativeness of existing regional background data for use in the modeling analysis is provided in Section 3.3.1 for PM_{2.5} and Section 3.5 for all other applicable criteria pollutants.

3.1.3

Cumulative Modeling Analysis

For those pollutant impacts due to Project sources alone that are demonstrated to be less than applicable SILs, no further analysis is required and the Project impacts are presumed not to cause or contribute significantly to violation of the NAAQS or PSD Increments. Where the Project's impacts are determined to exceed SILs, additional refined modeling is required to demonstrate that the cumulative impact of the Project and nearby sources will not cause or contribute to air pollution in violation of any NAAQS and PSD Increment, shown in Table 3-2 of Section 3.2.

The cumulative modeling will be performed for all receptors where the proposed Project had a significant impact, as determined by the significance modeling analysis. The cumulative analyses will include background concentrations of

pollutants as discussed in Section 3.5 and contributions from nearby off-site sources as discussed in Section 3.10.

In the event that the NO₂ and/or SO₂ 1-hour and/or PM_{2.5} 24-hour modeling predicts exceeds the applicable NAAQS, the MAXDCONT post processor to AERMOD will be used to assess whether the Project's contribution to the predicted violations, paired in time and space, is insignificant at all receptors in consideration.

In addition, in accordance with EPA guidance¹, the significant contribution analysis will examine every multi-year average of the daily maximum 1-hour values for NO₂, beginning with the 8th-highest and for SO₂ beginning with the 4th-highest, continuing down the ranked distribution until all cumulative impacts are below the NAAQS. For the 24-hour PM_{2.5} analysis, the significant contribution analysis will examine every multi-year average of the maximum 24-hour average values, beginning with the 8th-highest, continuing down the ranked distribution until all cumulative impacts are below the NAAQS.

3.2

AMBIENT AIR QUALITY STANDARDS

Table 3-2 presents a summary of the air quality standards that will be addressed for NO₂, SO₂, PM₁₀, PM_{2.5}, and CO. The SILs are presented, along with the SMCs, PSD Increments, and NAAQS. If Project impacts are shown to be less than the SILs and SMCs, then no further analysis is required. If the SILs are exceeded, additional analyses will be necessary including the development of a background source inventory and background monitored concentrations. It should be noted that the 1-hr SIL for NO₂ is an interim SIL based on EPA guidance, and has been adopted by WVDEP based on WVDEP's concurrence with EPA that modeled concentrations less than the 1-hr SIL for NO₂ represent a de-minimis level of concentration and would not be expected to contribute to violations of the 1-hr NO₂ NAAQS.

Table 3-2 Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS ^a	Class II Increment Standards	Class II SIL	SMC
SO ₂	1-Hour	196 ^{b,q}	-	7.8 ^{c,n}	-
	3-Hour	1,300 ^{d,e}	512 ^d	25 ^g	-
	24-Hour	365 ^{d,h}	91 ^d	5 ^g	13
	Annual	80 ^{u,h}	20 ^u	1 ^{g,u}	-
PM ₁₀	24-Hour	150 ^{i,s}	30 ^d	5 ^g	10
	Annual	50 ^{j,r}	17 ^u	1 ^{g,u}	-
PM _{2.5}	24-Hour	35 ^{k,f}	9 ^d	1.2 ^f	t

¹ EPA Memorandum, dated March 1, 2011, from Tyler Fox, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard."

Pollutant	Averaging Period	NAAQS ^a	Class II Increment Standards	Class II SIL	SMC
	Annual	12 ^{l,o} /15 ^{e,i}	4 ^u	0.3 ^o , 0.2 ^v	-
NO ₂	1-Hour	188 ^{l,p}	-	7.5 ^{o,n}	-
	Annual	100 ^u	25 ^u	1 ^{g,u}	14
CO	1-Hour	40,000 ^d	-	2,000 ^g	-
	8-Hour	10,000 ^d	-	500 ^g	575
Pb	Rolling 3-Month	0.15 ^m	-	-	-
Ozone	8-hour	70 ppb	-	1 ppbv	<100 tons per year (tons/yr) VOC

- a) Primary standard unless otherwise noted.
- b) The 3-year average of the 99th-percentile of the annual distribution of daily maximum 1-hour concentrations must not exceed standard.
- c) EPA Interim SIL adopted by WVDEP on December 1, 2010.
- d) One exceedance allowed per year.
- e) Secondary standard.
- f) For the PM_{2.5} 24-hour SIL analysis, modeled concentration is the highest of the 5-year averages of the maximum modeled 24-hour average PM_{2.5} concentrations predicted each year at each receptor, based on 5 years of National Weather Service (NWS) data. Use of the SIL is subject to evaluation depending on the approach taken to address PM_{2.5} secondary impacts. For the PM_{2.5} 24-hr NAAQS analysis, the modeled concentration is the 98th percentile of the 5-year averages of the maximum modeled 24-hour average PM_{2.5} concentrations (EPA memorandum, dated March 20, 2014, from S. Page, "Guidance for PM_{2.5} Permit Modeling").
- g) For determining compliance with the SIL, no exceedances allowed.
- h) The 24-hour and annual SO₂ NAAQS were revoked, but are in effect until the SO₂ 1-hour designations are finalized. However, the increment standards and related SILs remain in effect.
- i) Expected number of days per calendar year, on average, with arithmetic time-averaged concentration above standard is equal to or less than one. For modeling analyses, compliance is evaluated by comparing the high, 6th-high modeled concentration over five years (plus an appropriate background concentration) to the NAAQS.
- j) Based on 3-year average of the annual mean concentrations.
- k) The 3-year average of the 98th percentile of 24-hour concentrations must not exceed standard. The NAAQS was revised effective December 18, 2006.
- l) The 3-year average of the 98th-percentile of the annual distribution of daily maximum 1-hour concentrations must not exceed standard.
- m) Rolling 3-month average, no exceedances allowed.
- n) Highest of the 5-year averages of the maximum modeled 1-hour NO₂ and 1-hour SO₂ concentrations at each receptor, based on 5 years of meteorological data, must not exceed the 1-hr NO₂ and SO₂ SIL, respectively, in order to demonstrate insignificant impacts. (EPA memorandum, dated March 1, 2011, from T. Fox, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard" and memorandum dated June 29, 2010, from S. Page, "Guidance Concerning the Implementation of the 1-hour NO₂ NAAQS for the Prevention of Significant Deterioration Program" and WVDEP memorandum, dated December 1, 2010, from Andrew Fleck, "Interim 1-Hour Significant Impact Levels for Nitrogen Dioxide and Sulfur Dioxide").
- o) The highest average of the modeled annual averages across 5 years of NWS meteorological data is compared to the PM_{2.5} annual average SIL and AAQS. Use of the SIL is subject to evaluation depending on the approach taken to address PM_{2.5} secondary impacts. (EPA memorandum, dated March 20, 2014, from S. Page, "Guidance for PM_{2.5} Permit Modeling").

- p) For NO₂ 1-hour NAAQS analysis, modeled concentration is the 98th percentile (H8H) of the annual distribution of daily maximum 1-hour concentrations averaged across 5 years of NWS data (EPA memorandum, dated June 28, 2010, from T. Fox, "Applicability of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard").
- q) For SO₂ 1-hour NAAQS analysis, modeled concentration is the 99th percentile of the annual distribution of daily maximum 1-hour concentrations averaged across 5 years of NWS data (EPA memorandum dated August 23, 2010, from S. Page, "Guidance Concerning the Implementation of the 1-hour SO₂ NAAQS for the Prevention of Significant Deterioration Program").
- r) AAQS REVOKED.
- s) For PM₁₀ 24-hour average NAAQS analysis, modeled concentration is the highest 6th highest concentration over 5 years of NWS data.
- t) On January 22, 2013, the U.S. Court of Appeals for the District of Columbia Circuit vacated the parts of two PSD rules establishing a PM_{2.5} SMC, finding that the EPA was precluded from using the PM_{2.5} SMCs to exempt permit applicants from the statutory requirement to compile preconstruction monitoring data.
- u) No exceedances are allowed for annual averages to determine compliance with the NAAQS and to determine whether impacts are significant compared to the SIL.
- v) On August 1, 2016 USEPA published draft guidance on SILs for PM_{2.5} and ozone. USEPA proposed no change to the 24-hr PM_{2.5} SIL of 1.2 µg/m³; however, an annual PM_{2.5} SIL of 0.2 µg/m³ is recommended in this draft guidance. An 8-hour ozone SIL of 1 ppb was also proposed.

3.3 *PM_{2.5} CONSIDERATIONS*

In January 2013, the SMCs for PM_{2.5} were vacated by the DC Circuit Court. The SMCs are concentrations that are used to determine if a project subject to PSD regulations needs to compile preconstruction ambient monitoring to determine if existing air quality conditions are representative of the project site.

Preconstruction monitoring is typically required when a project's modeled impacts exceed the SMCs and the existing air quality monitoring network in the region is inadequate to characterize existing air quality.

The Project is located approximately 11 km southeast of an existing ambient monitor that measures PM_{2.5}. This monitor in Martinsburg, WV (Site ID 54-003-0003) has been collecting PM_{2.5} data since 1999. Due to the monitor's proximity, Roxul asserts that this monitor is suitable to represent the state of the air quality near the Project site during the pre-construction stage. Therefore, additional preconstruction monitoring should not be required for the Project, due to the existence of representative PM_{2.5} ambient air quality data.

In addition to the SMC vacature in January 2013, EPA also remanded the SIL for PM_{2.5}. EPA intends to revise the approach to how the SIL is implemented. In the interim, widely accepted practice for PSD permitting is to continue to use the PM_{2.5} SILs as benchmarks to determine a project's de-minimis standing with respect to the PM_{2.5} NAAQS, but also to ensure that a project's modeled impacts do not exceed the NAAQS (despite being less than the SIL) when added to an existing representative background value of PM_{2.5}. Roxul intends to employ this practice as part of the air quality modeling analysis, specifically, that the Project's modeled concentrations of directly emitted PM_{2.5} are both less than the levels of the SIL, but also less than the NAAQS when added to a representative background PM_{2.5} concentration, obtained from the Piney Run, Garrett County, MD PM_{2.5} monitor.

3.3.1 *Representative Background Concentrations of PM_{2.5}*

There are total of five PM_{2.5} ambient air monitoring stations in the greater vicinity of the project site. The monitors are of different types, serving specific regional screening, and are spread over the states of WV, MD, and VA. Monitors' distance to project, measurement scale, sampling rate, and data coverage are listed in Table 3-3.

Table 3-3 List of PM_{2.5} Ambient Monitor Station in the Vicinity of the Project Site

PM _{2.5} Monitor Location	PM _{2.5} Monitor ID	Distance to Project (km)	Measurement Scale	Sampling Rate	Data Coverage 2013-15	Design Conc. (µg/m ³) 24hr, Annual
Martinsburg, Berkeley Co., WV	54-003-0003	11	Urban (4-50km)	24-hour, every 3 rd day	333 obs., 91%	26.6, 9.9*
Piney Run, Garrett Co., MD	24-023-0002	105	Regional Scale (50 - 100s km)	1-hour, every day	924 obs., 84%	15.9, 6.6
Hagerstown, Washington Co., MD	24-043-0009	25	Urban (4-50km)	1-hour, every day	1014 obs., 93%	25.7, 9.4
Ashburn, Loudoun Co. VA	51-107-1005	51	Neighborhood (400m - 4km)	24-hour, every 3 rd days	338 obs., 93%	20.3, 8.7
Rte 669, Frederick Co. VA	51-069-0010	21	Neighborhood (400m - 4km)	24-hour, every 3 rd days	361 obs., 99%	23.7, 8.9

* Berkeley Co. design values are based on 2014-2016 observations provided by WVDAQ

In addition proximity to large industrial sources, prevailing winds were taken in consideration. The locations of the industrial facilities throughout the region were obtained from the National Emission Inventory (NEI) 2014. Wind roses were constructed with local monitor observations, when available (Piney Run and Hagerstown, MD) or observations from the nearest NWS station were used. Martinsburg airport was considered representative of the Berkeley Co. monitor location; Leesburg Municipal (JYO) airport represents the winds at Loudoun Co. monitor; and the winds captured at Winchester Regional (OKV) airport are considered representative for the Frederick Co. monitor. The Berkeley Co, Garret Co, Hagerstown Frederick Co monitors are located in the foot hills of the Allegheny Plateau and west of the Blue Ridge Mountains; the Loudoun Co monitor is located just east of the Blue Ridge mountains. The wind roses summarize the wind conditions at the representative locations for the period of interest - 2013-2015. Monitor and weather station locations together with the regional PM_{2.5} sources are presented in Figure 2-1 over terrain elevation background.

monitor is highly influenced by these operations. In addition, when evaluating the Hagerstown, MD monitor it should be noted that an urban scale monitor is operated in Berkeley Co., WV and would be closer to the Project site. Therefore the observations at this monitor are not considered as a representative background for the Project site.

Berkeley Co., WV monitor is located approximately 11 km northwest of the Project. This is an urban scale monitor and is situated in a more urban environment compared to the site. The data capture rate is once every 3 days. Additionally the monitor is located 1.5 km north of a cement plant with extensive quarrying operations. It is likely that the monitor is highly influenced by this source. Moreover the industrial sites in the vicinity of the monitor will be included explicitly in the NAAQS and increment modeling.

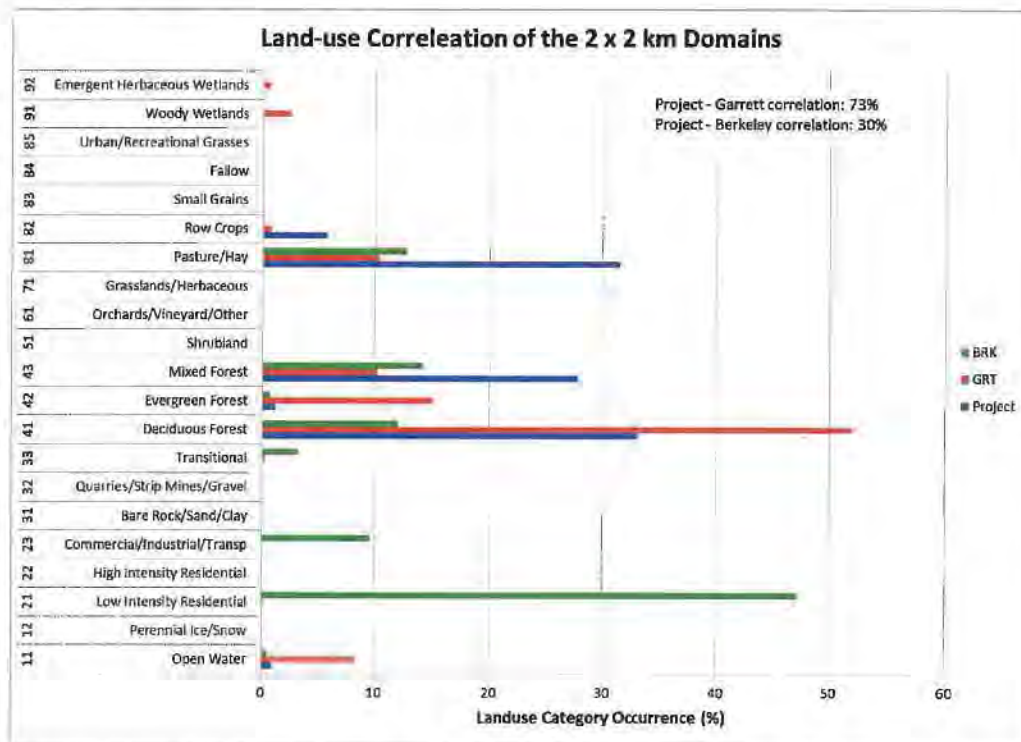
The initial review of the five available monitors indicates that the preferred sites for this project are the Berkeley Co. and the Garret Co. monitors. Further detailed evaluation of the land-use characteristics of these locations and comparison to the Project site are used to support the final monitor selection.

The land-use characteristics of the project site were compared to the same for the two monitors. For this purpose, AERSURFACE was used to extract the land features included within an area of 1-km radius. The domain size was selected to simulate the modeling requirement for surface roughness, a characteristic that AERMOD is found very sensitive. Further calculations show that the correlation between the land characteristics of the Project and the two monitor domains is as follows:

- Project to Garrett Co. monitor (GRT) correlation = 73%
- Project to Berkeley Co. monitor (BRK) correlation = 30%

Figure 2-2 shows the comparison between the land-use features of the Project and two monitor sites based on the 1992 National Land Cover Data archive, provided by the USGS.

Figure 2-2 Comparison of Land-use Features Between the Martinsburg (BRK) and Garrett Co, (GRT) Monitors and Project



Based on the above arguments, ERM proposes to use the Garrett County monitor as representative of the regional concentrations in the PM_{2.5} NAAQS analysis for this PSD application. The cumulative modeling will include explicitly the regional sources in the vicinity of the Project, therefore the use of the Garrett County monitor observations can be considered realistic representation of the regional background values without introducing double counting of the concentrations.

3.4 OZONE ANALYSIS AND SECONDARY FORMATION OF PM_{2.5}

In December 2016, EPA released a guidance memorandum (EPA 2016a) for review and comment that described how Modeled Emission Rates of Precursors (MERPs) could be calculated as part of a Tier I ozone and secondary PM_{2.5} formation analysis to assess a project’s emissions of precursor pollutants as they would relate to the ozone and PM_{2.5} “critical air quality thresholds”. Roxul will utilize the MERPs guidance to assess the projects impacts on ozone secondary PM_{2.5} formation as described in the paragraphs below.

3.4.1 *Calculation of MERPs for Ozone*

As specified in Table 1-2, the potential emissions of NO_x from the proposed project are 241 tpy and the potential emissions of VOC are 580 tons per year. The MERPs guidance provides modeling results representing the maximum downwind ozone concentrations due NO_x and VOC emissions of hypothetical sources. EPA conducted photochemical modeling of hypothetical sources using emission rates of 500 tpy, 1,000 tpy, and 3,000 tpy of both NO_x and VOC for various locations throughout the US. Figure A-1 of the MERPs guidance presents the locations of the sources modeled in the Eastern US. The EPA Source 8 was located in Southern Pennsylvania, in Adams County and was found to be located approximately 75 km northeast of the project. Due to the close regional proximity of EPA Source 8, Roxul asserts that this source is most suitable to develop the appropriate MERP levels with which to assess the Project's emissions of precursors against the appropriate "critical air quality threshold". For the purpose of this analysis, the critical air quality threshold for ozone will be considered to be equivalent to the proposed ozone SIL of 1 ppb. It should be noted that most current monitor design values shown in Table 3-4 for the region are all below the ozone NAAQS of 70 ppb.

Table 3-4 *Monitor Values at the Berkeley, WV*

Monitor ID	County, State	Observed 2014 8hr Design Value (ppb)	Observed 2015 8hr Design Value (ppb)	Observed 2016 8hr Design Value (ppb)
540030003	Berkeley, WV	60.0	66.0	64.0

Also, for the purpose of this analysis, Roxul will consider MERP values derived from the model results for EPA Source 8 based on the 500 tpy cases for both NO_x and VOC, as these are the closest approximations of the project emission rates. Table 3-5 presents modeled ozone concentrations from Table A-1 of the MERPs guidance for the 500 tpy case for Source 8.

Table 3-5 *EPA Hypothetical Source Ozone Modeling Results - Source 8 (Pennsylvania)*

Precursor	Emissions (tpy)	Stack Height	Maximum Modeled Ozone Concentration (ppb)
NO _x	500	Low (1 m)	1.67
NO _x	500	High (90 m)	1.66
VOC	500	Low (1 m)	0.16
VOC	500	High (90 m)	0.16

The results of EPA's hypothetical source modeling presented in Table 3-5 can be used to derive appropriate MERP values for NO_x and VOC. The MERPs guidance specifies the following equation to derive a MERP:

$$\text{MERP} = \text{Critical Air Quality Threshold} * (\text{Modeled emission rate from hypothetical source} / \text{Modeled air quality impact from hypothetical source})$$

As stated previously, Roxul will use the proposed ozone SIL of 1 ppb to represent the critical air quality threshold. The SIL represents a de-minimis impact level, that is, if the maximum concentration of ozone due to a single source is less than the SIL, then it can be concluded that the source has an insignificant contribution to ozone formation. If the low stack height case for both NO_x and VOC is conservatively chosen along with the ozone SIL, the resulting MERPs values are the following:

$$\begin{aligned} \text{NOX MERP} &= 1\text{ppb} * 500\text{ tpy} / 1.67\text{ ppb} = 299\text{ tpy} \\ \text{VOC MERP} &= 1\text{ppb} * 500\text{ tpy} / 0.16\text{ ppb} = 3125\text{ tpy} \end{aligned}$$

The potential emissions of NO_x (241 tpy) and VOC (580 tpy) are below the MERP values calculated above. However, since the emissions of these ozone precursors each exceed the individually applicable PSD SERs, the MERPs guidance suggests that the total emission rate of precursors should be cumulatively evaluated with respect to the MERP levels. The following equation shows the Project's cumulative MERP consumption. A cumulative MERP consumption of less than 100% indicates that a project would not cause ozone concentrations exceeding the ozone SIL.

$$\begin{aligned} &(\text{Project NOx emissions (241 tpy)} / \text{NOX MERP (299 tpy)}) + \\ &(\text{Project VOC emissions (580 tpy)} / \text{VOC MERP (3125 tpy)}) = 99.2\% \end{aligned}$$

The calculated cumulative consumption of the MERPs is 99.2%. Roxul concludes that this analysis utilizing recent EPA guidance demonstrates that the proposed project will result in insignificant ozone impacts.

3.4.2 *Secondary PM_{2.5} and EPA MERPs Guidance*

In addition to the photochemical ozone modeling for various hypothetical sources across the US contained in the MERPs guidance, EPA has also provided photochemical modeling for PM_{2.5} for the same hypothetical sources due to emissions of PM_{2.5} precursor pollutants NO_x and SO₂. The use of MERPs for NO_x and SO₂ to determine whether a project would have significant PM_{2.5} impacts (i.e., exceed the applicable SILs) is complicated by the fact that a project's total impact on PM_{2.5} air quality includes contributions from both precursor emissions and direct emissions of PM_{2.5} from project sources. Section 4 of this report presents model results that indicate that the PM_{2.5} SILs are exceeded due to directly emitted PM_{2.5} alone. Therefore, calculation of MERPs would not be

needed since the Project already has significant PM_{2.5} impacts. However, the photochemical model results for hypothetical sources in the MERPs guidance can still serve as a resource to assess the potential contribution of secondary PM_{2.5} to the total modeled concentrations due to the Project. The approach described in the following paragraphs represents a Tier 1 secondary PM_{2.5} assessment, as described in Section 5.4.2(b) in the revised Guideline on Air Quality Models (EPA 2017).

Tables A-2 and A-3 of the MERPs guidance contain model results for PM_{2.5} 24-hr and annual averaging periods for the various hypothetical sources modeled by EPA across the US. Similar to the modeling conducted for ozone, EPA conducted photochemical modeling of hypothetical sources using emissions of 500 tpy, 1,000 tpy, and 3,000 tpy of both NO_x and SO₂.

In order to characterize expected maximum modeled impacts of PM_{2.5} from the proposed project, Roxul has used the model results for EPA Source 8 located in Southern Pennsylvania, Adams County. Figures 3-1 and 3-2 present plots of the modeled PM_{2.5} concentrations for Source 8 plotted against modeled emissions of NO_x and SO₂ for the 500 tpy, 1,000 tpy, and 3,000 tpy "high" stack height cases. Each plot includes a trend line with a linear equation. The linear equation for each precursor and PM_{2.5} averaging period can be used in conjunction with the Project potential emissions of NO_x and SO₂ to calculate an appropriate PM_{2.5} concentration that can be added to the direct PM_{2.5} concentration from AERMOD.

Figure 3-1 EPA Hypothetical Source PM_{2.5} Modeling Results - Source 8 (Pennsylvania) - 24-hr Average

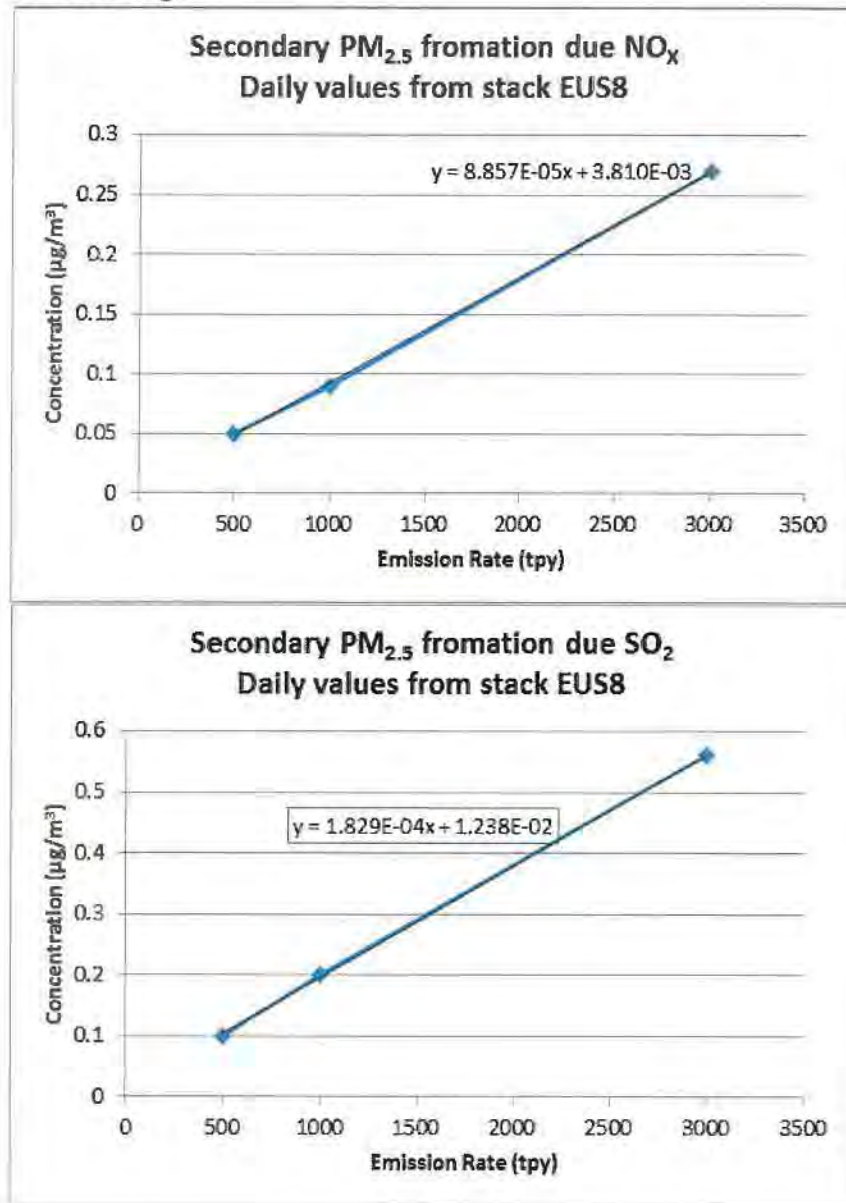
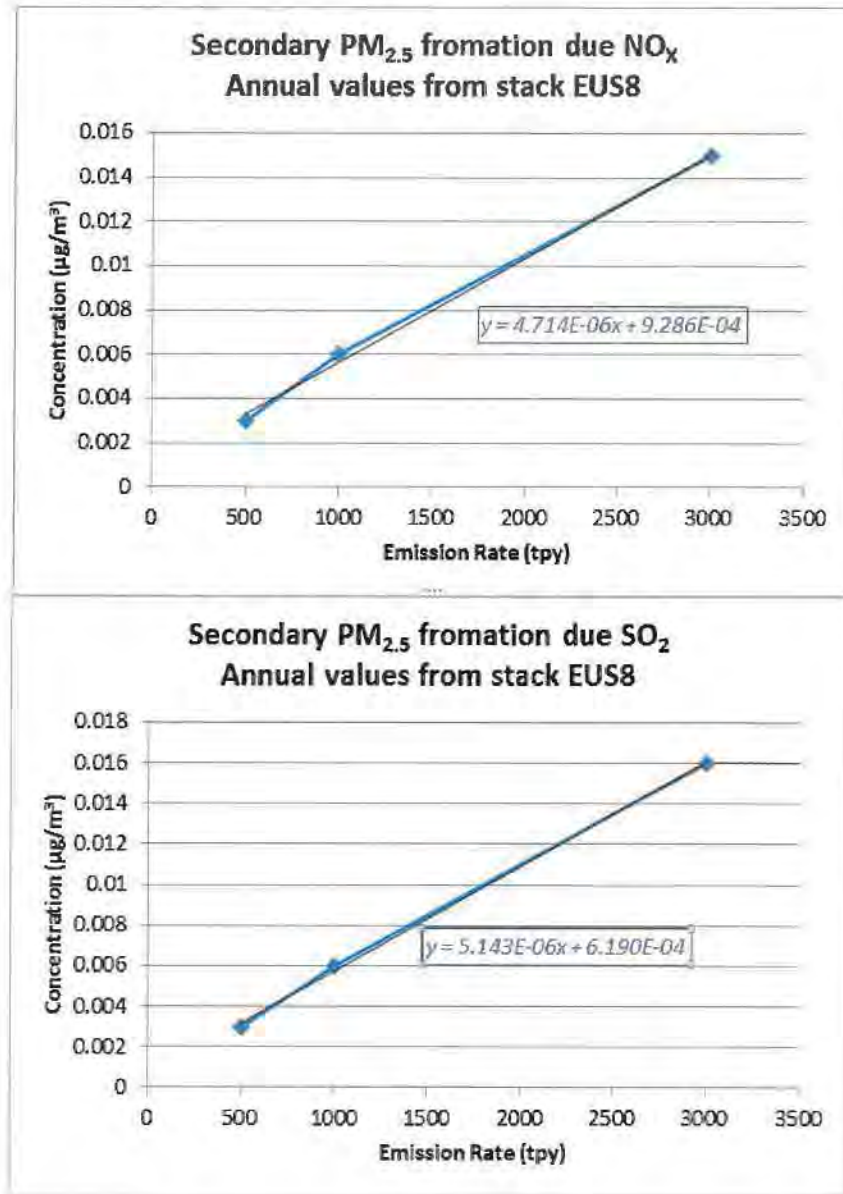


Figure 3-2 EPA Hypothetical Source PM_{2.5} Modeling Results - Source 8 (Pennsylvania) - Annual Average



The secondary PM_{2.5} concentrations due to the Project derived from the equations shown in Figures 3-2 and 3-3 are as follows:

$$24\text{-hr Secondary PM}_{2.5} \text{ due NO}_x = 8.56e^{-5} \cdot (241 \text{ tpy}) + 3.81e^{-3} = 0.025 \mu\text{g}/\text{m}^3$$

$$+$$

$$24\text{-hr Secondary PM}_{2.5} \text{ due SO}_2 = 1.83e^{-4} \cdot (163 \text{ tpy}) + 1.24e^{-2} = 0.042 \mu\text{g}/\text{m}^3$$

Total Secondary PM_{2.5} (24-hr) = 0.067 µg/m³

$$\begin{aligned} \text{Annual Secondary PM}_{2.5} \text{ due NO}_x &= 4.71e^{-6} \cdot (241 \text{ tpy}) + 9.29e^{-4} = 0.0021 \mu\text{g}/\text{m}^3 \\ &+ \\ \text{Annual Secondary PM}_{2.5} \text{ due SO}_2 &= 5.14e^{-6} \cdot (163 \text{ tpy}) + 6.19e^{-4} = 0.0015 \mu\text{g}/\text{m}^3 \\ \hline \text{Total Secondary PM}_{2.5} \text{ (Annual)} &= 0.0035 \mu\text{g}/\text{m}^3 \end{aligned}$$

The secondary PM_{2.5} concentrations determined above, based on a relationship between PM_{2.5} concentrations and precursor emissions that were derived from maximum PM_{2.5} modeled concentrations from EPA hypothetical source photochemical modeling in the same region as the proposed project, can be added to direct PM_{2.5} modeled concentrations to determine the total project air quality impact on PM_{2.5}. These concentrations represent only very small fraction of the SIL values – approximately 5.58% of the 24-hour SIL and 1.75% of the annual. Therefore the project impacts could be considered as insignificant and no further modeling actions would be required.

3.5 BACKGROUND POLLUTANT CONCENTRATIONS

As discussed in Section 3.1.3, representative background pollutant concentrations must be utilized if a cumulative air quality modeling analysis is necessary for NO₂, PM_{2.5}, PM₁₀, SO₂, or CO. The following discussion presents the most current monitor design values for nearby monitors that Roxul has identified that are representative of Jefferson County.

3.5.1 Representative Background Concentrations of NO₂

Table 3-6 presents the most recent NO₂ monitor design values for the regional transport monitor in Adams County, PA (EPA ID 42-001-0001). This is the closest NO₂ monitor to the proposed Project with a valid 2016 monitor design value. The Adams County monitor is located 77 km to the northeast of the project site. The NO₂ data coverage of 93.0% was found sufficient for modeling purposes. The monitor is placed in rural setting similar to the project site.

Table 3-6 Annual and 1-hr NO₂ Monitor Design Values

POLLUTANT	MONITOR LOCATION	MONITOR ID	Distance to Project (km)	AVERAGING PERIOD	DESIGN CONCENTRATION (µg/m ³)
NO ₂	Adams Co., PA	42-001-0001	77	1-Hour	33.2
				Annual	9.4

To characterize 1-hr background NO₂ values, Roxul proposes to utilize EPA guidance (EPA 2011) and calculate the design value based on the most recent

three years of data. The proposed NAAQS analysis would be performed in two stages. In the first stage a conservative approach would be applied by adding a single design value to all model predicted concentrations. If needed a refined approach would be applied by calculating variable background values. Specifically, the most recent 3-year average of the 98th percentile monitor values by season and hour-of-day are to be calculated. EPA guidance suggests that the season and hour-of-day combination be based on the 3rd highest values to represent the 98th percentile.

3.5.2 *Representative Background Concentrations of PM_{2.5}*

As discussed in Section 3.3, the proposed PM_{2.5} ambient data are collected at the Garrett County, MD monitoring station. Roxul proposes to use these data to characterize background PM_{2.5} for use in any necessary cumulative PM_{2.5} analysis. Table 3-7 presents the current annual and 24-hr monitor design values.

Table 3-7 PM_{2.5} Monitor Design Values

POLLUTANT	MONITOR LOCATION	MONITOR ID	Distance to Project (km)	AVERAGING PERIOD	DESIGN CONCENTRATION (µg/m ³)
PM _{2.5}	Pine Run Garrett Co., MD	24-023-0002	105	24-Hour	14.3
				Annual	5.7

To characterize 24-hr background PM_{2.5} values, Roxul proposes to utilize EPA guidance (EPA 2014) and calculate the design value based on the most recent three years of data 2014-2016. The proposed NAAQS analysis would be performed in two stages. In the first stage a conservative approach would be applied by adding a single design value to all model predicted concentrations. If needed a refined approach would be applied by calculating variable background values. Specifically, the EPA guidance recommends the following approach:

- For each year, determine the annual 98th percentile 24-hr monitor value;
- For all 24-hr values in the year less than or equal to the 98th percentile value, divide the distribution into four seasonal categories;
- Determine the maximum concentration in each seasonal category;
- Average the seasonal maximum concentrations across the three years (e.g., average spring value for years 1-3).

The approach described above will result in four 24-hr values that will be used as input as background values in AERMOD if the overall 24-hr monitor design value is unnecessarily conservative.

3.5.3 *Representative Background Concentrations of PM₁₀*

The closest PM₁₀ monitor to the proposed Project is located in Winchester City, VA, 33 km to the southwest. Based on proximity, Roxul proposes the use of Winchester City monitor observations in the PM₁₀ NAAQS analysis for this application. The maximum second highest monitor design value over the most recent three years of available data will be used to characterize background PM₁₀ in the cumulative NAAQS analysis, if needed. Table 3-8 summarizes the most recent design value from the Winchester City, VA PM₁₀ monitor.

Table 3-8 *PM₁₀ Monitor Design Values*

POLLUTANT	MONITOR LOCATION	MONITOR ID	Distance to Project (km)	AVERAGING PERIOD	DESIGN CONCENTRATION (µg/m ³)
PM ₁₀	Winchester City, VA	51-840-0002	33	24-Hour	24

3.5.4 *Representative Background Concentrations of SO₂*

Table 3-9 presents the most recent SO₂ monitor design values for the regional transport monitor in Garrett County, MD (EPA ID 24-023-0002). This is the most representative SO₂ monitor with a valid 2016 monitor design value. The Garrett County monitor is located 105 km west-northwest of the Project site. The SO₂ data coverage of 85.6% was found sufficient for modeling purposes. The monitor is placed in rural setting similar to the Project site.

Table 3-9 *SO₂ Monitor Design Values*

POLLUTANT	MONITOR LOCATION	MONITOR ID	Distance to Project (km)	AVERAGING PERIOD	DESIGN CONCENTRATION (µg/m ³)
SO ₂	Garrett Co., MD	24-023-0002	105	1-Hour	39.5
				3-Hour	39.5
				24-Hour	17.5
				Annual	3.2

To characterize 1-hr background SO₂ values, Roxul proposes to utilize EPA guidance (EPA 2011) and calculate the design value based on the most recent three years of data. The proposed NAAQS analysis would be performed in two stages. In the first stage a conservative approach would be applied by adding a

single design value to all model predicted concentrations. If needed a refined approach would be applied by calculating variable background values. Specifically, the most recent 3-year average of the 99th percentile monitor values by season and hour-of-day are to be calculated. EPA guidance suggests that the season and hour-of-day combination be based on the 2nd highest values to represent the 99th percentile. Roxul proposes to use the 1-hr SO₂ design value in the 3-hour NAAQS analysis.

3.5.5 Representative Background Concentrations of CO

The most representative CO monitor found in the vicinity of the Project is the Garrett County, MD regional transport monitor. If a cumulative analysis is triggered, Roxul will utilize the maximum highest-second highest monitor design value over the most recent three years of available monitor data for both the 1-hr and 8-hr averages to characterize background CO. Table 3-10 summarizes the most recent design values from the Garrett County, MD CO monitor.

Table 3-10 CO Monitor Design Values

POLLUTANT	MONITOR LOCATION	MONITOR ID	Distance to Project (km)	AVERAGING PERIOD	DESIGN CONCENTRATION (µg/m ³)
CO	Garrett Co., MD	24-023-0002	105	1-Hour	458
				8-Hour	344

3.6 NO_x TO NO₂ CONVERSION

For the NO₂ modeling analyses, Roxul proposes to make use of the Ambient Ratio Method (ARM2) option in AERMOD to account for the formation of NO₂ from the emissions of NO_x from the Project sources. Roxul will utilize ARM2 with the national default range of NO₂ to NO_x ratios (50% to 90%). When ARM2 is used, AERMOD assigns the appropriate ratio for each hour and receptor based on the total modeled concentration of NO_x.

3.6.1 Optional NO₂ Modeling Refinements

The ARM approach described above is a Tier II NO₂ modeling methodology. Further refinements in AERMOD are available that account for NO_x to NO₂ transformation through the use of actual monitored concentrations of ozone. These refinements are referred to as Tier III NO₂ modeling methods. The Tier III approaches are the Plume Volume Molar Ratio Method (PVMRM) or the Ozone Limiting Method (OLM) options in AERMOD.

Roxul proposes to utilize a Tier III air quality modeling approach on an as-needed basis. Specifically, if the cumulative NO₂ modeling analysis results in unrealistically high concentrations of NO₂, then the Tier III options will be considered. EPA guidance (USEPA 2014a, USEPA 2015b) recommends the PVMRM approach over the OLM approach for “relatively isolated, elevated sources”. Once the cumulative NO_x modeling inventory is finalized, Roxul will consider the appropriateness of both the PVMRM and OLM approaches. The characteristics of nearby NO_x sources and the interaction of those sources with Roxul’s modeled NO₂ impacts will be considered in making the determination to apply PVMRM or OLM. The current PVMRM formulation in AERMOD 16216r is a revised version of PVMRM that was originally made available in AERMOD version 15181 as PVMRM2. PVMRM2 represents an improvement over the original PVMRM approach in that it addresses known issues with PVMRM in overestimating NO₂ conversion due to overestimates of plume volumes in stable conditions. EPA has published a technical support document that details the enhancements in PVMRM2 vs. PVMRM (USEPA 2015a).

Use of the Tier III refinements in AERMOD requires three additional inputs:

- Monitored ozone data;
- An equilibrium nitric oxide (NO)/NO₂ ratio; and
- Identification of source specific in-stack ratios of NO₂/NO_x.

Ozone data from the Berkeley County, WV ozone monitor will be used as input in the Tier III NO₂ modeling. Roxul will either characterize the ozone data on an hourly basis (a separate hour-by-hour file that will be read by AERMOD), or on a seasonal and hour-of-day basis. The default equilibrium nitric oxide (NO)/NO₂ ratio of 0.9 will be used.

In the absence of source-specific in-stack data, US EPA suggests a default in-stack NO₂/NO_x ratio of 0.5. Roxul will use an in-stack ratio of 0.5 for all project sources if manufacturer supported ratios cannot be obtained. For any cumulative inventory source greater than 1 km from the project site, Roxul will use an in-stack NO₂/NO_x ratio of 0.2. This approach is consistent with USEPA guidance for multi-source NO₂ modeling analyses (USEPA 2014a).

3.7 *GEOGRAPHIC SETTING*

3.7.1 *Land Use Characteristics*

The proposed facility will be located in the city of Ranson, Jefferson County, WV. AERMOD will be used in the default (rural) mode. Roxul has analyzed the land use classifications within an area defined by a 3 km radius from the approximate center of the site, and has determined that the land use within this area is less than 1% urban classification. This determination was made by analyzing the

USGS NLCD 1992 data, where urban classifications were assumed to be category 22 (high intensity residential) and category 23 (commercial /industrial/ transportation).

3.7.2

Terrain

The Project site is situated in elevated terrain at approximately 162 m. The latest version of EPA's AERMAP program (version 11103) will be used to determine the ground elevation and hill scale for each modeled receptor, based on data obtained from the USGS National Elevation Database (NED). The NED data will be obtained at a horizontal resolution of 1 arc-second (30-m) for use in this analysis.

3.7.3

Effects on Growth, Soils, Vegetation, and Visibility

PSD requirements include an evaluation of the effects of growth due to a project, and an evaluation of the effects of project emissions on soils, vegetation, and visibility. Evaluation of potential impacts on vegetation and soils will be performed by comparison of maximum modeled impacts from the Project to Air Quality Related Value (AQRV) screening concentrations provided in the EPA document "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals"² and to NAAQS secondary standards. 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. The NAAQS secondary standards were set to protect public welfare, including protection against damage to crops and vegetation. Therefore, comparing the modeled emissions to the AQRVs and the NAAQS secondary standards provides an indication as to whether potential impacts are likely to be significant. Table 3-11 summarizes the applicable AQRVs or NAAQS secondary standards.

Table 3-11 *Summary of Applicable AQRVs and AAQS*

Pollutant	Averaging Period	AQRV Screening Levels ($\mu\text{g}/\text{m}^3$)	Secondary NAAQS ($\mu\text{g}/\text{m}^3$)
PM ₁₀	24-hour	--	150
	Annual	--	50
PM _{2.5}	24-hour	--	35
	Annual	--	15
NO ₂	4-hour	3,760	--
	8 hour	3,760	--
	1-month	564	--
	Annual	100	100

²USEPA, A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals, EPA 450/2-81-078, December 12, 1980.

Pollutant	Averaging Period	AQRV Screening Levels ($\mu\text{g}/\text{m}^3$)	Secondary NAAQS ($\mu\text{g}/\text{m}^3$)
SO ₂	1-hour	917	--
	3-hour	786	1,300
	24-hour	--	260
	Annual	18	60
CO	1-hour	--	--
	8-hour	--	--
	Weekly ¹	1,800,000	--
Pb	Quarterly	1.5	0.15

"--" = not applicable or not available.

¹ Weekly average impact approximated by modeled 24-hr average impact.

With respect to visibility impacts, it should be noted that the facility will comply with the applicable WVDAQ visible emissions regulations. In addition, Roxul will consult with WVDAQ to determine if any areas in the vicinity are considered to be sensitive with respect to potential visibility degradation, and investigate the appropriateness of applying the EPA VISCREEN (Version 1.01, dated 13190) visibility model to sensitive viewsheds within these areas to conservatively assess the proposed Project's impact on visibility impairment. VISCREEN will be executed following the procedures described in EPA's Workbook for Plume Visual Impact Screening and Analysis for Level-1 visibility assessments, if necessary.³

3.8

RECEPTOR GRIDS

For this modeling analysis, nested Cartesian receptor grids of variable spacing will be utilized to resolve the ground concentration patterns. The grids will be defined using a common central point at the proposed project as an origin, extended distance from the origin, and receptor spacing. As a result of this approach the following sub-grid are defined:

- at most 50-meter spacing along the fence line;
- 100-meter spacing from origin out 3 km;
- 250-meter spacing from 3 km to 5 km from the facility;
- 500-meter spacing from 5 km to 10 km from the facility;
- 1000-meter spacing from 10 km to 20 km from the facility; and
- 2000-meter spacing from 20 km to 50 km from the facility, as needed.

As noted previously, AERMAP will be used to define ground elevations and hill scales for each receptor. Roxul will analyze isopleths of modeled concentrations

³ EPA, Workbook for Plume Visual Impact Screening and Analysis (Revised), EPA-454/R-92-023, 1992.

due to the proposed Project, and determine if the proposed receptor grid adequately accounts for the worst case impacts. The receptor grid extent will be adjusted accordingly in a manner to adequately resolve the areas with increasing ground concentration gradients. In case of isolated high impacts from the proposed Project appearing in sections of the coarse receptor grid (500-m spacing and larger), then additional 100-meter spaced sub-grids will be used to better resolve the concentration patterns. Roxul will make any adjustments to the proposed grid on a case by case basis, and provide justification for any refinements in the modeling report to WVDAQ.

The facility fence line will be used as the boundary to determine ambient air. No receptors will be placed within this fence line boundary. A physical fence will control public access to the facility.

All Cartesian coordinates will be in UTM system, zone 18, datum NAD-83.

3.9

METEOROLOGICAL DATA FOR AIR QUALITY MODELING

EPA requires site-specific meteorological data to be included in the PSD application modeling. In absence of site-specific data, data from a representative NWS station should be used.

Roxul proposes to utilize meteorological data collected from 2012-2016 at the Eastern WV Regional Airport, Shepherd Field (KMRB) in this modeling analysis. The KMRB Automated Surface Observation System (ASOS) system is located approximately 9.8 km to the west of the Project site. Upper air data from Washington Dulles International Airport (IAD) will also be used in the analysis. The following steps will be taken to prepare and process these data with the latest versions of EPA's processing programs:

- AERMET version 16216 will be used to process the surface and upper air meteorological data;
- The ADJ_U* option will be used in AERMET;
- One-minute and five-minute ASOS wind data will be processed for input into AERMET through the use of the AERMINUTE version 15272 preprocessor;
- AERSURFACE will be run with varying options for moisture conditions (average, wet, and dry) at seasonal temporal resolution;
- Climatological data from the National Climatic Data Center (NCDC) will be used to assign the moisture and snowfall characteristics for each season of the 5-year modeling period;
- The resulting files will be processed into 5 individual calendar years and one 5-year period for model input.

The ADJ_U* option addresses a known bias towards underprediction of friction velocity under stable, low wind speed conditions, leading to observed model overprediction for these conditions. ADJ_U* is a regulatory option in the default application of AERMET version 16216 for use in AERMOD. In addition, for this application no site-specific meteorological data is available. The surface data included were recorded at the Martinsburg airport NWS station and do not include turbulence observations.

AERMET processing is performed in 3 stages. Stage 1 processing reads the raw onsite, surface, and upper air files, performs data range and completeness checks, and formats data for input to Stage 2. Stage 2 reads the files prepared in Stage 1, adds the 1- and 5-minute wind observations and prepares a single merged file with all necessary inputs for Stage 3. Stage 3 carries out the boundary layer parameterizations needed to calculate turbulence parameters such as the friction velocity, convective velocity scale, Monin-Obukhov length scale, and convective and mechanical mixing depths as well as determines hourly surface characteristics (albedo, Bowen Ratio, and surface roughness length) based on the AERSURFACE outputs.

3.9.2 *Summary of AERMET Location Inputs*

Integrated Surface Hourly Data (ISHD) format data from KMRB will be input in the AERMET "SURFACE" pathway, and FSL format upper air data will be input in the AERMET "UPPERAIR" pathway. The following location data will be used in AERMET:

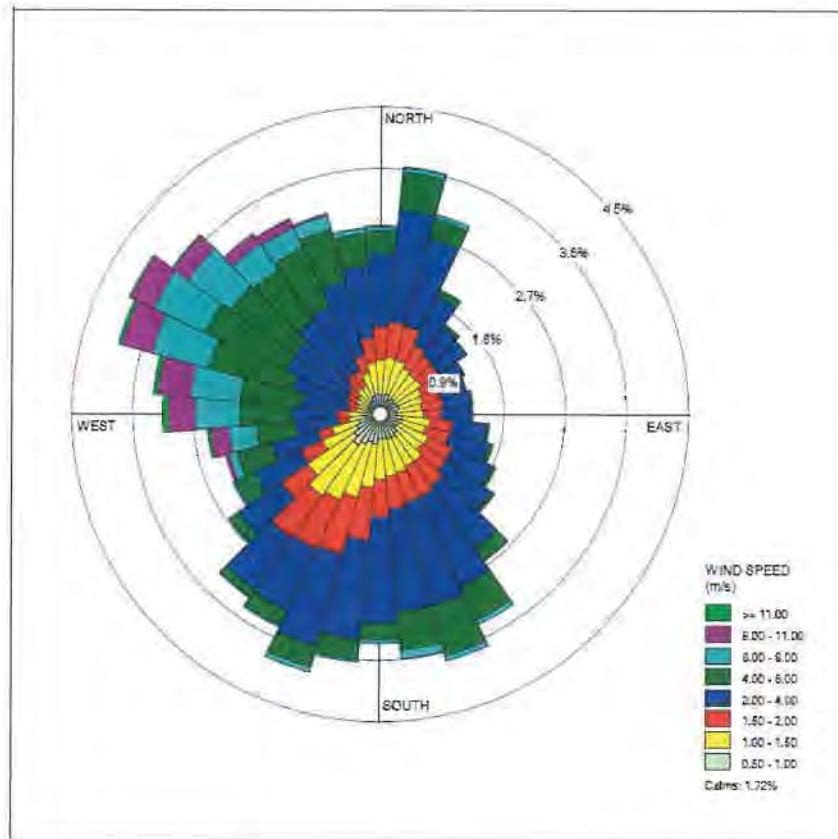
- KMRB ASOS Location: 39.402N 77.984W - specified by NCEI;
- KMRB Elevation: 162.8 m - specified in NCEI;
- IAD Upper Air Location: 38.98N 77.47W - noted in FSL file header; and
- Hourly AERMET data is processed in time zone 5.

3.9.3 *Meteorological Data Representativeness*

3.9.3.1 *Representativeness of Wind Measurements*

A wind rose for KMRB for 2012-2016 is shown in Figure 3-3.

Figure 3-3 *KMRB Wind Rose - 2012-2016*



The proposed Project site and KMRB are both situated in the gently rolling terrain region of the Potomac Highlands. The Project site is located approximately 10 km east of the meteorological station; both locations have similar terrain elevation: Project - 177 m, KMRB - 165 m. Both sites are situated in a the valley east of the Allegheny Mountain and west of the northern tip of Blue Ridge Mountain; therefore, it is reasonable to assume they are both exposed to the same regional wind pattern, and would not experience local steering of the wind from the dominant northwesterly and southerly direction. Roxul asserts that due to the relatively close proximity and similar terrain setting, that the KMRB winds are representative of the proposed Project site.

3.9.3.2 *Representativeness of Surface Characteristics*

The surface characteristics required by AERMET (surface roughness, Bowen ratio, and albedo) are required to be representative of the meteorological measurement site, as specified in the EPA's AERMOD Implementation Guidance. The AERSURFACE (Version 13016) land-use processor will be used for the development of the necessary micrometeorological parameters for use in AERMET. The following is a summary of the settings that will be used in AERSURFACE:

- USGS 1992 NLCD input land use data
- Center Latitude (decimal degrees): 39.402
- Center Longitude (decimal degrees): -77.984
- Datum: NAD83
- Study radius (km) for surface roughness: 1.0
- Airport? Y, Continuous snow cover? Y
- Surface moisture? **Variable**, Arid region? N
- Temporal resolution: Seasonal
- Month/Season assignments? Default
- Late autumn after frost and harvest, or winter with no snow: 0
- Winter with continuous snow on the ground: 12 1 2
- Transitional spring (partial green coverage, short annuals): 3 4 5
- Midsummer with lush vegetation: 6 7 8
- Autumn with unharvested cropland: 9 10 11

The variable inputs will be based on climatological data compiled by NCDC. The moisture characterization and snow cover will be characterized on seasonal basis based on NCDC climatological records for the airport site. AERSURFACE will be executed with seasonal resolution with 12 wind direction sectors.

Additional details on the moisture and snow cover options that will be used are provided in Section 3.9.4.

As noted previously, the KMRB station is located approximately 9.8 km west of the Project site. Bowen ratio and albedo are bulk variables in AERMET, that is,

they are intended to be representative of the greater modeling domain as opposed to being highly site specific. AERSURFACE determines the appropriate value of Bowen ratio and albedo by considering the land-use within a 10 km by 10 km area centered on the meteorological instruments location. Table 3-12 summarizes the average values of surface roughness within 1 km of the KMRB ASOS site and the proposed Project site, as well as the Bowen ratio and albedo for both sites determined by AERSURFACE. AERSURFACE was executed on a seasonal basis for a single 360 wind direction sector for the purposes of this comparison.

Table 3-12 Comparison of Micrometeorological Variables

Season	Albedo		Bowen Ratio		Surface Roughness	
	Project	Airport	Project	Airport	Project	Airport
1	0.55	0.53	0.50	0.50	0.125	0.025
2	0.14	0.15	0.38	0.48	0.264	0.055
3	0.18	0.18	0.44	0.42	0.563	0.110
4	0.18	0.18	0.75	0.83	0.563	0.102

The NLCD 1992 land use data analyzed by AERSURFACE produce very similar average albedo and Bowen ratio values between the proposed Project and the airport site. However, the surface roughness values for the proposed site derived from AERSURFACE are notably higher than the values derived for KMRB from the NLCD 1992 land use data. Roxul proposes conservatively to use the KMRB surface roughness in the modeling.

3.9.4 *AERMET Processing*

AERMET (version 16216) will be executed using EPA recommended settings to produce the meteorological data needed for AERMOD. The five year period from 2011-2015 is proposed for use in this analysis. The AERMET analysis will include the use of both the AERMINUTE and AERSURFACE preprocessors. The AERMINUTE (version 15272) meteorological data processor will be used to produce wind speed and direction data based on archived 1-minute and 5-minute ASOS data for KMRB, for input into AERMET Stage 2. A 0.5 m/s wind speed threshold will be applied to the 1-minute ASOS derived wind speeds in AERMET.

In addition to the surface meteorological data from KMRB, Roxul will utilize upper air data from Washington Dulles International (IAD) airport in this analysis. Upper air data is used in AERMET to determine an initial potential temperature distribution from a morning sounding. AERMET assumes the 12Z sounding is to be nearly equivalent to a morning sounding. The initial potential temperature distribution is used by AERMET to characterize the growth of the

daytime convective boundary layer. It is important to use upper air data that is representative of the model application site. IAD is the closest upper air collection station to the proposed project site.

Precipitation, snow fall and temperature statistics, provided by the National Center for Environmental Information (NCEI), were used in the determination of snow cover and moisture characteristics for each season. Monthly averages for 1981-2010 period collected at the KMRB station were consider to establish the historical precipitation amounts and temperatures. The guidance suggests that the 30-year rainfall record be examined, and then precipitation of the modeling period be compared to the 30 year statistical norms. A season was considered dry if the precipitation during a year of the modeling period is in the lower 30th percentile of the corresponding climatic norm. Similarly, average moisture is assumed for seasonal precipitation the in the range of 30th to 70th percentile, and wet moisture is assumed for the 70th percentile and greater. The proposed snow cover and moisture options for the 2012-2016 KMRB meteorological data processing are presented in Table 3-13.

Table 3-13 KMRB Snow Cover and Monthly Surface Moisture Assignments

Modeling Year	WINTER		SPRING	SUMMER	FALL
	Moisture	Continuous Snow on the ground?	Moisture	Moisture	Moisture
2012	Avg	Yes	Avg	Dry	Avg
2013	Wet	Yes	Dry	Avg	Wet
2014	Wet	Yes	Avg	Avg	Avg
2015	Dry	Yes	Avg	Dry	Dry
2016	Wet	Yes	Avg	Wet	Dry

3.10 REGIONAL INVENTORY FOR CUMULATIVE MODELING ANALYSES

As discussed in Section 3.1.3, cumulative air quality modeling analyses may be necessary if the Project’s modeled impacts exceed the applicable SILs. The cumulative analyses will include representative background concentrations from regional monitors, as well as contributions from other sources in the area, “nearby sources” whose close proximity to the Project site would make their modeled impacts in relation to the modeled impacts from the proposed Project not well characterized by representative background monitor data alone.

Important considerations for identifying nearby sources to include in the cumulative modeling inventory, in a manner that does not make the assessment overly conservative or complicated, are discussed by EPA in Section 8.3 of the Guideline on Air Quality Models (40 CFR Part 51, Appendix W). Specifically, paragraph 8.3.3(b)(iii) of the Guideline provides the following language:

The number of nearby sources to be explicitly modeled in the air quality analysis is expected to be few except in unusual situations. In most cases, the few nearby sources will be located within 10 to 20 km from the source(s) under consideration.

The Guideline also contains the following language to define “nearby sources” in paragraph 8.3.3 (b):

Nearby Sources: All sources in the vicinity of the source(s) under consideration for emissions limits that are not adequately represented by ambient monitoring data should be explicitly modeled. Since an ambient monitor is limited to characterizing air quality at a fixed location, sources that cause a significant concentration gradient in the vicinity of the source(s) under consideration for emissions limits are not likely to be adequately characterized by the monitored data due to the high degree of variability of the source’s impact.

Roxul anticipates that the maximum significant impact area (SIA, i.e., the distance defined by furthest receptor from the Project with a modeled concentration due to the Project in excess of an applicable SIL) will be within 50 km for the 1-hour average and within 20 km for the larger averaging periods. Considering the above referenced language from the Guideline, Roxul proposes to limit the cumulative inventory for all pollutants and averaging periods that exceed their respective SIL to major sources within an area of radius 25km of the proposed Project site.

Separate inventories will be developed for CO, NO_x, PM₁₀, PM_{2.5}, and SO₂ in conjunction with WVDAQ, if required. Title V permits and permit applications that are publically available will be the primary basis for the development of modeled emission rates for these inventories. The stack parameters will be based on the WVDAQ, MDDEP, and VADEQ emission inventory and available permits.

If the modeling results imply that further refinement of the off-site inventories is necessary, Roxul will consult with WVDAQ.

3.11

CLASS I IMPACTS

The proposed Project is located within 300 km of three (3) federally protected Class I areas. All of these Class I areas are located generally to the east and southeast of the Project. The Class I areas and approximate distances from the Project site are as follows:

- Otter Creek Wilderness – 153 km, managed by the US Forest Service (USFS),
- Dolly Sods Wilderness – 131 km, managed by USFS, and
- Shenandoah National Park – 60 km, managed by the National Park Service (NPS).

The Federal Land Managers (FLMs) have recommended an emissions over distance screening threshold that can be used to preliminarily assess a project's significance with respect to air quality related values (AQRVs), namely visibility and deposition in Class I areas (NPS 2010). This ratio is represented by total annualized maximum 24-hour emissions of NO_x, SO₂, PM₁₀, and H₂SO₄ in tons/yr divided by distance to a Class I area in km and is referred to as the Q/D ratio. The FLM guidance suggests that projects with a Q/D ratio of less than 10 would not be expected to have significant impacts with respect to AQRVs in Class I areas. Roxul anticipates that Q/D ratios for the closest Class I area will be approximately 9.6, which is below the FLM screening level of 10 and therefore no AQRV analysis is proposed.

Roxul proposes to evaluate the project related increase of NO₂, PM₁₀, PM_{2.5}, and SO₂ 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 will be 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 will be determined based on the receptors used by the NPS to represent each Class I area for refined air quality modeling analyses⁴. If maximum modeled concentrations at the 50 km receptors are less than the Class I SILs for NO₂, PM₁₀, PM_{2.5}, and SO₂, then it can be assumed that the project would also have maximum potential impacts that would be less than the SILs at the more distant Class I areas.

To determine elevations for the 50 km ring of receptors, Roxul proposes to use AERMAP to determine the elevations for the receptor locations recommended by the NPS for each Class I area within 300 km. After the elevations for each Class I area receptor has been determined with AERMAP, Roxul will identify the maximum and minimum elevations (and associated hill scale heights) for all NPS Class I receptors, and use these elevations and associated hill scales as the elevation and hill scale for each receptor in the 50 km arc receptors for each Class I area.

If the Class I SILs are exceeded in the AERMOD screening evaluation, Roxul proposes refined analysis with the CALPUFF model to evaluate the project impact within the park proper. In the event of refined modeling, Roxul also proposes the use of chemical transformation with CALPUFF, namely the MESOPUFF II scheme coupled with the VISTAS meteorological data set provided by EPA. The use of the chemical transformation option would account also for the secondary PM_{2.5} formation.

⁴ <http://www.nature.nps.gov/air/maps/receptors/>

4.0

MODEL RESULTS PRESENTATION

Five (5) criteria pollutants will be modeled, namely CO, NO₂, PM_{2.5}, PM₁₀, and SO₂. Maximum ground level model design values will be identified for the appropriate averaging periods and compliance with SILs, and subsequently the NAAQS and PSD Increments, as necessary. Results will be presented in a tabular and graphical format (as needed). Electronic modeling files will be provided with the report.

5.0

REFERENCES

- U.S. Environmental Protection Agency. (EPA 2016) AERMOD Implementation Guide, AERMOD Implementation Workgroup. December 2016.
- National Park Service. (NPS 2010) Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report - Revised (2010). Natural Resource Report NPS/NRPC/NRR - 2010/232
- U.S. Environmental Protection Agency. (EPA 2011) EPA memo entitled "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard", EPA, Office of Air Quality Planning and Standards, Raleigh, NC. March 1, 2011.
- U.S. Environmental Protection Agency. (EPA 2013) AERSURFACE User's Guide, Office of Air Quality Planning and Standards, Raleigh, NC. January 2008, Revised 01/16/2013.
- U.S. Environmental Protection Agency. (EPA 2014) Guidance for PM_{2.5} Permit Modeling, Office of Air Quality Planning and Standards, Raleigh, NC. March 20, 2014.
- U.S. Environmental Protection Agency. (EPA 2014a) EPA memo entitled "Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO₂ National Ambient Air Quality Standard", EPA, Office of Air Quality Planning and Standards, Raleigh, NC. September 30, 2014.
- U.S. Environmental Protection Agency. (EPA 2015a) Technical Support Document (TSD) for NO₂-related AERMOD Modifications, EPA, Office of Air Quality Planning and Standards, Raleigh, NC. July 2015, EPA-454/B-15-004.
- U.S. Environmental Protection Agency. (EPA 2016a) EPA memo entitled "Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM_{2.5} under the PSD Permitting Program", EPA, Office of Air Quality Planning and Standards, Raleigh, NC. December 2, 2016.
- U.S. Environmental Protection Agency. (EPA 2017) Appendix W to 40 CFR 51, Published January 17, 2017 Federal Register Volume 82 No. 10, Revisions to the Guideline on Air Quality Models: Enhancements to the AERMOD Dispersion Modeling System and Incorporation of Approaches to Address Ozone and Fine Particulate Matter; Final Rule.

Best Available Control Technology
Appendix D

November 2017
Project No. 0408003

Environmental Resources Management
204 Chase Drive
Hurricane, West Virginia 25526
304-757-4777

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D.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT) ANALYSIS

Based on potential emissions, BACT is required by the West Virginia Department of Environmental Protection (WVDEP) air pollution control regulations contained in Title 45 Code of State Regulations Series 14 (45 CSR 14) for sulfur dioxide (SO₂), volatile organic compounds (VOCs), nitrogen oxides (NO_x), particulate matter (PM), and particulate matter with a diameter of 10 micrometers or less (PM₁₀), particulate matter with a diameter of 2.5 micrometers or less (PM_{2.5}), carbon monoxide (CO), sulfuric acid (H₂SO₄) mist, and carbon dioxide equivalents (CO₂e) from all project emissions sources, including:

- Source L1 - Mineral Wool Line 1 (including recycle plant),
- Source RFN1 - Rockfon Line,
- Source COAL1 - Coal Milling, and
- Other Facility - Wide Operations.

A BACT analysis for each project emission source and corresponding set of criteria pollutants is included in this section. A greenhouse gas (GHG) BACT analysis is provided in Section D.9.

D.1 BACT ANALYSIS PROCESS

BACT is defined in 45 CSR 14 as:

Best available control technology (BACT) means 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.

Federal guidance on BACT requires an evaluation that follows a “top down” approach, as described in the New Source Review Workshop Manual¹ issued by the United States Environmental Protection Agency (USEPA) in 1990. The five basic steps of a top-down BACT analysis are:

- Step 1: Identify potential control technologies;
- Step 2: Eliminate technically infeasible options;
- Step 3: Rank remaining control technologies by control effectiveness;
- Step 4: Evaluate the most effective controls and document results; and
- Step 5: Select BACT.

The first step is to identify potentially “available” control options for each emission unit and for each pollutant under review. Available options consist of a comprehensive list of those technologies with a potentially practical application to the emissions unit in question. The list includes lowest achievable emission rate (LAER) technologies, innovative technologies, and controls applied to similar source categories. Reasonably available control technology (RACT), State regulations, and federal regulations were reviewed as a starting point for potential BACT limits.

For this analysis, the following sources were investigated to identify potentially available control technologies:

- USEPA’s RACT/BACT/LAER Clearinghouse (RBLC) database;
- USEPA’s New Source Review (NSR) website;
- In-house experts;
- Technical books and articles;
- State permits issued for similar sources that have not been entered into the RBLC;
- Vendor quotes and communications with control device equipment manufacturers;
- Guidance documents referenced within this application; and
- Proposed and existing New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP), including Maximum Achievable Control Technology (MACT).

After identifying potential technologies, the second step is to eliminate technically infeasible options from further consideration. To be considered feasible, a technology must be both available and applicable. In this step, technical arguments for eliminating a technology from further consideration

¹ *New Source Review Workshop Manual Prevention of Significant Deterioration and Nonattainment Area Permitting*, EPA, Draft October 1990.

must be clearly documented based on physical, chemical, engineering, and source-specific factors related to safe and successful use of the controls.

The third step is to rank the technologies not eliminated in the second step in order of descending control effectiveness for each pollutant of concern. If the highest ranked technology is proposed as BACT, it is not necessary to perform any further technical or economic evaluation. Potential adverse impacts must still be identified and evaluated.

The fourth step entails an evaluation of energy, environmental, and economic impacts for determining a final level of control. The evaluation begins with the most stringent control option and continues until a technology under consideration cannot be eliminated based on adverse energy, environmental, or economic impacts. The economic or "cost-effectiveness" analysis is conducted in a manner consistent with USEPA's Office of Air Quality Planning and Standards (OAPQS) Control Cost Manual, Sixth Edition and subsequent revisions.

The fifth and final step is to select as BACT the emission limit from application of the most effective of the remaining technologies under consideration for each pollutant of concern. BACT must be no less stringent than the level of control required by any applicable NSPS and NESHAP or State regulatory standards applicable to the emission units included in this permit application.

This BACT analysis provides background information on potential control technologies, a summary of determinations contained in the RBLC database for similar emission units, a discussion of other potential control options that may be applicable to the emission units, and proposed BACT emission limits. A report² developed by the European Commission Joint Research Centre was used as a starting point for potentially applicable melting furnace controls and control device efficiencies. The report provides installation data on facilities throughout the European Union (EU) with melting processes similar to the proposed facility.

The primary basis of the emission estimates for the proposed Roxul facility is stack emissions data from similar Roxul facilities. These emissions reflect control devices that are typical to Roxul mineral wool facility designs and as such are used as a starting point for this BACT analysis.

D.2

BACT DETERMINATION FOR EMISSIONS FROM MATERIAL DELIVERY, HANDLING, STORAGE, AND TRANSFER OPERATIONS

Emissions of filterable PM/PM₁₀/PM_{2.5} are generated from material handling operations. Generally, these emissions can be grouped as fugitive or point (vent) source emissions. This section evaluates BACT for the following fugitive and point or vent emission sources as described in Section 2.0 of the application.

² European Commission, *Best Available Techniques (BAT) Reference Document for the Manufacture of Glass, Integrated Pollution Prevention and Control (IPPC) Industrial Emissions Directive 2010/75/EU*, 2013.

Fugitive Sources:

- Coal Milling Building (B235);
- Coal Unloading (Delivery Truck to Bunker) (B230);
- Coal Loading Hopper (B231);
- Raw Material Outdoor Stockpile (Including Delivery to Stockpile from Offsite) (RMS);
- Raw Material Storage (Delivery to Raw Material Storage from Offsite or Stockpile) (B210);
- Raw Material Loading Hopper (B215);
- Raw Material Reject Collection Bin (RM_REJ);
- Sieve Reject Collection Bin (S_REJ);
- Melting Furnace Portable Crusher & Storage (Including Drop to Pit Waste, and Pit Waste Stock Pile Wind Erosion) (B170); and
- Raw Material, Finished Product, and Coal Transport on Paved Haul Roads (Rd_RM, Rd_FP, Rd_CM).

Vent Sources:

- De-Dusting Baghouse (CE01);
- Vacuum Cleaning Baghouse (CE02);
- Three (3) Coal Storage Silos (IMF03);
- Coal Feed Tank (IMF25);
- Charging Building Vacuum Cleaning Filter (IMF21);
- Sorbent Silo (IMF08);
- Spent Sorbent Silo (IMF09);
- Two (2) Storage Silos (Filter Fines Day/ Secondary Energy Materials) (IMF07);
- Filter Fines Receiving Silo (IMF10);
- Conveyor Transition Point (B215 to B220) (IMF11);
- Conveyor Transition Point (B210 to B220) (IMF12);
- Conveyor Transition Point (B220 No. 1) (IMF14);
- Conveyor Transition Point (B220 No. 2) (IMF15);
- Conveyor Transition Point (B220 to B300) (IMF16);
- Charging Material Handling Building Vent 1 (IMF17);
- Charging Material Handling Building Vent 2 (IMF18);

- Coal Conveyor Transition Point (B231 to B235) (IMF04)
- Coal Conveyor Transition Point (B231 to B235) (IMF13);
- Recycle Building Vent 1 (CM10);
- Recycle Building Vent 2 (CM11);
- Recycle Building Vent 3 (CM08); and
- Recycle Building Vent 4 (CM09).

D.2.1

Fugitive Emissions from Material Delivery, Handling, Storage, and Transport Operations- Filterable PM, PM₁₀, and PM_{2.5}

Raw materials are delivered in bulk by truck and are temporarily staged between two buildings facing inward. Daily quantities of the bulk materials are transferred with a front-end loader and subdivided into three (3) sided concrete enclosures with a fixed roof. Alternatively, materials are delivered directly to a stockpile. Front-end loaders are used to transfer raw materials from the material storage building or stockpile into a loading hopper that feeds an enclosed conveyor system.

In addition to raw material unloading and storage, fugitive emissions are also generated from material drops associated with the melting furnace portable crusher and reject material transfers.

Coal or pet coke for on-site milling will be delivered in lump size by truck and unloaded at the coal bunker enclosed at 3 sides and roofed (B230). From the coal bunker, the coal is loaded by a front-end loader into the loading hopper (B231) enclosed on 3 sides and roofed. The Coal Loading Hopper (B231) feeds material onto a series of enclosed conveyors that direct the material to a day bin inside the coal milling building (B235).

BACT Floor

Per Title 45 Code of State Regulations Series 7 (45 CSR 07), the facility shall not emit filterable PM into the open air from any process source operation greater than 20 percent opacity. This emissions limit applies to the Melting Furnace Portable Crusher & Storage.

Per 45 CSR 07-5, the facility must limit fugitive emissions by equipping manufacturing processes with a system to minimize fugitive PM emissions. This BACT analysis analyzes the feasibility of add-on controls to reduce fugitive emissions. All roads will be paved to minimize fugitive dust emissions.

The requirements of Title 40 Code of Federal Regulations (40 CFR) Part 60, Subpart OOO apply to the Raw Material Reject Collection Bin and Sieve Reject Collection Bin. In accordance with this regulation, these emission sources must not exceed 7 percent opacity.

Step 1 – Identify Potential Control Technologies

Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated PM/PM ₁₀ /PM _{2.5} Control Efficiency
Wind screens and/or partial enclosures	Varies (50% - 75%)
Water sprays or wet suppression	Varies
Fabric filter (Baghouse)	95-99+% [As low as 0.001 grains per dry standard cubic foot (gr/dscf)]
Good housekeeping practices	Varies

- *Wind Screens and/or Partial Enclosures* – The use of screen walls and other structures to shelter material handling operations from wind effects has been shown to provide a reduction in airborne dust from such operations. Partial enclosures are most effective and practical at dedicated loading and unloading points.
- *Water Sprays or Wet Suppression* – Fine mists of water applied to dust generating sources, such as bulk material drop points, reduce dust emissions by impacting small particulates with water. The wetted particulate becomes heavier and quickly settles out of the air, reducing airborne dust. Alternatively, material may be thoroughly wetted prior to handling, which suppresses the generation of dust when the material is disturbed.
- *Fabric Filter (Baghouse)* – Local collection hoods and fabric filters, or baghouses, are the industry standard for particulate controls and the most efficient means of removing varying sizes of particulate material. An additional advantage of using local collection hoods and baghouses is that air flows can be adjusted individually to accommodate changes in the dust loading. The best results are obtained when the fabric filter's velocity is controlled for the particular emission characteristics (air-to-cloth ratio) and providing additional capacity to handle the baghouse's cleaning cycle. The primary method of particle leakage is through pores in the filter that are not covered with the filter cake. The velocity of the exhaust through the pores is high, entraining both small and large particles. Once a filter cake forms, only a few of these pores exist.
- *Good Housekeeping Practices* – Good housekeeping practices are used in areas where it is difficult to feasibly implement other control technologies. Good housekeeping practices generally consist of activities such as the application of water or other chemicals to suppress dust from becoming airborne for unpaved roads, utilizing paved roads when possible, posting speed limits for trucks and vehicles while on-site, and sweeping to keep roadways free of dust.

Step 2 – Eliminate Technically Infeasible Options

Water Sprays or Wet Suppression

Water sprays and wet suppression of the materials delivered by truck are infeasible due to the need to move the materials onto a conveyor system where dry material is required to prevent clogging. The raw materials and fuel to be used (coal) are not suitable for this type of control.

Fabric Filter

Fabric filters are technically infeasible because large vent hoods and air flows would be needed to collect the material from the storage areas. Emissions of PM, PM₁₀, and PM_{2.5} from the Raw Material Reject Collection Bin and Sieve Reject Collection Bin may not require exceedingly large vent hoods and air flows; however, if these sources were vented at 100 dry standard cubic feet per minute (dscfm), the particulate concentration would be below the threshold at which fabric filters are considered technically feasible for PM reduction (<0.0002 gr PM/dscf). As such, fabric filters are eliminated from further consideration.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Wind screens and/or partial enclosures.
2. Good housekeeping practices.

Step 4 – Evaluate Remaining Control Technologies

Wind Screens and/or Partial Enclosures

Wind screens and partial enclosures are effective at blocking wind which both entrains and carries dust and particulate away from the source. As previously mentioned, truck deliveries are unloaded between enclosures in the middle of a building. The material will be temporarily staged in this location; therefore, short-term wind effects will be minimized by two walls and by moving the material for longer-term storage. The facility plans to install three-sided concrete raw material and coal bins with a fixed roof and covers on outdoor loading hoppers to reduce the effects of wind. Fugitive emissions from rejected material will be minimized by directing the material into bins with 4-sided rubber drop guards. Fugitive emissions associated with the storage of crushed material exiting the portable crusher will be minimized through the use of three-sided concrete enclosures.

Good Housekeeping Practices

Good housekeeping practices will also be applied to material handling operations. The facility will have paved roads and paved material handling areas to help suppress vehicular dusting. Speed limits will be posted for trucks and vehicles while on-site to prevent loose materials from becoming airborne during

transportation. Most of the processing will take place within buildings. Roadways and other surfaced areas will be periodically swept to remove dust.

The Raw Material Reject Collection Bin and Sieve Reject Collection Bin will comply with NSPS OOO emission limits through Visible Emissions (VE) monitoring. Compliance with NSPS OOO ensures good housekeeping practices have been applied for these two sources.

The most efficient and effective control of filterable PM, PM₁₀ and PM_{2.5} emissions for the material handling sources are a combination of partial enclosures and good housekeeping practices. No other control procedures are applicable.

Step 5 - Selection of BACT

A combination of partial enclosures along with good housekeeping practices will represent BACT for controlling fugitive PM, PM₁₀ and PM_{2.5} emissions from these fugitive sources. Roxul proposes compliance with NSPS Subpart OOO with no add-on controls as BACT for PM/PM₁₀/PM_{2.5} from the Raw Material Reject Collection Bin and Sieve Reject Collection Bin. Compliance will be demonstrated through recordkeeping and VE observations, as indicated in Attachment O.

D.2.2 *Vent Emissions from Material Delivery, Handling, Storage, and Transport Operations - Filterable PM, PM₁₀, and PM_{2.5}*

A BACT analysis is presented below for emissions from material handling vents associated with material handling, storage, and transfer. These activities include loading materials (e.g., coal, raw materials, or wool waste) into a hopper, transferring materials on conveyors, loading materials into silos, and performing crushing and sizing operations.

BACT Floor

Per 45 CSR 07, the facility shall not emit filterable PM into the open air from any process source operation greater than 20 percent opacity. Emission limits for each source are summarized in Attachment O.

The requirements of 40 CFR Part 60, Subpart OOO apply to certain storage silos, building vents, and conveyor transfer points. In accordance with this regulation, emissions from the building vents and storage bins must not exceed 7 percent opacity, while the conveyor transfer points must not exceed a PM emission rate of 0.014 gr/dscf.

Step 1 - Identify Potential Control Technologies

Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated PM/PM ₁₀ /PM _{2.5} Control Efficiency
Enclosed (or partially enclosed) conveyors and transfer stations	Varies
Water sprays or wet suppression	Varies
Fabric filter (baghouse or bin vent filter)	95-99+% (As low as 0.001 gr/dscf)
Good housekeeping practices	Varies

Control technologies for filterable PM/PM₁₀/PM_{2.5} are discussed earlier in Section D.2.1.

Step 2 – Eliminate Technically Infeasible Options

Water Sprays or Wet Suppression

Water sprays and wet suppression are not suitable for control of the raw material and coal transfer and conveying emissions because the systems for material handling, transfer, and storage are designed for dry materials. Wet materials may clog equipment and create additional wear. Water sprays and wet suppression are technically infeasible and will not be considered further.

Fabric Filter (Charging Material Handling Building Vents 1 & 2)

The emission concentrations of PM, PM₁₀, and PM_{2.5} from Charging Material Handling Building Vent 1 and Vent 2 are below the threshold at which fabric filters are considered technically feasible for PM reduction (0.001 gr PM/dscf). Therefore, fabric filters are eliminated from further consideration for these two vents.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Fabric filter and bin vent filter.
2. Enclosed conveyors and transfer stations.
3. Good housekeeping practices.

Step 4 – Evaluate Remaining Control Technologies

Fabric Filter or Bin Vent Filter

The most efficient and effective control devices for filterable PM/PM₁₀/PM_{2.5} emissions from material handling, storage, and transfer are fabric filters and bin vent filters. Fabric filters or bin vent filters will be used to reduce particulate emissions from point dust sources as shown in Attachment O. Baghouses or fabric filters will be implemented to control emissions from the loading hoppers, charging building vacuum cleaner, and conveyor transfer points because vents can be used to collect airborne material from indoor process areas and routed to a filter. Bin vent filters are used to control emissions from storage silos and feed tanks.

Recycle plant transfer and milling operations are conducted indoors. The building will be kept closed with a fast roller gate controlled by the movement of the front-end loader to minimize fugitive emissions. Emissions will be released indoors, which allows a majority of the particulate emissions to settle inside. The building is equipped with four vents (Recycle Building Vents), and each of these vents is equipped with a fabric filter to control emissions that do not settle within the Recycle Plant Building. A de-dusting baghouse will control dust generated from wool waste transfer, handling, and storage and dust generated by mechanical saws on the mineral wool line. A vacuum cleaning baghouse will be used to control dust from the packaging area.

Enclosed (or Partially Enclosed) Conveyors and Transfer Stations

Enclosed (or partially enclosed) conveyors and transfer stations will be used as appropriate, as well as using indoor conveyors, when possible.

Good Housekeeping Practices

Good housekeeping practices will also be applied to material handling and storage operations. Process and storage areas and other surfaced areas will be periodically swept to remove dust.

The top most effective controls (baghouses/fabric filters and bin vent filters) are proposed to be BACT.

Step 5 – Selection of BACT

Roxul proposes to use baghouses/fabric filters, and bin vent filters as BACT for controlling PM/PM₁₀/PM_{2.5} emissions from material delivery, handling, storage, and transport vents. Roxul proposes compliance with NSPS Subpart OOO with no add-on controls as BACT for PM/PM₁₀/PM_{2.5} from the Charging Material Handling Vents. Proposed control devices, BACT emission limits, and compliance demonstration methods are summarized in Attachment O for each emission source.

D.3 BACT DETERMINATION FOR MELTING FURNACE

This section evaluates BACT for the following sources as described in Section 2.1 of the application:

- Melting Furnace: IMF01.

D.3.1 Melting Furnace – Filterable PM, PM₁₀, PM_{2.5}, and Condensable PM (CPM)

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for PM/PM₁₀/PM_{2.5} established for

melting furnaces. The Melting Furnace is subject to regulation under federal and State rules, as identified in Section 4.0 of the permit application.

BACT Floor

The requirements of 40 CFR Part 63, Subpart DDD apply to owners or operators of mineral wool production facilities that are located at major sources of hazardous air pollutants (HAP) emissions. The Melting Furnace must, at a minimum comply with the applicable Mineral Wool MACT filterable PM emission limit of 0.05 kilogram per megagram (kg/Mg) of melt (0.10 pound per ton [lb/ton] of melt).

WVDEP air pollution control regulation Title 45 Code of State Regulations Series 6 (45 CSR 06) will apply to the Melting Furnace. The Melting Furnace must, at a minimum comply with the applicable emissions rate.

Step 1 – Identify Potential Control Technologies

Potentially applicable controls include fabric filters or baghouses, ceramic filters, wet scrubbers or Venturi scrubbers, dry electrostatic precipitators (ESPs), or wet electrostatic precipitators (WESPs). Other available control technologies for controlling PM emissions include high efficiency cyclones. Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated PM/PM ₁₀ /PM _{2.5} and CPM Control Efficiency ³
Fabric filter (baghouse)	95-99+% (As low as 0.001 gr/dscf)
Ceramic filter	95-99+% (As low as 0.001 gr/dscf)
Wet scrubber or high efficiency Venturi scrubber	70-99% (~0.01 gr/dscf)
ESP	95-99% (0.002 - 0.004 gr/dscf)
WESP	95-99% (0.002 - 0.004 gr/dscf)
High efficiency cyclone	80-99% for PM, 30-90% for PM ₁₀ , 0-40% for PM _{2.5} (>0.01 gr/dscf)

There are four primary types of particulate control systems⁴:

- *Fabric Filters*⁵ - This type of particulate control technology utilizes filters to remove dry particles from gas streams. Fabric filter filtration involves the use of reusable filter bags. Initially, dust is deposited on the surface and on the fibers within the fabric filter. Dust becomes the dominant filter medium as

³ Grain loadings are for filterable PM/PM₁₀/PM_{2.5} only. Limited data is available for the condensable portion, and not all particulate control devices effectively control CPM.

⁴ European Commission, Best Available Techniques (BAT) Reference Document for the Manufacture of Glass, Integrated Pollution Prevention and Control (IPPC) Industrial Emissions Directive 2010/75/EU, 2013.

⁵ Air Pollution Control Technology Fact Sheet: Fabric Filter Pulse-Jet Cleaned Type, EPA-452/F-03-025, Washington, D.C.: Clean Air Technology Center, July 2003.

the dust cake layer builds on the filter. The resistance to gas flow and pressure drop increase as the thickness of the dust cake layer increases until the gas can no longer easily pass through for filtration. Reusable filters can be cleaned by mechanically shaking, reversing the air flow, or pulsing the bags (i.e., fabric filter baghouses); filter bags must be replaced when they become loaded with PM to the point that the pressure drop across the filter bags reaches a specified level. The design efficiency of dry filtration typically ranges between 0.001 to 0.01 gr/dscf. Baghouse technology has been used extensively to control filterable PM/PM₁₀/PM_{2.5} emissions from melting furnaces achieving outlet concentrations below 0.01 gr/dscf. Baghouses are expected to be the most effective control device and the device most commonly used to limit filterable PM emissions.

- *Ceramic Filter*⁶ - When exhaust temperatures exceed the bag filter operating range, the filter must be bypassed or cooled by dilution to avoid burning bags. In certain applications, high-temperature filter media can substitute conventional filter media and are instead of a candle filter design. For example, the candles in the Tri-Mer systems are manufactured from a new generation of low-density ceramic fibers that give the candles an ability to capture fine particulates at the surface without blinding at significant elevated temperatures above what is possible with fabric bags. This control technology has been installed to control emissions from a variety of high temperature exhausts, such as glass furnace exhaust streams.
- *Wet Scrubbers*⁷ - This type of particulate control technology removes PM from a gas stream by capturing it in liquid droplets. Wet scrubbers are efficient for removing fine and sub micrometer particles. High efficiency Venturi scrubbers utilize a downdraft of air to push the particulates into contact with water droplets. The collection efficiency of a Venturi scrubber is highly dependent on pressure drop, the liquid-to-gas ratio, and chemical nature of wettability of the particulate. Efficiency improves with increased liquid-to-gas ratios, but at the expense of higher pressure drop and energy consumption. Venturi scrubbers must be followed by an entrainment collector for the liquid spray. The collectors are typically centrifugal and will have an additional pressure drop. Water scrubber systems are in use, but can be less effective for controlling PM/PM₁₀ emissions than baghouses.
- *ESP, WESP*^{8,9,10} - ESPs use an electrostatic field to charge particles contained in the gas stream. The charged particles migrate to a grounded collection

⁶ Tri-Mer Corporation "Catalytic Ceramic Filter Systems Air Pollution Treatment" Presented at the South Coast Air Quality Management District Symposium, June 2015. Available online at: <http://www.aqmd.gov/docs/default-source/Agendas/aqmp/control-strategy-symposium/pm2-5-moss.pdf?sfvrsn=2>

⁷ Air Pollution Control Technology Fact Sheet: Venturi Scrubber, EPA-452/F-03-017, Washington, D.C.: Clean Air Technology Center, July 2003

⁸ Air Pollution Control Technology Fact Sheet: Dry Electrostatic Precipitator (ESP) Wire -Pipe Type, EPA- 452/F-03-027, Washington, D.C.: Clean Air Technology Center, July 2003

⁹ Air Pollution Control Technology Fact Sheet: Wet Electrostatic Precipitator (ESP) Wire -Pipe Type, EPA-452 F-03-029, Washington, D.C.: Clean Air Technology Center, July 2003

surface where they are periodically dislodged by vibrating or rapping. The dust is collected in a hopper at the bottom of the ESP. With respect to PM_{2.5} emissions, dry ESPs have a lower overall efficiency than baghouses. Dry ESPs are not designed to collect wet or sticky PM, such as condensable particles. Condensable matter will clog the ESP, stay attached to the plates, and possibly short out the unit. However, WESPs can collect sticky particles and mists, as well as highly resistive or explosive dusts. The humid atmosphere that results from the continuous or intermittent washing in a wet ESP enables these units to collect high resistivity particles, absorb gases or cause pollutants to condense, and cool and condition the gas stream. Liquid particles or aerosols present in the gas stream are collected along with particles and provide another means of rinsing the collection electrodes.

- *Mechanical Collectors*¹¹ – This type of particulate control technology (such as a cyclone) is typically utilized to remove large particles (greater than 8 to 10 microns [µm] in aerodynamic diameter) through centrifugal and inertial forces induced by mechanically accelerating the particle-laden gas stream. This type of control is not effective in removing small particles – achieving approximately 30% control efficiency for PM₁₀. Therefore, it is not considered a “best” available control technology.

For the Melting Furnace operations, PM/PM₁₀/PM_{2.5} control technologies can be ranked in terms of effectiveness as follows: baghouse equivalent to ceramic filter; high efficiency Venturi scrubber; then ESP or WESP. Bagoes do have advantages compared to ceramic filters regarding operational cost (lower pressure drop, less costly exchange of filter media) and investment cost (filter media cost and possible length of bags compared to candles and heavy weight and footprint of filter) and are therefore expected to be the most effective control device and the device most commonly used to limit PM emissions.

Step 2 – Eliminate Technically Infeasible Options

High Efficiency Cyclone

No BACT determinations were found that include the use of mechanical collectors, so this type of control is considered to be technically infeasible for removing fine PM emissions. Mechanical collectors are used primarily for pretreatment control devices and are not considered a “best” available control technology; for these reasons, this control technology is eliminated from further consideration.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Fabric filter (baghouse).

¹⁰ Air Pollution Control Technology Fact Sheet: Wet Electrostatic Precipitator (ESP) Wire -Plate Type, EPA- 452/F-03-030, Washington, D.C.: Clean Air Technology Center, July 2003

¹¹ Air Pollution Control Technology Fact Sheet: Cyclones, EPA- 452/F-03-005, Washington, D.C.: Clean Air Technology Center, July 2003

2. Ceramic filter.
3. Wet scrubber or high efficiency Venturi scrubber.
4. WESP or ESP.

Step 4 – Evaluate Remaining Control Technologies

BACT Limit Overview

According to the RBLC search results, the most stringent limits for cupola filterable particulate emissions are achieved by using baghouses as the add-on control technology. RBLC search results for PM/PM₁₀/PM_{2.5} BACT emission limits for iron cupolas, glass melting furnaces, and fiberglass melting furnaces indicate that the concentration established as BACT ranged from 0.005 gr PM₁₀/dscf to 0.007 gr/dscf, while the BACT emission rate ranged from 0.07 lb PM₁₀/ton to 1.87 lb/ton for similar emission source categories. These limits are for the PM/PM₁₀ filterable portion and do not include condensable particulate. BACT emission limits in terms of lb/hr are preferred because the effluent concentration from a baghouse is nearly constant.

Fabric Filter (Baghouse)

A baghouse is the top ranked control technology for PM/PM₁₀/PM_{2.5} control. Flue gas from the melting furnace will be directed to a baghouse to collect raw material fines. A second baghouse in series is used for control of emissions of filterable PM/PM₁₀/PM_{2.5}. Since baghouses do not effectively control CPM, additional control of PM/PM₁₀/PM_{2.5}, primarily comprised of CPM, will be considered for use after dry filtration.

Ceramic Filter

Ceramic filter systems are utilized primarily in the glass industry for hot gas solutions and can achieve control efficiencies as high as a traditional fabric filter systems. High temperature filters are no longer used for abating emissions from stone wool cupolas due to high costs and permanent plant shut downs.¹² Compared to traditional filter systems, a ceramic filtration system is much heavier, which would require careful engineering and additional load bearing support for the additional weight. Generally, these systems are much larger than a traditional bag filter system. The ceramic filter system pressure drop is also much greater than a traditional filter system, which corresponds to considerably higher energy demands for the ceramic filter system. Hot gas solutions are not required to control emissions from the Melting Furnace exhaust; therefore, ceramic filtration is eliminated due to negative energy/environmental impacts compared to a traditional baghouse.

¹² European Commission, BAT Reference Document for the Manufacture of Glass, Integrated Pollution Prevention and Control (IPPC) Industrial Emissions Directive 2010/75/EU, 2013.

Wet Scrubber or High Efficiency Venturi Scrubber

High gas velocities and turbulence in the Venturi scrubber result in high collection efficiencies ranging from 70% to 99% for particles larger than 1 μm and at least 50% for sub-micron particles. These control efficiency ranges are based on an inlet pollutant loading range of 0.1 to 50 grains per standard cubic foot (gr/scf) and will be considerably lower based on the PM/PM₁₀/PM_{2.5} concentration in the Melting Furnace exhaust after initial dry filtration. To achieve high filtration efficiencies, Venturi scrubbers require large pressure drops, which in turn, increase energy consumption and operating costs. A majority of the CPM compounds will be sub-micron particles. A 50% control efficiency is a conservative control estimate for Venturi scrubber control based on the expected particle size and pollutant inlet loading; however, for economic analysis purposes, a 90% control efficiency was applied. A cost-effectiveness calculation for installing a Venturi scrubber to control PM/PM₁₀/PM_{2.5} from the Melting Furnace exhaust indicates that this technology is not cost-effective. Not only are wet scrubbers less effective on smaller particulate sizes, but these systems also generate waste in the form of a slurry or wet sludge, creating the need for both wastewater treatment and solid waste disposal. Although the facility will not have wastewater treatment on site, additional wastewater treatment costs were not accounted for in the economic analysis and it was assumed that wastewater could be discharged to the sewer. The cost per ton of pollutant removed is at least \$13,739 for PM/PM₁₀/PM_{2.5} as shown in Appendix D-1. A Venturi scrubber is not cost effective and has been eliminated from further consideration.

WESP

The cost per ton of pollutant removed by WESP is at least \$27,378 for PM/PM₁₀/PM_{2.5} as shown in Appendix D-1. Thus, a WESP is not economically viable for reducing the PM/PM₁₀/PM_{2.5} in the Melting Furnace exhaust after initial dry filtration.

The emissions from the Melting Furnace will be controlled using a baghouse to collect the filterable particulate. This is the most effective remaining control technology for controlling filterable particulate emissions from the Melting Furnace. BACT emission limits are proposed in units of pounds per hour (lb/hr) because the emissions from the baghouse are directly related to the nearly constant concentration.

Step 5 – Selection of BACT

Roxul proposes to use a baghouse as BACT to control PM/PM₁₀/PM_{2.5} from the Melting Furnace and meet an emission limit of 2.32 lb PM_{filt}/hr (1.05 kg PM_{filt}/hr), 8.22 lb PM₁₀/hr (3.73 kg PM₁₀/hr), and 7.47 lb PM_{2.5}/hr (3.39 kg PM_{2.5}/hr). Attachment O contains a summary of proposed compliance demonstration methods.

D.3.2 *Melting Furnace – CO, VOC*

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for CO and VOCs established for melting furnaces. The Melting Furnace is subject to regulation under federal and State rules, as identified in Section 4.0 of the application.

BACT Floor

The requirements of 40 CFR Part 63, Subpart DDD apply to owners or operators of mineral wool production facilities that are located at major sources of HAP emissions. The Melting Furnace must, at a minimum comply with the applicable Mineral Wool MACT carbonyl sulfide (COS) (a VOC) emission limit of 3.2 lb/ton of melt for open-top cupolas.

Step 1 – Identify Potential Control Technologies

Potentially applicable controls include afterburners, regenerative incineration, and recuperative incineration. Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated CO/VOC Control Efficiency
Thermal oxidizer (afterburner)	98-99+ %
Recuperative thermal oxidizer	98-99+ %
Regenerative thermal oxidizer	95-99%
Catalytic oxidizer	90-99%
Adsorber (Carbon Filtration)	95-98%
Wet Scrubber	70-99+ % (Packed Tower) 50-95% (Spray Tower)
Condenser	50-90%
Good combustion practices	Varies

CO is formed through the incomplete oxidation of organic material to carbon dioxide (CO₂). CO₂ arises from the combustion of fuel, from the decomposition of carbonates, and from the oxidation of other carbon-containing raw materials. Factors that may lead to the formation of CO include inadequate air flow rates, inadequate mixing of air and fuel, and improper temperatures in combustion zones. Melting conditions will affect the constituents present in the melting exhaust.

The melt process in the Melting Furnace is an oxidizing process, which operates with an excess of oxygen. In other words, the furnace is designed to operate with more oxygen (O₂) than required for complete combustion of fuel to occur, which allows for the maximum conversion of organic pollutants to CO₂. Roxul will be required to monitor the quantity of O₂, air, and fuel introduced to the Melting Furnace in order to determine the percent excess oxygen, which is used as an indicator for compliance with the Mineral Wool MACT.

CO emission control beyond inherent control achieved by the oxidizing furnace design can be achieved by:

- *Good Combustion Practices* - Good combustion practices, such as operating logs and recordkeeping, training, maintenance knowledge, routine and preventive maintenance, burner and control adjustments, monitoring fuel quality, etc., to maintain proper operating conditions; or
- *Add-on Controls (that will facilitate the further oxidation of CO to CO₂)* - In situations where CO is generated by process activities (such as chemical reactions) or where combustion equipment design modifications are inadequate to achieve the desired level of control, add-on controls may be necessary to limit CO emissions. Add-on control equipment for CO includes thermal or catalytic oxidation techniques to convert CO to CO₂. The choice of controls is based upon several factors, including the degree of control desired, the concentration of CO in the air stream, and other physical characteristics of the air stream (including the presence of other pollutants).

VOCs will be present in the Melting Furnace exhaust due to the volatilization of organic compounds during the melting process, including re-melting of wool with binder. There are two basic categories of controls for VOCs: destruction processes; and reclamation processes. Destruction technologies reduce the VOC concentration by high temperature oxidation into CO₂ and water vapor. Reclamation is the capture of VOCs for reuse or disposal.

The destruction of organic compounds usually requires temperatures ranging from 1,200°F to 2,200°F (649°C to 1,204°C) for direct thermal oxidizers or 600°F to 1,250°F (316°C to 677°C) for catalytic systems. Combustion temperature depends on the chemical composition and the desired destruction efficiency. CO₂ and water vapor are the typical products of complete combustion. Turbulent mixing and combustion chamber retention times of 0.75 seconds or greater are needed to obtain high destruction efficiencies.

Combustion or oxidation is the most efficient method of destroying VOCs, typically designed to achieve at least 98% control efficiency. However, high control efficiencies may not be achievable in gas flows with low VOC concentrations. As a result, the cost of combustion may be limiting for high gas flows with low VOC concentrations. Combustion control technologies include thermal oxidation, recuperative thermal oxidation, regenerative thermal oxidation, and catalytic oxidation.

- *Thermal Oxidizer or Afterburner*¹³ - A thermal oxidizer is a large vessel with a burner where fuel, gaseous waste, and air are introduced and combined to achieve the required destruction removal efficiency (DRE). The mixture must be (1) exposed to a sufficiently high temperature, (2) for an adequate time

¹³ Air Pollution Control Technology Fact Sheet: Thermal Incinerator, EPA-452/F-03-022, Washington, D.C.: Clean Air Technology Center, July 2003.

period, (3) in a relatively turbulent environment to enable the chemical reactions to reach the degree of completion needed to achieve the DRE.

- *Recuperative or Regenerative Thermal Oxidizers*^{14, 15} – Recuperative and regenerative thermal oxidizers (RTOs) are two types of oxidizers that are widely applied to the control of VOCs. Both include some form of internal heat recovery, designed to reduce the operating cost of the system related to the consumption of a fuel source (typically natural gas) to raise the incoming gas temperature up to a combustion temperature within the burner zone as necessary to achieve the desired DRE. It is possible that a recuperative unit can achieve up to 99% DRE, depending on the gaseous inlet VOC concentration. RTOs have the ability to achieve an efficiency of 95%, and a DRE of up to 99%, again depending on the VOC inlet concentration. The normal operating temperature for an RTO in the combustion zone is between 1,400°F to 1,600°F (760°C to 871°C).
- *Catalytic Oxidizers* – Catalytic oxidation systems are also used to reduce VOC and organic HAP emissions. As the exhaust gas contacts the catalyst, the catalyst promotes the oxidation of CO and VOC compounds to form CO₂ and water. For a catalytic oxidation system to operate correctly, the exhaust gas must contain excess O₂ and must be within a particular temperature range depending on the type of catalyst material used. Exhaust gas temperatures that are too high may cause permanent damage to the catalyst, while operating temperatures that are too low result in lower pollutant conversion efficiency. Catalysts are typically made from a precious metal such as platinum, palladium, or rhodium. The typical VOC removal efficiency of a catalytic oxidation system is 90% or greater.

Organic compounds may be reclaimed by one of three possible methods: adsorption; absorption (scrubbing); or condensation. In general, the organic compounds are separated from the emission stream and reclaimed for reuse or disposal. Depending on the nature of the contaminant and the inlet concentration of the emission stream, recovery technologies can reach efficiencies of at least 98% for VOCs, but these technologies are not efficient for control of CO emissions.

- *Adsorption Systems*¹⁶ – Adsorption is a surface phenomenon where attraction between an adsorbent, such as activated carbon, and the adsorbate, such as VOC molecules, binds the pollutants to the carbon surface. Both the carbon and VOC are chemically intact after adsorption. The VOCs may be removed, or desorbed, from the carbon and reclaimed or destroyed.

¹⁴ Air Pollution Control Technology Fact Sheet: Incinerator – Recuperative Type, EPA-452/F-03-020, Washington, D.C.: Clean Air Technology Center, July 2003.

¹⁵ Air Pollution Control Technology Fact Sheet: Regenerative Incinerator, EPA-452/F-03-021, Washington, D.C.: Clean Air Technology Center, July 2003.

¹⁶ *Technical Bulletin: Choosing an Adsorption System for VOC: Carbon, Zeolite, or Polymers*, EPA 456/F-99-004, Research Triangle Park, NC: Office of Air Quality Planning and Standards, May 1999.

- *Absorption Systems* – Absorption is a unit operation where components of a gas phase mixture (pollutants) are selectively transferred to a relatively nonvolatile liquid, usually water.
- *Condensation Systems*¹⁷ – Condensation is the separation of VOCs from an emission stream through a phase change, by either increasing the system pressure or, more commonly, lowering the system temperature below the dew point of the VOC vapor. When condensers are used for air pollution control, they usually operate at the pressure of the emission stream, and typically require a refrigeration unit to obtain the temperature necessary to condense the VOCs from the emission stream.

Afterburners are expected to be the most effective control device and the device most commonly used to limit CO and VOC emissions from melting operations. RTOs are expected to be the second most effective control device.

Step 2 – Eliminate Technically Infeasible Options

Catalytic Oxidizer

Exhaust gas streams that contain impurities (particulates) will likely cause fouling of the catalyst, so use of a catalytic oxidizer on the Melting Furnace exhaust is technically infeasible.

Adsorber (Carbon Filtration), Wet Scrubber, and Condenser

Reclamation technologies are not technically feasible for the control of CO emissions. Further, adsorption and absorption systems are not considered technically feasible to control VOC emissions if there is a high amount of PM in the exhaust stream. Condensation systems are not technically feasible because this type of system requires a high VOC concentration in the exhaust stream to achieve appropriate control efficiencies. No examples of adsorption, absorption, or condensation add-on control systems were found in the RBLC for CO and VOC emissions from melting furnaces.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Afterburner/thermal oxidizer.
2. Recuperative thermal oxidizer.
3. Regenerative thermal oxidizer.
4. Good combustion practices.

Step 4 – Evaluate Remaining Control Technologies

BACT Limit Overview

¹⁷ *Technical Bulletin: Refrigerated Condensers for Control of Organic Air Emissions*, EPA-456/R-01-004, Research Triangle Park, NC: Office of Air Quality Planning and Standards, December 2001.

CO and VOC emissions are higher from traditional stone wool cupolas¹⁸ than from glass melting furnaces, so the typical CO and VOC emission range found in the RBLC is misleading for melting furnaces due to process differences. The Roxul facility in Byhalia, Mississippi complies with a CO BACT emission limit of 13.29 lb/hr (6.03 kg/hr) on a 30-day rolling average basis. No examples of add on control technologies were found in the RBLC review for glass melting furnaces, fiberglass melting furnaces, or mineral wool melting furnaces. Thermal oxidizers and RTOs were selected as BACT for iron cupolas and gray iron melting.

Afterburner, Regenerative Thermal Oxidizer, and Recuperative Thermal Oxidizer

Cost effectiveness results are evaluated (on a top down basis) for thermal oxidation, recuperative incineration, and regenerative thermal oxidation. A cost effectiveness calculation for installing thermal oxidizer for VOC and CO control on the Melting Furnace indicates that this technology is not cost effective. The cost per ton of VOC removed is \$20,743, and cost per ton of CO removed is \$21,664, as shown in Appendix D-1. Similarly, a recuperative thermal oxidizer and an RTO are not cost effective. The cost per ton of VOC removed is \$13,240 and cost per ton of CO removed is \$13,776, as shown in Appendix D-1.

Good Combustion Practices.

The base case, good combustion practices, is the last remaining control option for VOC and CO reduction. Good combustion practices do not have any adverse economic or environmental impacts. Good combustion practices include, but are not limited to the following:

- Proper combustion tuning, temperature, and air/fuel mixing;
- Documentation of good combustion practices including:
 - Specifications for temperature and air/fuel mixing obtained through empiric knowledge, Continuous Emission Monitoring (CEM) system data, operational experience, etc.;
 - Criteria for monitoring, inspecting, preventative maintenance, and training; and

¹⁸ European Commission, BAT Reference Document for the Manufacture of Glass, Integrated Pollution Prevention and Control (IPPC) Industrial Emissions Directive 2010/75/EU, 2013.

- Recommended frequency and dates for all scheduled maintenance related activities.

Potential VOC emissions are primarily based on the MACT COS limit (lb/ton melt); therefore a separate short-term limit is not necessary for BACT.

Step 5 - Selection of BACT

Roxul proposes to maintain an oxidizing atmosphere as BACT to control both CO and VOC from the Melting Furnace. The CO emissions limit from the Melting Furnace is proposed to be 11.21 lb/hr (5.09 kg/hr) based on a 30-day rolling average (based on a CEM for CO). VOC emissions will be limited to 51.08 tpy (46.34 metric ton [tonne]/yr). Proposed compliance demonstration methods are summarized in Attachment O.

D.3.3

Melting Furnace - SO₂, H₂SO₄ Mist

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for SO₂ and acid gases established for melting furnaces. Sulfur from coal and furnace slag in the batch are sources of SO₂ and sulfur compounds. Slag is a material that has the potential to be landfilled if not otherwise utilized; furthermore, it replaces the need for natural stone and quarried materials.

Step 1 - Identify Potential Control Technologies

Potential controls include wet scrubbers or Venturi scrubbers and sorbent injection systems with upstream filtration. These types of controls are effective for reducing SO₂ emissions, as well as for reducing emissions of acid gases (such as sulfuric, hydrochloric, and hydrofluoric acid). Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated SO ₂ , H ₂ SO ₄ Mist Control Efficiency
Wet scrubber	90-95%
Sorbent Injection System (with Upstream Filter)	Up to 95%

In general, flue gas desulfurization (FGD) systems remove SO₂ from exhaust streams by using an alkaline reagent to form sulfite and sulfate salts by either a wet or dry contact system. Control technologies for SO₂ and acid gases include the following types of FGD controls:

- *Wet Scrubber*¹⁹ – In a wet scrubber, the gas stream is brought into contact with a scrubbing liquid, typically by spraying the liquid in a contacting tower. Depending upon the removal efficiency and scrubbing reagent, the contacting device can be a Venturi, spray tower, packed tower, or other device that provides excellent gas-liquid contact. FGD wet scrubbers typically employ sodium, calcium, or dual-alkali reagents using packed or spray towers. The required excess of reactant in the solution to achieve high acid gas dissolution rates is small. The reaction rate is mainly determined by the absorption of gas by the liquid. Wet FGD systems generate wastewater and wet sludge streams requiring treatment and disposal. Wet scrubber system disadvantages include waste treatment and higher energy consumption.
- Sorbent Injection System (with Upstream Filter) – A fabric filter (or baghouse) is one of the most efficient means of separating particulates from a gas stream. The advantage of fabric filters is that efficiency is largely insensitive to the physical characteristics of the gas stream and changes in the dust loading. Baghouse installations are an industry standard for particulate controls and can also be used with alkali salts to remove acid gases. A reagent is injected into the flue gas stream to remove acid gases by surface reactions. In order to reduce the sorbent requirements, these systems typically recycle most of the baghouse collection into the feed system to promote better sorbent utilization. Furthermore, filter cake on the fabric due to deposited absorption reagent, can improve the absorption of acid gases.

Step 2 – Eliminate Technically Infeasible Options

Each identified control technology is technically feasible.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Wet scrubber; Sorbent Injection System with Upstream Filter.

Step 4 – Evaluate Remaining Control Technologies

BACT Limit Overview

RBLC search results for SO₂ BACT emission limits for iron cupolas, glass melting furnaces, and fiberglass melting furnaces indicate that the concentration established as BACT ranges from 0.22 lb SO₂/ton to 2.02 lb SO₂/ton for similar emission source categories. The most stringent limits are achieved by using dry sorbent injection technology. For example, the gray iron cupola at Waupaca Foundry, Inc. in Tennessee complies with the most stringent BACT limit of 0.22 lb SO₂/ton through the use of dry injection scrubbing systems located upstream of a pulse-jet fabric filter baghouse control system. No examples of BACT limits

¹⁹ Air Pollution Control Technology Fact Sheet: Flue Gas Desulfurization (FGD) – Wet, Spray Dry, and Dry Scrubbers, EPA- 452/F-03-034, Washington, D.C.: Clean Air Technology Center, July 2003

for a mineral wool facility were included in the RBLC search results; however, the mineral wool melting furnace at Roxul’s plant in Byhalia, Mississippi is limited to a BACT emission rate of 78.77 lb SO₂/hr (35.73 kg/hr) based on a 30-day rolling average.

Wet Scrubber; Sorbent Injection System (with Upstream Filter)

Both wet scrubbers and sorbent injection systems (with upstream filters), can achieve up to 95% control. Adverse environmental and energy impacts must be considered. A wet scrubber will result in a liquid or slurry waste stream, which would require solid and wet waste disposal, as well as wastewater treatment prior to discharge from the facility. No wastewater treatment will be conducted at the facility, and piping, pumping, storage, and disposal of a liquid or slurry waste product would have significant costs. A baghouse with sorbent injection can capture salts that are formed when gaseous acids react with sorbent. Because of process and site conditions, a dry waste is easier to treat and dispose of than wet. Upstream filtration (such as the second baghouse at Roxul) would offer an additional environmental benefit of filterable PM/PM₁₀/PM_{2.5} control. A wet scrubber would have energy demands to meet the same level of additional control. Therefore, Roxul proposes to use a sorbent injection system (with upstream filter) to treat the Melting Furnace gases.

Step 5 – Selection of BACT

Roxul proposes to use a sorbent injection system as BACT to control SO₂ and acid gas emissions from the Melting Furnace. The SO₂ BACT emissions limit from the Melting Furnace is proposed to be 33.63 lb/hr (15.26 kg/hr) based on a 30-day rolling average (based on a CEM for SO₂). The H₂SO₄ mist BACT emissions limit from the Melting Furnace is proposed to be 3.74 lb/hr (1.70 kg/hr). Proposed compliance demonstration methods are summarized in Attachment O.

D.3.4 Melting Furnace – NO_x

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for NO_x established for melting furnaces.

Step 1 – Identify Potential Control Technologies

Potentially applicable controls include oxy-fuel fired burners and combustion control. Other available control technologies for controlling NO_x emissions include selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR). Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated NO _x Control Efficiency
SCR	70%-95%
Ceramic catalytic filter	60% - 90% or higher, depending on

Control Type	Estimated NO _x Control Efficiency
	temperature
SNCR	40%-75%
Oxy-fuel fired burners	70%-85%
Good combustion practices	Varies

NO_x emissions from melting activities arise primarily from three sources: nitrates in raw materials, fuel NO_x and thermal NO_x. The fourth source, prompt NO_x, is relatively insignificant. Thermal NO_x is the most significant contributor to NO_x emissions and can be reduced if fuel consumption is reduced. Therefore, techniques that improve energy efficiency generally result in lower overall NO_x emissions on a lb/ton basis. NO_x controls can be classified into two types: post-combustion methods; and combustion control techniques. Post-combustion control methods include SCR, catalytic filters (baghouses), and SNCR.

- SCR^{20,21} - SCR involves the injection of ammonia or urea in conjunction with a metal oxide catalyst into the flue gases. The optimum operating temperature of this technology is between 600 to 900 °F. Typical long-term removal efficiencies are maintained between 70% and 80%, although the systems are normally designed to achieve between 75% to 95% reduction.
- *Ceramic Catalytic Filter* - Ceramic filters can be manufactured with filter walls that have nanobits of highly-efficient SCR catalyst for NO_x control (such as Tri-Mer Corporation's UltraCat Catalyst filters).
- SNCR^{22,23} - SNCR utilizes similar techniques as SCR where chemical additions of ammonia or urea are exposed to hot combustion gases. However, the reactions take place at higher temperatures without the presence of a catalyst. This methodology has been demonstrated in systems with operating temperatures between 1,600°F and 2,100°F, with the optimum temperature around 1750°F to 1850°F. NO_x reductions in the range of 40% to 70% are commonly quoted for SNCR, although figures above 80% have been reported in other industries. In a well-controlled process where optimum conditions can be achieved, reductions of 50% to 75% are possible.

Combustion control techniques include: burner modifications; flue gas recirculation (FGR) low excess air firing; or low nitrogen (N₂) fuel (if applicable and available). The following examples of control techniques are applicable to the Melting Furnace.

²⁰ Air Pollution Control Technology Fact Sheet: Selective Catalytic Reduction (SCR), EPA- 452/F-03-032, Washington, D.C.: Clean Air Technology Center, July 2003

²¹ *Best Available Techniques Reference Document for the Manufacture of Glass*, Section 4.4.2.7 Selective Catalytic Reduction, Industrial Emissions Directive 2010/75/EU, European Commission JRC Reference Report, 2013.

²² Air Pollution Control Technology Fact Sheet: Selective Non-Catalytic Reduction (SNCR), EPA-452/F-03-031, Washington, D.C.: Clean Air Technology Center, July 2003

²³ *Best Available Techniques Reference Document for the Manufacture of Glass*, Section 4.4.2.8 Selective Non-Catalytic Reduction, Industrial Emissions Directive 2010/75/EU, European Commission JRC Reference Report, 2013.

- *Oxy-fuel Burners*²⁴ –An approach to increasing combustion efficiency is to fire specially designed burners with O₂ instead of air. The conversion to O₂ firing instead of air firing reduces NO_x emissions by eliminating some of the N₂ in combustion air. In addition, when small amounts of combustion air are replaced with O₂, a significant increase in flame temperature can be realized and an intense flame is produced. An example of this is a cyclone burner where the flame is short and intense. Excess fuel air or steam, injected just after the combustion chamber, is sufficient to rapidly quench the flue gas to temperatures below the NO_x formation temperature range. Combustion can then be completed in over fire air. (This technique also is used with low-NO_x burners to prevent the formation of prompt NO_x.)
- *Good Combustion Practices* – Good combustion practices, such as operating logs and recordkeeping, training, maintenance knowledge, routine and preventive maintenance, burner and control adjustments, monitoring fuel quality, etc. help maintain proper equipment operation.

Step 2 – Eliminate Technically Infeasible Options

Ceramic Catalytic Filter

Conventional ceramic filters for PM control can withstand operating temperatures up to 1650°F (899°C). However, when NO_x removal capabilities are required as part of the ceramic filter capability, the acceptable maximum temperature decreases significantly due to risks of sintering for the catalyst. Tri-Mer defines a temperature range for PM+NO_x removal from 350°F to 950°F (177°C to 510°C), with limitations of operating temperatures for high NO_x reduction between 350°F to 750°F (177°C to 399°C). This is in line with specifications of other vendors of de-NO_x catalytic ceramic candles available on the market, like TopFrax™ from Haldor Topsoe which treats industrial high-temperature off gases for de-NO_x purposes up to 750°F (399°C). Potential locations for the installation and operation of a ceramic catalytic filter are evaluated below.

The temperature range up-stream of the Melting Furnace heat recovery system is 900°F to 1075°F (482°C to 579°C), with temperature peaks up to 1300°F (704°C). This location is not compatible with an installation of a catalytic ceramic filter for de-NO_x control because the operating temperature is too high for the catalytic ceramic candles.

There will be a significant risk over time that the catalyst will deactivate by ammoniumbisulfate salts (ABS) if a catalytic ceramic filter is installed downstream of the Melting Furnace heat recovery system. Risk of ABS formation is due to unwanted oxidation of SO₂ from the Melting Furnace flue gasses to sulfur trioxide (SO₃) over the catalyst and unreacted ammonia (NH₃). The

²⁴ *Technical Bulletin: Refrigerated Condensers for Control of Organic Air Emissions*, EPA-456/F-99-006R, Research Triangle Park, NC: Office of Air Quality Planning and Standards, November 1999.

oxidation rate of SO₂ to SO₃ is low at low temperatures (below 1%); however, ABS catalytic deactivation is well known from other industries (e.g., power plants and waste incinerators) and widely documented in the literature for deactivation of SCR catalysts. ABS has the potential to cause major clogging problems on the catalyst surface due to its small and sticky particle formation.²⁵ At a location downstream of the desulfurization system, the ABS risk is significantly decreased. However, due to the operating temperature of 265°F (129°C), the temperature is too low for the catalyst to be active.

SCR

A conventional clean gas tail-end SCR installation would require excessive energy due to re-heating the flue gases from the operating temperature of 265°F to the required SCR operating temperature of 600°F to 900°F. Installing de-NO_x equipment as a clean tail-end technology would not require dust removal and would be a conventional SCR solution.

As a result of the temperature barriers discussed, neither a ceramic catalytic filter nor a conventional clean gas tail-end SCR installation is technically feasible. Both controls are eliminated from further consideration.

Step 3 – Rank Remaining Technically Feasible Control Options

1. SNCR.
2. Oxy-fuel burners.
3. Good combustion practices.

Step 4 – Evaluate Remaining Control Technologies

BACT Limit Overview

RBLC search results for NO_x BACT emission limits for iron cupolas, glass melting furnaces, and fiberglass melting furnaces indicate that the emission rates established as BACT ranged from 7.09 lb NO_x/hr to 48.61 lb NO_x/hr and from 0.44 lb NO_x/ton to 13.56 lb NO_x/ton for similar emission source categories. These BACT emission rates are achieved through the use of low NO_x burners (LNB) and good engineering practices. No other examples of control technologies were found in the RBLC review for similar emission source categories.

SNCR

An SNCR will be integrated into the Melting Furnace design and is proposed as BACT for the Melting Furnace. Because the top remaining control is proposed to be BACT, a cost effectiveness calculation is not required. The negative

²⁵ Gutberlet, Licata, and Schluter. "Deactivation of SCR Catalyst." Available online at: <https://www.netl.doe.gov/publications/proceedings/00/scr00/LICATA.PDF>

environmental impacts related to the SNCR include ammonia emissions. Safety measures are required to prevent ammonia leakage and exposure to fugitive ammonia emissions during storage operations and before injection into the flue gas stream. These safety and environmental issues are the same for each of the identified add-on control technologies and do not present enough risk to prohibit the implementation of an add-on control device. Emissions from un-reacted ammonia and slip will be reduced by ensuring proper integrated SNCR design.

Oxy-Fuel Burners

Oxy-fuel burners will also be used in the Melting Furnace because they are technically feasible and will result in energy savings.

The most efficient and effective control of NO_x emissions for the Melting Furnace is a combination of SNCR and oxy-fuel burners.

Step 5 – Selection of BACT

Roxul proposes to use the Melting Furnace integrated SNCR and oxy-fuel burners to control NO_x emissions from the Melting Furnace. The BACT emission limit is proposed to be 37.37 lb/hr (16.95 kg/hr) based on a 30-day rolling average (based on a CEM for NO_x). Proposed compliance demonstration methods are summarized in Attachment O.

D.4 BACT DETERMINATION FOR THE GUTTER, SPINNING CHAMBER, CURING OVEN, CURING OVEN HOODS, AND COOLING ZONE

This section evaluates BACT for the Gutter Exhaust, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Zone (HE01) as described in Section 2.1 of the application. These emission units will be combined prior to exhausting to the atmosphere and comprise emission point HE01.

D.4.1 Gutter, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Zone- Filterable PM, PM₁₀, PM_{2.5}, and CPM

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for filterable PM/PM₁₀/PM_{2.5} and CPM established for the gutter exhaust, spinning chamber, curing oven, curing oven hoods, and cooling zone.

BACT Floor

Per 45 CSR 6-4.3, opacity of emissions from the curing oven afterburner shall not exceed 20 percent, except as provided by 45 CSR 6-4.4. At a minimum, PM emissions from this unit cannot exceed the levels calculated in accordance with 6-4.1.

Step 1 – Identify Potential Control Technologies

Controls include fabric filters, wet scrubbers, WESPs, and stone wool filters. Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated PM/PM ₁₀ /PM _{2.5} Control Efficiency
Fabric filter (baghouse)	95-99+% (As low as 0.001 gr/dscf)
Wet scrubber (packed bed) or high efficiency Venturi scrubber	70-99% (<0.01 gr/dscf)
WESP	>98% (0.004 - 0.01 gr/dscf)
Stone Wool Filters	>95% (<0.01 gr/dscf)

Control technologies for filterable PM/PM₁₀/PM_{2.5} and CPM are discussed earlier in Section D.3.1.

- Stone Wool Filters* - When traditional fabric filters are unsuitable for treating waste gases due to adhesive and moist waste gas, stone wool filters can be employed. Stone wool filters can be used to control emissions of PM and binder droplets (as CPM) with effective removal efficiency, but have low removal efficiency for gaseous components. This type of filter needs to be replaced periodically in order to maintain good removal efficiency and to prevent increased resistance to airflow. Used filter media can usually be recycled to the furnace. The operation can be semi-dry; however, overall efficiency is improved if the operation is dry.

Step 2 - Eliminate Technically Infeasible Options

Fabric Filter (Baghouses)

Conventional fabric filter (baghouses) are unsuitable for controlling the waste gases from the Gutter Exhaust, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Zone because of the damp and adhesive nature of the exhaust, which would lead to rapid blinding.

Step 3 - Rank Remaining Technically Feasible Control Options

1. WESP.
2. Wet Scrubber (Packed Bed or Venturi).
3. Stone Wool Filters.

Step 4 - Evaluate Remaining Control Technologies

BACT Limit Overview

RBLC search results for PM/PM₁₀/PM_{2.5} BACT emission limits for natural gas fired curing ovens indicate that the emission rate established as BACT ranges from 0.03 lb PM₁₀/hr to 2.02 lb PM₁₀/hr for similar emission source categories

with no add-on controls. One example of add-on controls appeared in the RBLC search results for the Owens Corning facility in Crisp County, Georgia. At this facility, the bonded line cooling section and curing oven are controlled with low pressure drop scrubbers and a cyclone separator. The BACT emission limits are 7.84 lb PM/ton from bonded line forming and curing and 0.95 lb PM/ton for bonded line cooling.

WESP

CPM emissions make up the major portion of the pollutants from the Gutter Exhaust, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Zone. A wet scrubber or a WESP will control filterable and CPM emissions. A WESP is the most effective remaining control technology and is selected as BACT for removal of PM/PM₁₀/PM_{2.5}, including droplets and aerosols. Process water will consist of collected storm water from outside areas and supplemental water from the public water supply. Adverse environmental impacts are minimized because WESPs have relatively low pressure drop requirements and relatively low energy usage requirements. WESPs generally have long operating lives with low maintenance requirements.

Step 5 - Selection of BACT

Roxul proposes to use a WESP as BACT to control PM/PM₁₀/PM_{2.5} and CPM emissions from the Gutter, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Zone. Roxul is proposing BACT emission limits of 21.21 lb PM_{fil}/hr (9.62 kg PM_{fil}/hr), 21.21 lb PM₁₀/hr (9.62 kg PM₁₀/hr), and 19.22 lb PM_{2.5}/hr (8.72 kg PM_{2.5}/hr). Compliance will be demonstrated based on initial performance testing, as shown in Attachment O.

D.4.2

Gutter, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Zone - CO, VOC

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for CO and VOCs established for the gutter exhaust, spinning chamber, curing oven, curing oven hoods, and cooling zone. Note that not all of the sources that comprise emission point HE01 are sources of CO, but each source is listed for ease of discussion as it relates to both VOC and CO.

BACT Floor

The requirements of 40 CFR Part 63, Subpart DDD apply to owners or operators of mineral wool production facilities that are located at major sources of HAP emissions. The combined collection/curing operations must, at a minimum comply with the applicable Mineral Wool MACT emission limit of 2.4 lb formaldehyde/ton of melt, 0.71 lb phenol/ton of melt, and 0.92 lb methanol/ton of melt.

The requirements of 40 CFR Part 63, Subpart JJJJ apply to each new and existing facility that is a major source of HAP, at which web coating lines are operated. The Curing Oven is included in the web coating (Fleece Application) line. The Fleece Application line (including the Curing Oven) must, at a minimum comply with the applicable organic HAP emissions limits. Roxul will comply with NESHAP JJJJ through the use of compliant coatings without additional controls for organic HAP or VOC reduction. Proposed BACT emissions limits include emissions from compliant coatings. Refer to Section D.5.1 for additional discussion for Fleece Application.

Step 1 – Identify Potential Control Technologies

Thermal oxidation is generally used to control organic compounds from curing ovens. No add-on control devices were identified in this review for spinning or cooling; however, typical controls would include afterburners, recuperative incineration, and RTOs. Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated CO/VOC Control Efficiency
Thermal oxidizer	98-99+%
Recuperative thermal oxidizer	98-99+%
Regenerative thermal oxidizer	95-99%
Catalytic oxidizer	90-99%
Adsorber (Carbon Filtration)	95-98%
Wet Scrubber	70-99+% (Packed Tower) 50-95% (Spray Tower)
Condenser	50-90%
Good combustion practices (Curing Oven)	Varies

Control technologies for CO and VOC are discussed earlier in Section D.3.2.

Step 2 – Eliminate Technically Infeasible Options

Catalytic Oxidizer

Exhaust gas streams that contain impurities will likely cause fouling of the catalyst, so use of a catalytic oxidizer to control VOC and CO from the Gutter Exhaust, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Section is technically infeasible.

Adsorber (Carbon Filtration), Wet Scrubber, and Condenser

Reclamation technologies are not technically feasible for the control of CO emissions. Further, adsorption and absorption systems are typically not considered technically feasible to control VOC emissions if there is a high amount of PM in the exhaust stream as with these sources. Condensation systems are not technically feasible because this type of system requires a high

VOC concentration in the exhaust stream to achieve appropriate control efficiencies.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Afterburner/thermal oxidizer.
2. Recuperative thermal oxidizer.
3. Regenerative thermal oxidizer.
4. Good combustion practices (Curing Oven).

Step 4 – Evaluate Remaining Control Technologies

BACT Limit Overview

RBLC search results for VOC and CO BACT emission limits for natural gas fired curing ovens indicate that the emission rate established as BACT ranges from 0.01 lb VOC/hr to 2.56 lb VOC/hr and 0.14 lb CO/hr to 4.09 lb CO/hr for similar emission source categories with no add-on controls. These RBLC emission limits are not specific to mineral wool manufacturing facilities and do not account for the organics in the resins and binders specific to mineral wool production. However, one example of add-on controls appeared in the RBLC search results for a fiberglass facility (Owens Corning facility in Crisp County, Georgia). At this fiberglass facility, the bonded line cooling section and curing oven are controlled by a thermal oxidizer and are limited to 4 lb VOC/ton and 5 lb CO/ton. Emissions from the Gutter Exhaust, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Zone include volatile binder materials, binder break down products, and products of combustion. The final Mineral Wool MACT was promulgated on July 29, 2015, during the development of this set of federal rules, maximum achievable controls were assessed. Currently the Mineral Wool MACT represents the most stringent emissions limits for organic HAP, which represents the majority of organic compounds emitted from the Gutter Exhaust, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Zone.

Thermal Oxidizer (Afterburner)

The gaseous emissions from the Curing Oven will be exhausted through an afterburner to reduce VOC and CO emissions. An afterburner is the top ranked control device and best option for achieving high VOC and CO destruction efficiency; therefore, no further analysis for CO and VOC reduction from the Curing Oven is necessary. The afterburner will treat only the Curing Oven exhaust, which will minimize the natural gas (energy) usage necessary to destruct VOC and CO emissions and minimize environmental impacts from the products of combustion.

A cost-effectiveness calculation for installing an afterburner for VOC control on the Spinning Chamber and for VOC and CO control on the Cooling Section indicates that this technology is not cost-effective due to the large volume of air

that must be routed through the afterburner. All VOC emissions not emitted from the cooling section were assumed to be emitted from the Spinning Chamber for a "worst-case" cost estimate. The cost per ton of pollutants removed from the Spinning Chamber is \$25,842 for VOC as shown in Appendix D-1. The cost per ton of pollutants removed from the Cooling Section is \$2,827,380 for CO and \$52,878 for VOC as shown in Appendix D-1.

Recuperative or Regenerative Thermal Oxidizers

Similarly, a recuperative thermal oxidizer and an RTO are not cost-effective control technologies for the Spinning Chamber and Cooling Section. The cost per ton of pollutants removed from the Spinning Chamber is \$10,252 for VOC, as shown in Appendix D-1. The cost per ton of pollutants removed from the Cooling Section is \$1,424,419 for CO and \$26,574 for VOC. The addition of a combustion device for the control of such a large air flow would also cause a notable NO_x and CO₂ emissions increase due to increased fuel requirements. Further, CPM is the predominant pollutant which is better controlled by a WESP rather than an afterburner. Because these control devices (afterburner, recuperative thermal oxidizer, RTO) are not cost-effective, BACT is no add-on control for the Spinning Chamber and Cooling Section and compliance with the Mineral Wool MACT emissions limits.

Step 5 - Selection of BACT

Roxul proposes to use an afterburner as BACT for CO and VOC emissions from the Curing Oven, with no add-on controls for the Spinning Chamber and Cooling Sections. Roxul is proposing a CO emission limit of 1.82 lb/hr (0.82 kg/hr) and a VOC emission limit of 78.02 lb/hr (35.39 kg/hr) as BACT for the combined Gutter Exhaust, Curing Oven, Curing Oven Hoods, Spinning Chamber, and Cooling Zone (HE01). Proposed compliance demonstration methods are summarized in Attachment O.

D.4.3 *Gutter, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Zone - SO₂*

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for SO₂ established for the gutter exhaust, spinning chamber, curing oven, curing oven hoods, and cooling zone. The only source of SO₂ from the HE01 stack originates from natural gas combustion in the curing oven.

The curing oven oxidizes sulfur compounds present in natural gas into SO₂. The control of SO₂ emissions is most directly associated with using a low sulfur fuel such as natural gas. Potential SO₂ emissions are directly related to the sulfur content of fuels. Minimizing fuel sulfur content through the use of low sulfur fuels, such as natural gas has been determined to be BACT for many combustion processes, including ovens. Therefore, Roxul proposes use of low sulfur fuel (pipeline quality natural gas, as supplied) as BACT for the curing oven.

D.4.4 *Gutter, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Zone - NO_x*

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for NO_x established for the gutter exhaust, spinning chamber, curing oven, curing oven hoods, and cooling zone. No controls were identified for the spinning chamber or gutter. NO_x emissions from these sources are from natural gas fuel combustion and from binder materials. Note that not all of the sources that comprise emission point HE01 are sources of NO_x (e.g., spinning).

Step 1 – Identify Potential Control Technologies

Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated NO _x Control Efficiency
SCR	70-95%
SNCR	40-75%
Low NO _x burners	30-40%
Ultra-Low NO _x burners	80-90%
Good combustion practices	Varies

Control technologies for NO_x are discussed earlier in Section D.3.4.

- *Low NO_x Burners*^{26, 27} - LNB technology is designed to control the mixing of fuel and air at each burner in order to amplify the size and width of the flames, which increases the surface area of the flame. Peak flame temperature is thereby reduced, which results in less NO_x formation.

The utilization of LNBS results in a more efficient combustion process. A more efficient process will require less excess air for combustion. Thus, unburned N₂ will be minimized, resulting in a reduction of NO_x emissions.

- *Ultra-Low NO_x Burners (ULNB)*²⁸ - ULNB technology utilizes internal FGR and fuel staging to reduce NO_x emissions. Flue gas is internally recirculated back into the combustion zone to reduce peak flame temperatures and the average O₂ concentration to reduce thermal NO_x. The fuel to air ratio is diluted by the recirculated flue gas, which results in an increased flame length. ULNBs can achieve NO_x reduction ranging from 80 percent to 90

²⁶ World Bank Group Pollution Prevention and Abatement Handbook, Nitrogen Oxides: Pollution Prevention and Control, July 1998.

²⁷ Evaluation and Costing of NO_x Controls for Existing Utility Boilers in the NESCAUM Region, EPA 453/R-92-010, Table 1-2 Combustion Controls for Oil and Gas-fired Utility Boilers, December 1992.

²⁸ US Department of Energy, Office of Energy Efficiency & Renewable Energy, Advanced Manufacturing Office: Ultra-Low NO_x Premixed Industrial Burner, "Reduction of Burner NO_x Production with Premixed Combustion."

percent below baseline NO_x concentrations depending on the specific burner and combustion design.

Step 2 – Eliminate Technically Infeasible Options

SCR and SNCR

The Gutter Exhaust, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Zone will not have a gas stream in the temperature range to employ either SCR or SNCR technology. The minimum temperature required for SCR control is approximately 480°F (249°C), while the minimum temperature required for SNCR is approximately 1600°F (871°C). The maximum exhaust temperature from the Gutter Exhaust (211°F/99°C), Spinning Chamber (139°F/59°C), Curing Oven (391°F/199°C), and Cooling Zone (193°F/89°C) streams will be well below the minimum temperature required for SCR or SNCR. Therefore, SCR and SNCR are technically infeasible.

Ultra-Low NO_x Burners

ULNB cannot be used in the Curing Oven, or in the Curing Oven afterburner. The burners in the Cure Oven and in the afterburner are in open air systems using direct combustion. ULNB would have little or no reduction beyond baseline low NO_x emissions in an open air application.

Step 3 – Rank Remaining Technically Feasible Control Options

1. LNB (Curing Oven and Curing Oven afterburner).
2. Good combustion practices (Curing Oven and Curing Oven afterburner).

Step 4 – Evaluate Remaining Control Technologies

BACT Limit Overview

There was one RBLC query result for a NO_x BACT emission limit for forming and curing. This result indicated that good combustion practices and a NO_x emission limit of 3 lb/ton satisfy BACT.

Low NO_x Burners

LNBS are applicable, economical, and will be employed for the Curing Oven and Curing Oven afterburner. Low NO_x burners will achieve emissions of 0.078 lb NO_x/MMBtu for circulation burners and afterburner when utilizing natural gas only.

Good Combustion Practices

Good combustion practices are applicable, economical, and will be employed for the Curing Oven and Curing Oven afterburner. Good combustion practices

include activities such as maintaining combustion equipment according to the manufacturer's instructions and adjusting air-to-fuel ration per the manufacturer's recommendations.

Step 5 – Selection of BACT

Roxul proposes to use good combustion practices and LNB for the Curing Oven and Curing Oven afterburner. Roxul is proposing a NO_x emissions limit of 14.55 lb/hr (6.60 kg/hr) with no add-on controls as BACT for NO_x emissions from the Gutter Exhaust, Spinning Chamber, Curing Oven, Curing Oven Hoods, and Cooling Zone. Proposed compliance demonstration methods are summarized in Attachment O.

D.5 BACT DETERMINATION FOR FLEECE APPLICATION

This section evaluates BACT for Fleece Application (CM12 and CM13) as described in Section 2.1 of the application.

D.5.1 Fleece Application – VOC

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for VOCs established for the Fleece Application System.

BACT Floor

The requirements of 40 CFR Part 63, Subpart JJJJ apply to each new and existing facility that is a major source of HAP, at which web coating lines are operated. NESHAP Subpart JJJJ requires that HAP emissions be limited to "no more than 1.6 percent of the mass of coating materials applied for each month at new affected sources" or "no more than 8 percent of the coating solids applied for each month at new affected sources." The binder applied at the Fleece Application station is considered a compliant coating per NESHAP Subpart JJJJ without the need for additional controls. NESHAP Subpart JJJJ allows for compliance with this limit using VOC as a surrogate for organic HAP. At a minimum, the facility must comply with NESHAP Subpart JJJJ for Fleece Application.

Step 1 – Identify Potential Control Technologies

Potential add-on control technologies for evaporative losses include afterburners, thermal incineration, and recuperative incineration. BACT determinations were not found in the RBLC for this type of fleece application system; however, similar emission sources²⁹ also subject to NESHAP Subpart JJJJ were found and the related BACT determinations were used to identify potentially applicable

²⁹ These determinations are primarily related to paper coating.

controls. In general, the same type of control equipment can be used for controlling emissions of VOCs.

VOCs will be present due to the volatilization of organic compounds resulting from the binder dip tank and binder-coated fleece just prior to entry into the Curing Oven. However, as addressed in Step 4, evaporative losses are anticipated to be low due to operation at ambient temperature.

Control Type	Estimated VOC Control Efficiency
Thermal Oxidizer (Afterburner)	98-99+%
Recuperative Thermal Oxidizer	98-99+%
Regenerative Thermal Oxidizer	95-99%
Catalytic Oxidizer	90-99%
Adsorber (Carbon Filtration)	95-98%
Wet Scrubber	70 - 99+ % (Packed Tower) 50 - 95% (Spray Tower)
Condenser	50 - 90%
Material Selection (Low-VOC Binder)	80 - 99%
Good Work Practices	Varies

Control technologies for VOC are discussed earlier in Section D.3.2.

- *Material Selection* – The use of low-VOC materials, where feasible, can reduce VOC emissions and eliminate the need for add-on control technologies. The material selections for the coating (s) used in the Fleece Application system by-and-large are defined by the product specifications. Accordingly, the consideration of materials must account for potential impacts on Roxul’s final products, as well as technical and customer specifications. The potential for reductions in VOC emissions using alternative materials is an appropriate VOC-reduction method to evaluate further.
- *Good Work Practices* – Good work practices for the storage, handling, and use of VOC-containing materials can be effective in limiting evaporative losses. For example, storing VOC-containing materials in closed tanks or containers, cleaning up spills, and minimizing cleaning with VOC compounds can reduce VOC emissions.

Step 2 – Eliminate Technically Infeasible Options

According to the NESHAP Subpart JJJJ preamble, most existing major source facilities in the paper coating industry that apply solvent-based coatings use a thermal oxidation system to reduce emissions because the exhaust streams are laden with high concentrations of VOCs, unlike the Fleece Application System.

The VOC emissions from Fleece Application were conservatively assumed to be emitted entirely as fugitive emissions, although most of the VOC emissions will be emitted and controlled by the Curing Oven afterburner.

Thermal Oxidizer, Recuperative Thermal Oxidizer Regenerative Thermal Oxidizer

Recuperative/Regenerative Thermal Oxidation is not practical given the exhaust stream characteristics, including a relatively low VOC concentration and low flow rate (if the source were fully enclosed and vented). Accordingly, this technology is determined to be not technically feasible. As further consideration, thermal oxidation would generate additional pollutants from natural gas combustion.

Wet Scrubber

Wet Scrubbing is more commonly used for controlling inorganic gases than for controlling VOC emissions. Wet scrubbers are typically not recommended for VOC control as a standalone control device. Accordingly, this technology is determined to be not technically feasible.

Condenser

Condensation is not practical given the low VOC concentration in the gas stream and low temperature needed to achieve any significant reduction. Accordingly, this technology is determined to be not technically feasible. As further considerations, condensation produces a waste stream that would require disposal and the power requirement to cool the air would be costly and would generate additional pollutants from electric utilities, as documented in the NESHAP Subpart JJJJ preamble.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Thermal Oxidizer.
2. Catalytic Oxidizer.
3. Material Selection (Low-VOC Binder).
4. Carbon Adsorber.
5. Good Work Practices.

Step 4 – Evaluate Remaining Control Technologies

Thermal Oxidizer (Afterburner)

A cost-effectiveness calculation for installing an afterburner for VOC control on the Fleece Application System indicates that this technology is not cost-effective due to the low concentration of VOCs in the exhaust stream. The cost per ton of pollutants removed is at least \$12,339 for VOC as shown in Appendix D-1, assuming 100% of the VOC emissions from the coating are emitted and captured

prior to the Curing Oven. In reality, most of the emissions will not be emitted as fugitives and will be emitted and controlled during the curing process, though no emission reduction credit is taken by the Curing Oven afterburner. The cost-effectiveness calculation excludes the additional capital costs that would be required for the addition of an enclosure and ventilation system to deliver emissions to a separate control device. The cost-effectiveness calculation conservatively assumes an exhaust flow rate of 500 scfm, which is a minimum exhaust flow rate for thermal incineration. The minimum exhaust flow rate corresponds with the lowest equipment base cost and lowest operating and maintenance costs (i.e., smallest system). The addition of a combustion device for the control of VOC would create a NO_x emissions increase from natural gas combustion.

Catalytic Oxidizer

Likewise, a catalytic oxidizer is not cost effective, since a simple thermal oxidizer (afterburner) is the least expensive type of incinerator. A catalytic oxidizer would incur additional labor and material costs for the catalyst replacement. Furthermore, exhaust streams that contain impurities will likely cause fouling of the catalyst. There is also potential for the coupling agent/additives in the coating (binder) to destroy the catalyst, rendering it ineffective.

Adsorber (Carbon Filtration)

Carbon (or other adsorbent) adsorption is a proven technology for removal of VOCs. However, carbon adsorption has a number of limitations including: the need to filter emissions ahead of the adsorption units to prevent plugging the units; the build-up of heel on the carbon; the adverse effects of relative humidity on removal efficiency; and the potential for carbon bed fires related to the exothermic reaction associated with adsorption. In addition, carbon has a finite adsorption capacity. After the carbon filter has reached the adsorption limit, breakthrough of the organics in the air stream will occur. When breakthrough occurs, the outlet concentration from the carbon bed can be greater than the inlet concentration. When carbon has reached its adsorption capacity, it must be regenerated or replaced, which can be a limiting cost factor. For the purposes of this assessment, carbon filtration is considered to be technically feasible for the application of controlling VOC emissions. The control efficiency of carbon adsorption is variable and when breakthrough occurs, the control is not effective. The two most common bed types are fixed regenerable beds or disposable/rechargeable canisters. Once the carbon (or other adsorbent) is saturated with VOCs, the adsorbent would need to be disposed of, generating a solid waste stream, or regenerated, using potentially energy-intensive methods.

Material Selection

Low-VOC materials (compliant coatings) are at least as effective in reducing VOCs as add-on carbon adsorption systems, according to AP-42 Chapter 4, Section 4.2.2.6 – Evaporative Losses for Paper Coating. Because low-VOC

materials are at least as effective in reducing VOCs as adsorption and do not have the same environmental implications (i.e., requiring additional energy or generating additional waste), the use of low-VOC materials [0.016 kilogram VOC/kilogram (kg VOC/kg) coating³⁰] are selected as BACT for the Fleece Application System.

Good Work Practices

Good work practices, such as storing VOC-containing materials in closed tanks or containers, cleaning up spills, and minimizing cleaning with VOC compounds, will also be implemented to minimize VOC emissions. Good work practices are the base case for VOC reductions and do not have any adverse economic or environmental impacts.

Step 5 – Selection of BACT

Roxul proposes to use a combination of low-VOC coatings in accordance with the NESHAP Subpart JJJJ limit for new sources, and good work practices with no add-on controls as BACT VOC emissions from Fleece Application. Roxul will comply with the applicable requirements of NESHAP Subpart JJJJ, which will establish an emission limit for organic HAP (or VOC as a surrogate) from Fleece Application. VOC emissions will be limited to 25.58 tpy (25.93 tonne/yr) on a rolling 12-month basis. Proposed compliance demonstration methods are summarized in Attachment O.

D.6

BACT DETERMINATION FOR ROCKFON LINE OPERATIONS

This section evaluates BACT for the following sources as described in Section 2.2 of the application:

- IR Zone (RFNE1), Hot Press and Cure (RFNE2), De-dusting Baghouse (RFNE8), and Cooling Zone (RFNE7);
- Spray Paint Cabin (RFNE5);
- Drying Oven 1 (RFNE4);
- High Oven A (RFNE3) and High Oven B (RFNE9); and
- Drying Oven 2 and 3 (RFNE6).

D.6.1

IR Zone & Hot Press & Cure - Filterable PM, PM₁₀, PM_{2.5}, and CPM

Emissions of PM/PM₁₀/PM_{2.5}, including CPM, from the IR Zone and Hot Press & Cure are 0.02 lb/hr (0.01 kg/hr) per source. In addition, the maximum concentration of filterable PM/PM₁₀/PM_{2.5} is 0.001 gr/dscf per source, which is well below the concentration at which add-on controls are considered. As a result, the addition of control devices cannot be cost effective for BACT

³⁰ Per NESHAP Subpart JJJJ for new sources.

compliance. Roxul proposes BACT for the IR Zone to be 0.02 lb/hr (0.01 kg/hr) for PM/PM₁₀, 0.01 lb/hr (6.30E-03 kg/hr) for PM_{2.5}. Roxul proposes BACT for the Hot Press & Cure to be 0.02 lb/hr (0.01 kg/hr) for PM/PM₁₀, 0.01 lb/hr (6.30E-03 kg/hr) for PM_{2.5}.

D.6.2 *IR Zone & Hot Press and Cure – VOC*

The IR Zone and Hot Press and Cure operations include the application of glue. VOC emissions from the IR Zone and Hot Press and Cure are slightly above the threshold concentration at which add-on controls are technically feasible.

Step 1 – Identify Potential Control Technologies

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for VOCs emitted from curing operations. Potential add-on control technologies for evaporative losses include afterburners, thermal incineration, and recuperative incineration. Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated VOC Control Efficiency
Thermal Oxidizer (Afterburner)	98-99+%
Recuperative Thermal Oxidizer	98-99+%
Regenerative Thermal Oxidizer	95-99%
Catalytic Oxidizer	90-99%
Material Selection (Low-VOC Glues/Coatings)	80 – 99%

Descriptions of these controls were previously discussed in Sections D.3.2 and D.5.1.

Step 2 – Eliminate Technically Infeasible Options

Recuperative Thermal Oxidizer, Regenerative Thermal Oxidizer

Recuperative/Regenerative Thermal Oxidation is not practical given the low exhaust flow rate (less than 2,000 scfm per source) and low VOC concentration in the exhaust streams (less than 50 ppm per source). Regenerative thermal oxidizers (TOs) perform best at inlet concentrations around 1,000 ppm and exhaust flow rates of at least 5,000 scfm and up to 500,000 scfm. Recuperative TOs perform best at inlet concentrations of at least 2,000 ppm and typical gas flow rates from 500 scfm to 500,000 scfm. Based on the exhaust characteristics (low concentration and low exhaust flow rate), RTO technology is determined to be not technically feasible. The heat of combustion of hydrocarbon gases is insufficient to sustain high temperatures required without the addition of expensive auxiliary fuel. Thermal oxidizers without heat regeneration are applicable for lower flow rates and lower VOC concentrations. As further consideration, thermal oxidation would generate additional pollutants from natural gas combustion.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Thermal Oxidizer.
2. Material Selection (Low-VOC Glues/Coatings).
3. Catalytic Oxidizer.

Step 4 – Evaluate Remaining Control Technologies*Thermal Oxidizer (Afterburner)*

A conservative cost-effectiveness calculation was completed for installing an afterburner to control total process VOC emissions from both the IR Zone and Hot Press & Cure. The results indicate that this technology is not cost-effective due to the low VOC mass in the exhaust stream. The cost per ton of pollutants removed is \$56,551 for VOCs as shown in Appendix D-1. Further, the addition of a combustion device for the control of such low VOC concentrations would also cause a NO_x emissions increase from natural gas combustion.

Catalytic Oxidizer

Likewise, a catalytic oxidizer is not cost effective because costs for a catalytic oxidizer substantially increase when the VOC concentration in the exhaust stream is below 100 ppm. A simple thermal oxidizer is the least expensive type of incinerator. A catalytic oxidizer would incur additional labor and material costs for the catalyst replacement. Furthermore, catalytic oxidation is best suited for systems with little variation in type and concentration of VOCs, where heavy hydrocarbons and particulates are not present.

Material Selection (Low-VOC Glues/Coatings)

Use of low-VOC materials, such as solidified glue, is the most effective remaining available control to minimize VOC emissions.

Step 5 – Selection of BACT

BACT for VOC from the IR Zone and Hot Press and Cure operations is proposed to be use of glue with 53 gram per kilogram (g/kg) VOC content and no add-on controls, with a numerical VOC emission limit of 7.48 tpy (6.78 tonne/yr) on a rolling 12-month basis. Proposed compliance demonstration methods are summarized in Attachment O.

D.6.3***De-dusting Baghouse - Filterable PM, PM₁₀, PM_{2.5}***

Exhaust from cutting, sanding, milling, and crushing operations will be directed to the De-dusting Baghouse for control of filterable PM/PM₁₀/PM_{2.5} emissions. The De-dusting Baghouse will be designed with an alternative venting option, so that filtered exhaust air can be directed through a high efficiency particulate air

(HEPA) filter and used as warm air in the Rockfon production building. Product quality and worker health necessitates the use of a HEPA filter for this exhaust. Any filterable PM/PM₁₀/PM_{2.5} emissions from this exhaust that may be emitted from the enclosed Rockfon production building would be emitted as a fugitive source; however, these emissions would be a fraction of those emitted from the De-dusting Baghouse stack, due to the HEPA filter and “building” control. Fugitive particulate emissions entrained in the warm air will be controlled to concentrations beyond what is considered BACT because these emissions will pass through a HEPA filter before entering the building and becoming fugitive. The fugitive emissions from alternative venting will be controlled to concentrations beyond what is considered BACT.

The “worst-case” (non-HEPA filtered) particulate emissions contained in the De-dusting Baghouse stack exhaust will be controlled to concentrations beyond what is considered BACT (0.0005 gr/dscf). Therefore, BACT for the cutting, sanding, milling, and crushing operations is proposed to be the use of a baghouse, with a numerical emission limit of 0.34 lb/hr (0.15 kg/hr) for PM/PM₁₀ and 0.17 lb/hr (0.08 kg/hr) for PM_{2.5}. Material collected in the De-dusting Baghouse will be conveyed in an enclosed container to the Recycle Plant for reuse in the process, minimizing waste and environmental impacts. Proposed compliance demonstration methods are summarized in Attachment O.

D.6.4 *Drying Oven 1, Drying Oven 2 & 3, High Oven A, and High Oven B - Filterable PM, PM₁₀, PM_{2.5}, and CPM*

Particulate dust emissions are generated by air flow passing over the product in the Rockfon Ovens and by natural gas combustion.

Step 1 – Identify Potential Control Technologies

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for filterable PM/PM₁₀/PM_{2.5} process emissions from Drying Oven 1, Drying Oven 2 & 3, High Oven A, and High Oven B. Control efficiencies for potentially applicable technologies are shown in the table below for Drying Oven 1 and Drying Oven 2 & 3.

Control Type	Estimated PM/PM ₁₀ /PM _{2.5} Control Efficiency
Fabric Filter (Baghouse)	95-99+% (As low as 0.001 gr/dscf)
Wet Scrubber or High Efficiency Venturi Scrubber	70-99% (<0.01 gr/dscf)
ESP	>98% (0.004 - 0.01 gr/dscf)
WESP	>98% (0.004 - 0.01 gr/dscf)
Natural Gas Fuel and Good Combustion Practices	Varies

Descriptions of these controls were previously included in Section D.3.1.

Step 2 – Eliminate Technically Infeasible Options

ESP, WESP, or Wet Scrubber/High Efficiency Venturi Scrubber

No BACT determinations were found that include the use of an ESP, WESP, or scrubber to control PM emissions from similar drying ovens; thus, these types of control can be considered technically infeasible because they are not demonstrated control technologies for this particular application.

The exhaust grain loading is below the threshold where add-on controls are technically feasible for both High Oven A and High Oven B (below 0.002 gr/dscf).

Step 3 – Rank Remaining Technically Feasible Control Options

1. Fabric Filter (Drying Oven 1, Drying Oven 2 & 3 only).
2. Natural Gas Fuel and Good Combustion Practices (All Rockfon Ovens).

Step 4 – Evaluate Remaining Control Technologies

Particulate Filter

Dry filtration is the best remaining available control for Drying Oven 1 and Drying Oven 2 & 3. Dry filtration is capable of achieving a PM concentration of less than 0.005 gr/dscf.

Natural Gas Fuel and Good Combustion Practices

Use of natural gas and good combustion practices are applicable, economical, and will be employed for the Drying Oven 1, Drying Oven 2 & 3, High Oven A, and High Oven B. Good combustion practices include activities such as maintaining operating logs and recordkeeping, conducting training, ensuring maintenance knowledge, performing routine and preventive maintenance, conducting burner and control adjustments, monitoring fuel quality, etc.

Step 5 – Selection of BACT

Roxul proposes to equip Drying Oven 1 and Drying Oven 2 & 3 with particulate filters as BACT to control PM/PM₁₀/PM_{2.5} from drying operations. Roxul proposes no add-on controls for High Oven A and High Oven B. Each of the ovens will combust natural gas and implement good combustion practices. The following numerical emission limits are proposed as BACT:

- 0.08 lb/hr (0.04 kg/hr) for PM/PM₁₀ and 0.06 lb/hr (0.03 kg/hr) for PM_{2.5} (Drying Oven 1),

- 0.12 lb/hr (0.05 kg/hr) for PM/PM₁₀ and 0.09 lb/hr (0.04 kg/hr) for PM_{2.5} (High Oven A),
- 0.13 lb/hr (0.06 kg/hr) for PM/PM₁₀ and 0.09 lb/hr (0.04 kg/hr) for PM_{2.5} (Drying Oven 2 & 3), and
- 0.12 lb/hr (0.05 kg/hr) for PM/PM₁₀ and 0.09 lb/hr (0.04 kg/hr) for PM_{2.5} (High Oven B).

Proposed compliance demonstration methods are summarized in Attachment O.

D.6.5 *Drying Oven 1, Drying Oven 2 & 3, High Oven A, and High Oven B - VOC, CO*

Evaporative emissions are generated by drying paints and coatings. Additional VOC and CO emissions result from incomplete combustion caused when some of the fuel is only partially burned. VOC emissions from the coating application and drying were estimated by assuming that all of the VOC in the product is driven off and emitted in the Drying or High Ovens.

Step 1 – Identify Potential Control Technologies

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for organic evaporative losses and combustion emissions from dryers and ovens. Controls include afterburners and RTOs. Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated CO/VOC Control Efficiency
Thermal Oxidizer (Afterburner)	98-99+ %
Recuperative Thermal Oxidizer	98-99+ %
Regenerative Thermal Oxidizer	95-99%
Catalytic Oxidizer	90-99%
Material Selection (Low-VOC Paints/Coatings)	80 - 99%
Natural Gas Fuel and Good Combustion Practices	Varies

These potential control technologies for VOC emissions are discussed earlier in Sections D.3.2 and D.5.1.

Due to variability of the Rockfon product mix, a wide variety of paints may be used at multiple stages of the process, depending on product style, color, etc. Therefore, Roxul proposes a combined VOC limit for the Spray Paint Cabin, Drying Oven 1, High Oven A, High Oven B, Drying Oven 2 & 3, and Cooling Zone. The most affordable cost to control scenario assumes that all of the VOC emissions from these sources are emitted from the Drying Oven 1 exhaust because it has the lowest exhaust flow rate and highest exhaust temperature.

Step 2 – Eliminate Technically Infeasible Options

Each of the add-on control technologies are anticipated to not be technically feasible for Drying Oven 2 & 3, High Oven A, or High Oven B because each of these sources will have exhaust concentrations of less than 20 ppmv. However, for this exercise none of the control technologies identified in Step 1 were deemed technically infeasible.

Step 3 – Rank Remaining Technically Feasible Control Options

Drying Oven 1, Drying Oven 2 & 3, High Oven A, High Oven B:

1. Afterburner.
2. Recuperative Thermal Oxidizer.
3. Regenerative Thermal Oxidizer.
4. Material Selection (Low-VOC Paints/Coatings).
5. Catalytic Oxidation.
6. Use of Natural Gas and Good Combustion Practices.

Step 4 – Evaluate Remaining Control Technologies

Thermal Oxidizer (Afterburner)

A conservative cost-effectiveness calculation was completed for installing an afterburner to control total VOC emissions from Drying Oven 1. Drying Oven 1 has the lowest exhaust flow rate of the sources evaluated, which corresponds to the lowest equipment cost. Additionally, Drying Oven 1 has the highest exhaust temperature, which corresponds to the lowest auxiliary fuel requirement. Each of the other sources would be more expensive to control than Drying Oven 1. Assuming that all VOC emissions (30.69 tpy) from the Spray Paint Cabin, Drying Oven 1, High Oven A, High Oven B, Drying Oven 2 & 3, and Cooling Zone are emitted from Drying Oven 1 yields the most affordable cost scenario (i.e., lowest cost to control value). The cost per ton of pollutants removed is \$14,648 for VOC as shown in Appendix D-1 and is not cost effective. The addition of a combustion device for the control of VOC would also cause an increase of pollutant emissions from natural gas combustion.

Recuperative Thermal Oxidizer or Regenerative Thermal Oxidizer

Based on the exhaust characteristics from Drying Oven 1, an RTO is also not cost effective. RTO technology is not cost effective because the capital costs of RTO systems are much higher than traditional TOs (approximately double). Further, the operation costs are not low enough to offset the higher capital investment since the heat of combustion of the hydrocarbon gases is insufficient to sustain high thermal oxidation temperatures required without the addition of expensive auxiliary fuel.

Catalytic Oxidizer

Likewise, a catalytic oxidizer is not cost effective, since a simple thermal oxidizer (afterburner) is the least expensive type of incinerator. A catalytic oxidizer would incur additional labor and material costs for the catalyst replacement.

Furthermore, catalytic oxidation is best suited for systems with little variation in type and concentration of VOCs.

Material Selection

Because low-VOC materials are at least as effective in reducing VOCs as adsorption and do not have the same environmental implications (i.e., requiring additional energy or generating additional waste), the use of low-VOC materials [80 gram VOC per liter (g VOC/L)] is selected as BACT for the Rockfon Drying Ovens. Low-VOC coatings contain lower amounts of VOC than conventional organic solvent-borne coatings and usually fall into three major categories: high solids, waterborne, or powder coatings. The coatings used in the Rockfon operation will have a maximum VOC content of 80 grams per liter of coating. The low-VOC coatings will not be applied in large enough quantities to generate VOC emissions above the 20 ppmv threshold, where add-on controls become technically feasible for the Rockfon Ovens.

Natural Gas Fuel and Good Combustion Practices

For small, natural gas combustion sources, good combustion practices are the only applicable control for emissions generated from products of combustion. Good combustion practices, such as maintaining operating logs and recordkeeping, conducting training, ensuring maintenance knowledge, performing routine and preventive maintenance, conducting burner and control adjustments, monitoring fuel quality, etc. will be used to ensure complete combustion, so the conversion of VOC and CO to CO₂ is maximized.

Step 5 - Selection of BACT

Based on results from this top-down BACT analysis, Roxul proposes to use low-VOC coatings, containing a maximum VOC content of 80 g/L, to reduce process VOC emissions from Drying Oven 1, Drying Oven 2 & 3, High Oven A, and High Oven B. Roxul also proposes good combustion practices and use of natural gas to reduce CO and VOC emissions from combustion with a numerical emission limit of 84 lb CO/million standard cubic feet (MMscf) (1,346 kg/million standard cubic meter [MMsm³]) of natural gas. A numerical emission limit of 30.69 tpy (27.85 tonne/yr) VOC on a rolling 12-month basis is proposed as BACT for the Spray Paint Cabin, Drying Oven 1, Drying Oven 2 & 3, High Oven A, and High Oven B, and the Cooling Zone. Proposed compliance demonstration methods are summarized in Attachment O.

D.6.6

Drying Oven 1, Drying Oven 2 & 3, High Oven A, and High Oven B - SO₂

The Rockfon Ovens oxidize sulfur compounds present in natural gas into SO₂. The control of SO₂ emissions is most directly associated with using a low sulfur fuel such as natural gas. Potential SO₂ emissions are directly related to the sulfur content of fuels. Minimizing fuel sulfur content through the use of low sulfur fuels, such as pipeline quality natural gas, has been determined to be BACT for many combustion processes. Therefore, Roxul proposes use of natural gas (a low sulfur fuel, as supplied) as BACT for SO₂ emissions from Drying Oven 1, Drying Oven 2 & 3, High Oven A, and High Oven B.

D.6.7 *Drying Oven 1, Drying Oven 2 & 3, High Oven A, and High Oven B - NO_x*

NO_x are formed primarily through the thermal NO_x mechanism where N₂ thermally dissociates and subsequently reacts with O₂ molecules in the combustion air. NO_x can also be formed through a mechanism called prompt NO_x, when early reactions of N₂ molecules in the combustion air and hydrocarbon radicals in the fuel occur. Prompt NO_x is usually negligible compared to thermal NO_x. The third mechanism is called fuel NO_x, and stems from the reaction of fuel-bound N₂ compounds with O₂. Natural gas has negligible chemically bound fuel N₂; thus, potential NO_x emissions are minimal. Each of the burners is direct-fired and less than 5 MMBtu/hr combined, which does not warrant low NO_x burners. Further, NO_x emissions in the Rockfon Oven exhausts are very low, and as a result, addition of control devices cannot be cost effective. Roxul proposes minimizing NO_x emissions through the use natural gas and good combustion practices, with a numerical emission limit of 100 lb NO_x/MMscf (1,602 kg/MMsm³) of natural gas as BACT. Good combustion practices include activities such as maintaining operating logs and recordkeeping, conducting training, ensuring maintenance knowledge, performing routine and preventive maintenance, conducting burner and control adjustments, monitoring fuel quality, etc.

D.6.8 *Cooling Zone*

The Cooling Zone is electrically heated and pollutant concentrations from the Cooling Zone (PM/PM₁₀/PM_{2.5}, CPM, and VOCs) are below the concentrations at which add-on controls are applicable. VOCs are emitted in the Cooling Zone due to evaporative losses. The coatings used in the Rockfon operation will have a maximum VOC content of 80 g/L. Roxul proposes BACT for the Cooling Zone to be the use of low-VOC materials, containing a maximum VOC content of 80 g/L. Further, Cooling Zone emissions were conservatively included in Section D.6.5 (see VOC cost calculation description for Drying Oven 1). Cooling Zone VOC emissions will also be limited in the proposed overall combined VOC emission limit for Drying Oven 1, Drying Oven 2 & 3, High Oven A, High Oven B, and Cooling Zone. Additionally, Roxul proposes a numerical emission limit of 0.19 lb/hr (0.09 kg/hr) for PM/PM₁₀ and 0.14 lb/hr (0.07 kg/hr) for PM_{2.5}. Proposed compliance demonstration methods are summarized in Attachment O.

D.6.9 *Spray Paint Cabin - Filterable PM, PM₁₀, PM_{2.5}, and CPM*

High solids, low-VOC coatings are used in the Spray Paint Cabin to coat the ceiling tile surface. The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for filterable PM/PM₁₀/PM_{2.5} emissions from spray painting operations.

Step 1 – Identify Potential Control Technologies

Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated PM/PM ₁₀ /PM _{2.5} Control Efficiency
Particulate Filter	95-99+% (As low as 0.001 gr/dscf)
Wet Scrubber or High Efficiency Venturi Scrubber	70-99% (<0.01 gr/dscf)
ESP	>98% (0.004 – 0.01 gr/dscf)
WESP	>98% (0.004 – 0.01 gr/dscf)

Each of the applicable control technologies are described in Section D.3.1.

Step 2 – Eliminate Technically Infeasible Options

ESP/WESP

No BACT determinations were found that include the use of an ESP, or WESP to control PM emissions from spray booths, so these types of control can be considered technically infeasible because they are not demonstrated control technologies for this particular application.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Particulate Filter.
2. Wet Scrubber Or High Efficiency Venturi Scrubber.

Step 4 – Evaluate Remaining Control Technologies

Potential remaining add-on control technologies for solids from spray painting include dry, or fabric, filtration and high efficiency wet scrubbing.

Particulate Filter

The most common BACT control device for spray booths is dry filtration. Dry filtration is capable of achieving a PM concentration of less than 0.01 gr/dscf and can reduce PM emissions more effectively than wet scrubbing; therefore, dry filtration is the best remaining control technology and proposed to be BACT.

Step 5 – Selection of BACT

Roxul proposes to equip the Spray Paint Cabin with a particulate filter as BACT to control PM/PM₁₀/PM_{2.5} from spray paint operations, with a numerical emission limit of 0.88 lb/hr (0.40 kg/hr) for PM/PM₁₀ and 0.66 lb/hr (0.30 kg/hr) for PM_{2.5}. Proposed compliance demonstration methods are summarized in Attachment O.

D.6.10 *Spray Paint Cabin - VOCs*

The spray paint coating used in the Rockfon operation will be a low-VOC coating. VOC emissions from the Spray Paint Cabin will not be present in amounts above the threshold where add-on controls become technically feasible. Roxul proposes to use low-VOC coatings with a maximum VOC content of 80 g/L in the Spray Paint Cabin as BACT for VOC emissions. Further, the Spray Paint Cabin emissions were conservatively included in Section D.6.5 (see VOC cost calculation description for Drying Oven 1). Spray Paint Cabin VOC emissions will also be limited in the proposed overall combined VOC emission limit for the Spray Paint Cabin, Drying Oven 1, Drying Oven 2 & 3, High Oven A, High Oven B, and the Cooling Zone. Proposed compliance demonstration methods are summarized in Attachment O.

D.7 *BACT DETERMINATION FOR COAL MILLING*

This section evaluates BACT for the Coal Milling Burner and Baghouse (IMF05) and Coal Milling De-Dusting Baghouse (IMF06). Coal is milled using a vertical coal mill equipped with a natural gas-fired direct heating unit and a separator equipped with a dust filter. Control evaluations for emissions from coal milling sources associated with material handling, transportation, and storage are included in Section D.2.

D.7.1 *Coal Milling - Filterable PM, PM₁₀, PM_{2.5}, and CPM*

Particulate dust emissions are primarily generated by pulverizing coal, and a small amount of particulate emissions are generated as by-products of natural gas combustion and trace amounts of noncombustible particles.

Step 1 – Identify Potential Control Technologies

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for filterable PM/PM₁₀/PM_{2.5} process emissions from Coal Milling. Control efficiencies for potentially applicable technologies are shown in the table below for the vertical coal mill.

Control Type	Estimated PM/PM ₁₀ /PM _{2.5} Control Efficiency
High efficiency cyclone	80-99% for PM, 30-90% for PM ₁₀ , 0-40% for PM _{2.5} (>0.01 gr/dscf)
Fabric Filter (Baghouse)	95-99+% (As low as 0.001 gr/dscf)

Control Type	Estimated PM/PM ₁₀ /PM _{2.5} Control Efficiency
Natural Gas Fuel and Good Combustion Practices	Varies

Descriptions of these controls were previously included in Section D.3.1.

Step 2 – Eliminate Technically Infeasible Options

All controls identified in Step 1 are technically feasible.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Fabric Filter (Baghouse).
2. High Efficiency Cyclone.
3. Natural Gas Fuel and Good Combustion Practices.

Step 4 – Evaluate Remaining Control Technologies

BACT Limit Overview

RBLC search results for PM/PM₁₀/PM_{2.5} BACT emission limits for coal milling, pulverizing, and grinding activities indicate that the typical concentration established as BACT ranged from 0.004 gr PM₁₀/dscf to 0.02 gr/dscf, for similar sources. The most stringent limits for coal milling particulate emissions are achieved by using baghouses as the add-on control technology.

Fabric Filter (Baghouse)

Dry filtration is the best available control for coal milling and is capable of achieving a PM concentration of 0.005 gr/dscf.

High Efficiency Cyclone

Cyclones are used primarily for pretreatment control devices and are not considered a “best” available control technology; for these reasons, this control technology is eliminated from further consideration.

Natural Gas Fuel and Good Combustion Practices

Use of natural gas and good combustion practices are applicable, economical, and will be employed for the vertical coal mill. Good combustion practices include activities such as maintaining operating logs and recordkeeping, conducting training, ensuring maintenance knowledge, performing routine and preventive maintenance, conducting burner and control adjustments, monitoring fuel quality, etc.

Step 5 – Selection of BACT

Roxul proposes to equip the Coal Mill Burner & Baghouse (IMF05) and the De-dusting Baghouse (IMF06) with a fabric filters as BACT to control PM/PM₁₀/PM_{2.5}. The Coal Mill Burner and Baghouse (IMF05) will combust natural gas and Roxul will implement good combustion practices. The BACT numerical PM/PM₁₀ emission limit for the Coal Mill Burner and Baghouse (IMF05) is proposed to be 0.32 lb/hr (0.14 kg/hr) and 0.26 lb/hr (0.12 kg/hr) for PM_{2.5}. BACT numerical limits from the Coal Milling De-dusting Filter are proposed to be 0.22 lb/hr (0.10 kg/hr) for PM/PM₁₀ (filterable) and 0.11 lb/hr (0.05 kg/hr) for PM_{2.5} (filterable). Proposed compliance demonstration methods are summarized in Attachment O.

D.7.2 Coal Milling – VOC, CO

Coal milling operations are performed at temperatures high enough to cause organics to volatilize and release VOC emissions from the process. Additional VOC and CO emissions result from incomplete combustion caused when some of the fuel is only partially burned.

Step 1 – Identify Potential Control Technologies

The RBLC, recent permits, and other relevant documents were reviewed to identify the most stringent BACT limits for organic evaporative losses and combustion emissions from coal milling. No examples of add-on control devices were found in the RBLC for coal milling or coal processing operations. The most common controls include good combustion practices and good engineering design. Potentially applicable add-on controls include oxidation devices, while good combustion practices can be used to mitigate VOC emissions. Control efficiencies for potentially applicable controls are shown in the table below.

Control Type	Estimated CO/VOC Control Efficiency
Thermal Oxidizer (Afterburner)	98-99+ %
Recuperative Thermal Oxidizer	98-99+ %
Regenerative Thermal Oxidizer	95-99%
Catalytic Oxidizer	90-99%
Natural Gas Fuel and Good Combustion Practices	Varies

These potential control technologies for VOC emissions are discussed earlier in Section D.3.2 and D.5.1.

Step 2 – Eliminate Technically Infeasible Options

The VOC/CO concentration is dilute in the Coal Milling exhaust stream and is less than 20 ppmv, well below the threshold concentration for any of the add-on control devices identified in Step 1 to be effective and to be considered technically applicable or feasible. The concentration of VOC/CO from Coal

Milling is well below the VOC/CO concentration found in well-controlled streams. Further reduction of the VOC or CO concentrations found in the Coal Milling exhaust stream cannot be backed by a vendor; therefore add-on controls are not technically feasible or applicable to reduce VOC or CO emissions.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Natural Gas Fuel and Good Combustion Practices.

Step 4 – Evaluate Remaining Control Technologies

Natural Gas Fuel and Good Combustion Practices

The only remaining technically feasible control technology for controlling the dilute Coal Mill Burner & Baghouse exhaust stream is use of natural gas and good combustion practices.

BACT will be based upon good combustion practices, the only remaining feasible control technology, in order to minimize VOC and CO emissions.

Step 5 – Selection of BACT

Good combustion practices have been selected to control VOC and CO emissions from Coal Milling. Numerical VOC BACT emission limits from Coal Milling are proposed to be 0.41 lb/hr (0.19 kg/hr). Numerical CO BACT emission limits from Coal Milling are proposed to be 84 lb/MMscf (1,346 kg/MMsm³). Proposed compliance demonstration methods are summarized in Attachment O.

D.7.3

Coal Milling - SO₂

The coal milling burner oxidizes sulfur compounds present in natural gas into SO₂. Potential SO₂ emissions are directly related to the sulfur content of fuels; therefore, the control of SO₂ emissions is most directly associated with using a low sulfur fuel such as natural gas. For relatively small natural gas-fired sources, post combustion controls are technically infeasible and impractical due to the small quantities of SO₂ present in the exhaust gas. Furthermore, there were no examples available in the RBLC of these control devices being applied to natural gas-fired combustion sources. Therefore, Roxul proposes use of natural gas as BACT for SO₂ emissions from Coal Milling. Proposed compliance demonstration methods are summarized in Attachment O. Emissions of SO₂ from drying of coal in the mill are not expected because the coal is dried at 180°F (82°C), which is not a high enough temperature to undergo combustion.

D.7.4

Coal Milling - NO_x

As previously discussed, natural gas has negligible chemically bound fuel N₂; thus, potential NO_x emissions are minimal. Low-NO_x burner technology is the only technically feasible control option identified for reducing NO_x emissions.

Low-NO_x burners are commonly used in small boilers to reduce NO_x emissions. Roxul proposes minimizing NO_x emissions through the use of LNB (at 60 ppmvd at 3% O₂ based on manufacturer specification) and natural gas along with good combustion practices. Good combustion practices include activities such as maintaining operating logs and recordkeeping, conducting training, ensuring maintenance knowledge, performing routine and preventive maintenance, conducting burner and control adjustments, monitoring fuel quality, etc. Emissions of NO_x from drying of coal in the mill are not expected because the coal is dried at 180°F (82°C), which is not a high enough temperature to undergo combustion.

D.8 BACT DETERMINATION FOR OTHER FACILITY-WIDE ACTIVITIES

This section evaluates BACT for the following sources as described in Section 2 of the application:

- Rockfon Building Heat (RFN10);
- Natural Gas Boiler 1 and Natural Gas Boiler 2 (CM03, CM04);
- Product Marking (P_MARK);
- Emergency Fire Pump Engine (EFP1);
- Furnace Cooling Tower (IMF02);
- Gutter Cooling Tower (HE02); and
- Miscellaneous Storage Tanks (TKS).

D.8.1 Rockfon Building Heat, Natural Gas Boiler 1, and Natural Gas Boiler 2 – Filterable PM, PM₁₀, PM_{2.5}, and CPM

PM emissions from combustion are primarily the result of incomplete combustion, though PM emissions are also produced from the carryover of noncombustible trace constituents in the fuel (such as ash and metallic additives). Natural gas contains a very small amount of noncombustible trace constituents that result in PM emissions.

Step 1 – Identify Potential Control Technologies

The following technologies are potentially available control technologies for PM/PM₁₀/PM_{2.5} emission controls for natural gas-fired combustion (boilers).

Control Type	Estimated PM/PM ₁₀ /PM _{2.5} and CPM Control Efficiency
Fabric filter (baghouse)	95-99+% (As low as 0.001 gr/dscf)
Wet scrubber or high efficiency Venturi scrubber	70-99% (<0.01 gr/dscf)
ESP	>98% (0.004 – 0.01 gr/dscf)
Clean fuel and good combustion practices	Varies

With the exception of clean fuel, descriptions of these controls were previously discussed in Section D.3.1.

- *Clean Fuel and Good Combustion Practices* - Clean Fuel and Good Combustion Practices - Fuels containing ash have the potential to produce particulate emissions. Additionally, fuels containing sulfur have the potential to produce sulfur compounds that may form condensable particulate emissions. Natural gas contains negligible amounts of particulate and is considered a low sulfur fuel. The use of good combustion practices can minimize the potential particulate emissions associated with incomplete combustion.

Step 2 - Eliminate Technically Infeasible Options

Fabric Filter (Baghouse)

A baghouse is a post-combustion control technology that utilizes a fine mesh filter to remove particulate emissions primarily from large volume gas streams containing high particulate concentrations. No examples have been found where a baghouse has been applied to a small natural gas fired boiler due to the reduced volume and minimal particulate concentration of the associated exhaust gas stream. Therefore, baghouse technology is not technically feasible for the boilers.

ESP

ESP is a post-combustion particulate emissions control most readily applied to large volume gas streams containing high particulate concentrations. No examples have been found where an ESP has been applied to a small natural gas fired boiler due to the reduced volume and minimal particulate concentration of the associated exhaust gas stream. Therefore, ESP is not technically feasible for the boilers.

Wet Scrubber or High Efficiency Venturi Scrubber

For relatively small natural gas-fired sources, post-combustion controls, such as wet scrubbers are both technically infeasible and impractical due to the high pressure drops associated with these units and the low concentrations of PM/PM₁₀/PM_{2.5} present in the exhaust gas.

Step 3 - Rank Remaining Technically Feasible Control Options

1. Clean fuel (natural gas) and good combustion practices.

Step 4 - Evaluate Remaining Control Technologies

Clean Fuel and Good Combustion Practices

Because emissions of PM are small, add-on controls would not be necessary and would be considerably cost prohibitive. During the review of available control

technologies for combustion sources at similar plants, no determinations were found for the use of add-on controls to reduce PM emissions from natural gas-fired equipment. Therefore, Roxul considers BACT for these combustion sources to be the use of natural gas, a clean-burning fuel with low PM emissions, and good combustion practices.

Step 5 – Selection of BACT

Roxul proposes to use clean fuel (natural gas) and good combustion practices with no add-on controls as BACT for PM/PM₁₀/PM_{2.5} emissions from the boilers. Proposed compliance demonstration methods are summarized in Attachment O.

D.8.2 *Rockfon Building Heat, Natural Gas Boiler 1, and Natural Gas Boiler 2 – CO, VOC*

CO and VOC emissions from combustion result from incomplete combustion caused when some of the fuel is only partially burned.

Step 1 – Identify Potential Control Technologies

The most stringent control technology used to control CO emissions from combustion is catalytic oxidation. Catalytic oxidation systems are also used to reduce VOC and organic HAP emissions. The following technologies are potentially available control technologies for CO and VOC emission controls for natural gas combustion sources.

Control Type	Estimated CO/VOC Control Efficiency
Thermal oxidizer (afterburner)	98-99+ %
Recuperative Thermal Oxidizer	98-99+ %
Regenerative Thermal Oxidizer	95-99%
Catalytic oxidizer	90-99%
Clean fuel and good combustion practices	Varies

Except for clean fuel, descriptions of these controls were previously discussed in Section D.3.2. Clean fuel and good combustion practices are discussed in Section D.8.1.

Step 2 – Eliminate Technically Infeasible Options

Catalytic Oxidation

Catalytic oxidation is a post-combustion control technology that utilizes a catalyst to oxidize CO and VOC into CO₂ or water (H₂O). The technology has most commonly been applied to natural gas fired combustion turbines. No examples were identified where add-on control technology has been applied to a small natural gas-fired boiler. Because of the low quantities of CO and VOC

emissions and the limited use of the boilers, the use of catalytic oxidation technology is determined to be not technically feasible.

Thermal Oxidizer, Recuperative Thermal Oxidizer, and Regenerative Thermal Oxidizer

For relatively small natural gas-fired sources, post-combustion controls, such as thermal oxidizers, recuperative and regenerative thermal oxidizers are both technically infeasible and impractical due to the relatively small quantities of CO and VOC present in the exhaust gas.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Clean fuel (natural gas) and good combustion practices.

Step 4 – Evaluate Remaining Control Technologies

Clean Fuel and Good Combustion Practices

Add-on controls, even if feasible, are not typically required for combustion sources fired with natural gas. During the review of available control technologies for combustion sources at similar plants, no determinations were found for the use of add-on controls to reduce CO and VOC emissions from natural gas-fired equipment. Therefore, Roxul proposes that BACT for CO and VOC emissions from the boilers be limited to the use of natural gas (a clean-burning fuel with low CO and VOC emissions), good combustion practices, and a numerical emission limit of 84 lb CO/MMscf (1,346 kg/MMsm³) natural gas.

Step 5 – Selection of BACT

Roxul will utilize clean fuel (natural gas) and good combustion practices with no add-on controls, and a numerical emission limit of 84 lb CO/MMscf (1,346 kg/MMsm³) natural gas as BACT for CO and VOC emissions from the boilers. Proposed compliance demonstration methods are summarized in Attachment O.

D.8.3 *Rockfon Building Heat, Natural Gas Boiler 1, and Natural Gas Boiler 2 – SO₂*

The boilers oxidize sulfur compounds present in natural gas into SO₂. The control of SO₂ emissions is most directly associated with using a low sulfur fuel such as natural gas. Minimizing fuel sulfur content through the use of low sulfur diesel fuels or natural gas has been determined to be BACT for many combustion processes, including natural gas-fired boilers. Therefore, Roxul proposes use of low sulfur fuel (pipeline quality natural gas, as supplied) as BACT for the natural gas-fired boilers. Proposed compliance demonstration methods are summarized in Attachment O.

D.8.4 *Rockfon Building Heat, Natural Gas Boiler 1, and Natural Gas Boiler 2 – NO_x*

The principle pollutant generated by combustion of natural gas in the boilers is nitric oxide (NO) and nitrogen dioxide (NO₂), collectively referred to as NO_x. The majority of NO_x produced during combustion is NO (95%), but once emitted into the atmosphere, NO reacts to form NO₂. Proposed compliance demonstration methods are summarized in Attachment O.

Step 1 – Identify Potential Control Technologies

The following technologies are determined to be potentially available control technologies for NO_x emission controls from the natural gas-fired boilers.

Control Type	Estimated NO _x Control Efficiency
SCR	70-95%
SNCR	40-75%
Low NO _x Burners	30-40%
Good combustion practices	Varies

Descriptions of these controls were previously discussed in Section D.3.4. and Section D.4.4.

Step 2 – Eliminate Technically Infeasible Options

SCR

SCR is a post-combustion technology that reduces NO_x emissions by reacting NO_x with ammonia in the presence of a catalyst. SCR technology has been most commonly applied to larger boilers and to natural gas-fired combustion turbines. The outlet gas temperature will be substantially below that required for SCR. A precious metal catalyst may be feasible for SCR at a lowered temperature and a reduced NO_x control performance, but substantial reheat of the gas stream would be required. Therefore, SCR is not technically feasible for the small boilers.

SNCR

SNCR is a post-combustion NO_x control technology where ammonia or urea is injected into the exhaust to react with NO_x to form N₂ and water without the use of a catalyst. Use of this technology requires uniform mixing of the reagent and exhaust gas within a narrow temperature range. Operations outside of this temperature range will significantly reduce removal efficiencies and may result in ammonia emissions or increased NO_x emissions. No examples were found where SNCR has been applied to a small boiler. Small boilers are limited by the availability of sufficient residence times and temperature zones. There is no appropriate temperature range zone for SNCR. Therefore, SNCR is not technically feasible for the small boilers.

For relatively small natural gas-fired sources, post-combustion controls, such as SCR and SNCR are both technically infeasible and impractical due to the relatively small quantities of NO_x present in the exhaust gas.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Low-NO_x burners.
2. Good combustion practices.

Step 4 – Evaluate Remaining Control Technologies

Low NO_x Burners

Low-NO_x burner technology is the only technically feasible control option identified for reducing NO_x emissions. Low-NO_x burners are commonly used in small boilers to reduce NO_x emissions.

Step 5 – Selection of BACT

Roxul will utilize low-NO_x burners with a NO_x emission limit of 30 ppmvd @3% O₂ with no add-on controls as BACT for NO_x emissions from the boilers. Proposed compliance demonstration methods are summarized in Attachment O.

D.8.5 *Emergency Fire Pump Engine*

One diesel-fueled emergency fire pump engine will be installed to pump water in the event of a fire. The engine will be certified by the manufacturer to the standards in NSPS Subpart IIII.

Roxul proposes BACT for the emergency fire pump engine to be use of an engine certified to meet the standards of NSPS Subpart IIII. Emissions from the engine will be minimal because of limited operating hours. As a result, the addition of control devices cannot be cost effective. The engine will meet BACT through USEPA standards for PM, NO_x+NMHC (non-methane hydrocarbon), and CO and compliance with NSPS Subpart IIII. Further, the use of ultra-low sulfur diesel (ULSD) fuel (15 ppm sulfur) will limit emissions of SO₂.

D.8.6 *Product Marking*

Product marking emissions are generated by branding wheels fired by natural gas combustion (combined maximum burner capacity 0.4 MMBtu/hr) or inkjet labeling.

Individual pollutant emissions from combustion associated with branding wheels are very small (less than 0.05 lb/hr for individual criteria pollutants). The concentration of criteria pollutant emissions is below the threshold where add-on controls are applicable, and the addition of control devices cannot be cost effective for BACT. However, for the products of combustion, Roxul proposes to

use clean fuel (natural gas) and no add-on controls as BACT to control PM/PM₁₀/PM_{2.5}, CPM, VOC, CO, SO₂, and NO_x combustion emissions.

The inkjet labeling system utilizes VOC-containing inkjet inks and VOC-containing ink cleaners. These emissions will be fugitive and will have a lower emission rate than the VOC emissions from the Fleece Application line. As such, add-on controls will not be cost effective. Potential material substitutions, such as dye sublimation inks (used for fabrics with high percentages of polyester fibers) and UV-curable inks (used for rigid substrates because of their susceptibility to cracking on a flexible substrate) are not suitable for this process. Therefore, good work practices are selected as BACT. Good work practices include storing VOC-containing materials in closed tanks or containers, cleaning up spills, and minimizing cleaning with VOC compounds. VOC emissions from inking will be limited to 9.48 tpy (8.60 tonne/yr) on a rolling 12-month basis.

D.8.7 *Melting Furnace Cooling Tower and Gutter Cooling Tower - Filterable PM, PM₁₀, and PM_{2.5}*

PM/PM₁₀/PM_{2.5} emissions from cooling towers occur because wet 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 an emission.

Step 1 - Identify Potential Control Technologies

Control efficiencies for potentially applicable technologies are shown in the table below.

Control Type	Estimated PM/PM ₁₀ /PM _{2.5} Control Efficiency
High efficiency drift/mist eliminators	0.001 - 0.0005% drift loss
Limit Total Dissolved Solids (TDS) Concentration in Circulating Water	Varies

- *High Efficiency Drift Eliminators* - High efficiency drift eliminators remove entrained water droplets from the air, thus, reducing PM, PM₁₀, and PM_{2.5} emissions. Types of drift eliminators include herringbone (blade-type), wave form, and cellular (or honeycomb) designs. Drift eliminator system materials of construction may include ceramics, fiber reinforced cement, fiberglass, metal, plastic, or wood. Typically, drift eliminators are constructed of polyvinyl chloride plastic material, which effectively eliminates corrosion. Drift eliminators also incorporate ultraviolet inhibitors to resist cracking and degradation due to sunlight. Drift eliminator system designs may include other features, such as corrugations and water removal channels, to enhance the drift removal further. The drift rate as a percentage of circulating water flow rates varies with the specific project, and typically ranges from 0.01 to 0.0005% of circulating water flow rates. Higher efficiency drift eliminators

can achieve drift loss rates of 0.001% to 0.0005% of the circulating water flow rates.

- *Limiting TDS Concentrations in the Circulating Water* - In general, water droplets released as drift from wet cooling towers contain TDS concentrations equivalent to the solids concentrations in the circulating water. Dissolved solids can accumulate in the cooling water due to the following:
 - An increase in the concentration of dissolved solids in the make- up water as the circulating water evaporates;
 - Adding anti-corrosion additives to the cooling water; and/or
 - Adding anti-biocide additives to the cooling water.

Limiting the TDS concentration in the cooling water can reduce particulate emissions.

Drift/mist eliminators are the most commonly used control technique for PM/PM₁₀/PM_{2.5} emissions from cooling towers. A typical drift loss for cooling towers is 0.001%.

Step 2 – Eliminate Technically Infeasible Options

All proposed control technologies are technically feasible.

Step 3 – Rank Remaining Technically Feasible Control Options

The remaining control technologies for minimizing PM, PM₁₀, and PM_{2.5} emissions from the cooling towers are ranked in order of most effective to least effective, as follows:

1. High Efficiency Drift Eliminators (0.001% of circulating flow).
2. Limiting TDS Concentration in the circulating water.

Step 4 – Evaluate Remaining Control Technologies

High Efficiency Drift/Mist Eliminators

As previously discussed, there is a loss of water to the environment due to the evaporative cooling process. Trace chemicals and solids in the water droplets are emitted as PM. A drift eliminator is designed to capture the water droplets; thus, controlling the amount of total liquid drift. Drift eliminators cause the droplets to change direction and lose velocity at impact on the blade walls and fall back into the cooling tower. A review of the RBLC database and several other recently permitted cooling towers throughout the U.S. indicates that a high efficiency drift eliminator, achieving a drift rate of 0.001% is BACT for PM emissions from a cooling tower. Therefore, BACT for the cooling towers is proposed to be the top ranked control, high efficiency mist eliminators with a drift loss of 0.001%.

BACT Limit Overview

In the RBLC, BACT for cooling towers at certain energy centers, power plants, and refineries is selected as mist eliminators with a drift rate of 0.0005% instead of the typical drift rate of 0.001%. As previously mentioned, cooling tower particulate emissions depend not only on water circulation flow, but also drift rate and TDS content. According to RBLC search results, the typical circulating water rate associated with these units at energy-related facilities is over 100,000 gallons per minute (gpm). Specific examples include: Okeechobee Clean Energy Center's Mechanical Draft Cooling Tower with a flow rate of 465,815 gpm and a maximum TDS concentration of 35,000 ppm and Oregon Clean Energy Center's Mechanical Draft Cooling Tower with a flow rate of 322,000 gpm and a TDS of 2,030.5 ppm. A system with a lower water circulation rate can have a relatively higher particulate emissions rate if the TDS concentration is high. For example, Energy Answers Arcibo, LLC's Wet Cooling Tower has a flow rate of 65,150 gpm and a TDS concentration of 16,100 ppm. Each of these specific cooling tower examples with a drift rate of 0.0005% have an hourly emission limit ranging from 1.03 lb PM₁₀/hr (4.5 tons per year) up to 1.79 lb PM₁₀/hr (7.84 tons per year). The hourly emission rates from the Melting Furnace Cooling Tower and Gutter Cooling Tower will be a fraction of these rates (0.01 lb/hr or less).

Based on the circulating water flow rate, the TDS content, and drift rate, the emission rate from each cooling tower is 0.04 tpy of PM₁₀ or less and 0.02 tpy of PM_{2.5} or less; therefore, a drift loss of 0.001% is appropriate as BACT and is consistent with recent BACT determinations in the RBLC. If the circulating water flow rate or TDS concentration were significantly higher, then a drift loss of 0.0005% might be considered appropriate.

Step 5 - Selection of BACT

Roxul proposes to utilize a high efficiency drift/mist eliminator with 0.001% drift loss as BACT to control PM/PM₁₀/PM_{2.5} emissions from the Melting Furnace Cooling Tower and Gutter Cooling Tower. Proposed compliance demonstration methods are summarized in Attachment O.

D.8.8

Pre-Heat Burner - Filterable PM, PM₁₀, PM_{2.5}, and CPM

A small indirect-fired natural gas fired preheat burner is used to warm the Melting Furnace baghouses to prevent condensation prior to operation. PM emissions from combustion are primarily the result of incomplete combustion, though PM emissions are also produced from the carryover of noncombustible trace constituents in the fuel (such as ash and metallic additives). Natural gas contains a very small amount of noncombustible trace constituents that result in PM emissions.

Step 1 - Identify Potential Control Technologies

The following technologies are potentially available control technologies for PM/PM₁₀/PM_{2.5} emission controls for natural gas-fired heat transfer units.

Control Type	Estimated PM/PM ₁₀ /PM _{2.5} and CPM Control Efficiency
Fabric filter (baghouse)	95-99+% (As low as 0.001 gr/dscf)
Wet scrubber or high efficiency Venturi scrubber	70-99% (<0.01 gr/dscf)
ESP	>98% (0.004 - 0.01 gr/dscf)
Clean fuel and good combustion practices	Varies

Descriptions of these controls were previously discussed in Sections D.3.1 and D.8.1.

Step 2 – Eliminate Technically Infeasible Options

Fabric Filter (Baghouse)

A baghouse is a post-combustion control technology that utilizes a fine mesh filter to remove particulate emissions primarily from large volume gas streams containing high particulate concentrations. No examples have been found where a baghouse has been applied to an indirect natural gas fired heat transfer unit due to the reduced volume and minimal particulate concentration of the associated exhaust gas stream. Therefore, baghouse technology is not technically feasible for the preheat burner.

ESP

ESP is a post-combustion particulate emissions control most readily applied to large volume gas streams containing high particulate concentrations. No examples have been found where an ESP has been applied to an indirect natural gas fired heat transfer unit due to the reduced volume and minimal particulate concentration of the associated exhaust gas stream. Therefore, ESP is not technically feasible for the preheat burner.

Wet Scrubber or High Efficiency Venturi Scrubber

For relatively small natural gas-fired sources, post-combustion controls, such as wet scrubbers are both technically infeasible and impractical due to the high pressure drops associated with these units and the low concentrations of PM/PM₁₀/PM_{2.5} present in the exhaust gas.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Clean fuel (natural gas) and good combustion practices.

Step 4 – Evaluate Remaining Control Technologies

Clean Fuel and Good Combustion Practices

Because emissions of PM are small, add-on controls would not be necessary and would be considerably cost prohibitive. During the review of available control technologies for combustion sources at similar plants, no determinations were found for the use of add-on controls to reduce PM emissions from natural gas-fired equipment. Therefore, Roxul considers BACT for the Preheat Burner to be the use of natural gas, a clean-burning fuel with low PM emissions, and good combustion practices.

Step 5 – Selection of BACT

Roxul proposes to use clean fuel (natural gas) and good combustion practices with no add-on controls as BACT for PM/PM₁₀/PM_{2.5} emissions from the pre-heat burner. Proposed compliance demonstration methods are summarized in Attachment O.

D.8.9 Pre-Heat Burner – CO, VOC

CO and VOC emissions from combustion result from incomplete combustion caused when some of the fuel is only partially burned.

Step 1 – Identify Potential Control Technologies

The most stringent control technology used to control CO emissions from combustion is catalytic oxidation. Catalytic oxidation systems are also used to reduce VOC and organic HAP emissions. The following technologies are potentially available control technologies for CO and VOC emission controls for natural gas combustion sources.

Control Type	Estimated CO/VOC Control Efficiency
Thermal oxidizer (afterburner)	98-99+%
Recuperative thermal oxidizer	98-99+%
Regenerative thermal oxidizer	95-99%
Catalytic oxidizer	90-99%
Clean fuel and good combustion practices	Varies

Except for clean fuel, descriptions of these controls were previously discussed in Section D.3.2. Clean fuel and good combustion practices are discussed in Section D.8.1.

Step 2 – Eliminate Technically Infeasible Options

Catalytic Oxidizer

Catalytic oxidation is a post-combustion control technology that utilizes a catalyst to oxidize CO and VOC into CO₂ or H₂O. The technology has most commonly been applied to natural gas fired combustion turbines. No examples were identified where add-on control technology has been applied to an indirect

natural gas-fired heat transfer unit. Because of the low quantities of CO and VOC emissions and the limited use of the boilers, the use of catalytic oxidation technology is determined to be not feasible.

Thermal Oxidizer (Afterburner), Recuperative Thermal Oxidizer, and Regenerative Thermal Oxidizer

For relatively small natural gas-fired sources, post-combustion controls, such as thermal oxidizers, recuperative thermal oxidizers, and regenerative thermal oxidizers are both technically infeasible and impractical due to the relatively small quantities of CO and VOC present in the exhaust gas.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Clean fuel (natural gas) and good combustion practices.

Step 4 – Evaluate Remaining Control Technologies

Clean Fuel and Good Combustion Practices

Add-on controls, even if feasible, are not typically required for combustion sources fired with natural gas. During the review of available control technologies for combustion sources at similar plants, no determinations were found for the use of add-on controls to reduce CO and VOC emissions from natural gas-fired equipment. Therefore, Roxul proposes that BACT for CO and VOC emissions from the preheat burner be limited to the use of natural gas (a clean-burning fuel with low CO and VOC emissions), good combustion practices, and a numerical emission limit of 84 lb CO/MMscf (1,346 kg/MMsm³) natural gas.

Step 5 – Selection of BACT

Roxul will utilize clean fuel (natural gas) and good combustion practices with no add-on controls, and a numerical emission limit of 84 lb CO/MMscf (1,346 kg/MMsm³) natural gas as BACT for CO and VOC emissions from the pre-heat burner. Proposed compliance demonstration methods are summarized in Attachment O.

D.8.10

Pre-Heat Burner – SO₂

The preheat burner oxidizes sulfur compounds present in natural gas into SO₂. The control of SO₂ emissions is most directly associated with using a low sulfur fuel such as natural gas. Potential SO₂ emissions are directly related to the sulfur content of fuels. Minimizing fuel sulfur content through the use of low sulfur diesel fuels or natural gas has been determined to be BACT for many combustion processes, including indirect natural gas-fired heat transfer units. Therefore, Roxul proposes use of low sulfur fuel (pipeline quality natural gas, as supplied) as BACT for the natural gas-fired pre-heat burner.

D.8.11

Pre-Heat Burner - NO_x

The principle pollutant generated by combustion of natural gas in the boilers is NO and NO₂, collectively referred to as NO_x. The majority of NO_x produced during combustion is NO (95%), but once emitted into the atmosphere, NO reacts to form NO₂.

Step 1 – Identify Potential Control Technologies

The following technologies are determined to be potentially available control technologies for NO_x emission controls from the preheat burner.

Control Type	Estimated NO _x Control Efficiency
SCR	70-95%
SNCR	40-75%
Low NO _x burners	30-40%
Ultra-Low NO _x burners	80-90%
Good combustion practices	Varies

Descriptions of these controls were previously discussed in Section D.3.4. and Section D.4.4.

Step 2 – Eliminate Technically Infeasible Options*SCR*

SCR is a post-combustion technology that reduces NO_x emissions by reacting NO_x with ammonia in the presence of a catalyst. SCR technology has been most commonly applied to larger boilers and to natural gas-fired combustion turbines. The outlet gas temperature will be substantially below that required for SCR. A precious metal catalyst may be feasible for SCR at a lowered temperature and a reduced NO_x control performance, but substantial reheat of the gas stream would be required. Therefore, SCR is not technically feasible for the small pre-heat burner.

SNCR

SNCR is a post-combustion NO_x control technology where ammonia or urea is injected into the exhaust to react with NO_x to form N₂ and water without the use of a catalyst. Use of this technology requires uniform mixing of the reagent and exhaust gas within a narrow temperature range. Operations outside of this temperature range will significantly reduce removal efficiencies and may result in ammonia emissions or increased NO_x emissions. No examples were found where SNCR has been applied to a small natural gas-fired burner. There is no appropriate temperature range zone for SNCR. Therefore, SNCR is not technically feasible for the small pre-heat burner.

For relatively small natural gas-fired sources, post-combustion controls, such as SCR and SNCR are both technically infeasible and impractical due to the relatively small quantities of NO_x present in the exhaust gas.

ULNB

ULNB cannot be used in the Pre-Heat Burner because it is an open air system using direct combustion. ULNB would have little or no reduction beyond baseline low NO_x emissions in an open air application.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Low NO_x burners.
2. Good combustion practices.

Step 4 – Evaluate Remaining Control Technologies

BACT Limit Overview

RBLC search results for NO_x BACT emission limits for small natural gas fired sources indicate that the typical BACT the emission rate established for small natural gas fired burners (approximately 5 MMBtu/hr) is 0.1 lb/MMBtu (60 ppmvd @ 3% O₂) with good combustion practices and no add-on control.

LNB

LNB are applicable, economical, and will be employed for the Pre-Heat Burner. Low NO_x burners will be installed to meet 60 ppmvd at 3% O₂ based on manufacturer specification.

Good Combustion Practices

Good combustion practices are applicable, economical, and will be employed for the Pre-Heat Burner. Good combustion practices include activities such as maintaining combustion equipment according to the manufacturer's instructions and adjusting air-to-fuel ratio per the manufacturer's recommendations.

Step 5 – Selection of BACT

Roxul proposes to implement good combustion practices and LNB at 60 ppmvd @ 3% O₂ for NO_x emissions from the Pre-Heat Burner.

D.8.12

Miscellaneous Facility-wide Storage Tanks

Roxul proposes BACT for these emission units (refer to Section 2 of the application for a complete list) to be use of good operating practices with no add-on controls. All tanks that store volatile organic liquids at the Roxul facility will have capacities less than 19,813 gallons and are therefore not subject to NSPS

Subpart Kb. VOC emissions from these storage tanks are very small. As a result, the addition of control devices cannot be cost effective.

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 CO₂e 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: CO₂, methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorinated compounds (PFCs), and sulfur hexafluoride (SF₆). GHG emissions associated with combustion equipment are limited to CO₂, CH₄ and N₂O.

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. CO₂ 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 CO₂. Full oxidation of fuel carbon to CO₂ 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 O₂.

D.9.2 Description of CO₂e Control Technologies

Global Warming Potentials (GWPs) are used to calculate CO₂e to normalize emissions of pollutants such as CH₄ and N₂O, which are deemed to have a

greater detrimental impact on a mass basis than CO₂. Potential control options are addressed for CO₂e below. Because the primary GHG emitted by Roxul's mineral wool production facility will be CO₂, the control technologies and measures presented in this section focus on CO₂ control technologies.

D.9.2.1 CO₂ Control Technologies

Discussions of CO₂ 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 CO₂ 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 CO₂ emissions from the atmosphere through capturing and storing the CO₂ deep in the subsurface of the Earth. CCS is made up of three key stages:

1. **Capture:** Carbon capture is the separation of CO₂ from other gases produced when fossil fuels are combusted. Post-combustion CO₂ 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, CO₂ is compressed to facilitate transportation and storage if a locally available site for direct injection is unavailable. After compression, CO₂ is transported via pipeline to a suitable geologic storage site.
3. **Storage:** At a storage site, CO₂ 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 CO₂ from returning to the surface. Monitoring, reporting, and verification are important to demonstrate that CO₂ 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

CO₂ 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 CO₂. 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 CO₂ emissions from combustion. The use of lower carbon containing fuels can be an effective means to reduce the generation of CO₂ during the combustion process for sources with natural gas combustion capabilities.

D.9.2.2 CH₄ Control Technologies

Specific technologies and mitigation approaches for CH₄ vary by emission source due to different characteristics and emission processes. CH₄ emissions can be reduced by operating combustion processes with higher flame temperatures and higher excess O₂ levels. Available control technologies for the control of CH₄ 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 CH₄ emissions can increase NO_x emissions. Consequently, achieving low CH₄ and low NO_x emission rates is a balancing act in combustion process design and operation. In general, installing controls on combustion sources for CH₄ 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 N₂O Control Technologies

N₂O is generally emitted from industry through fossil fuel combustion, so technological upgrades and fuel switching are effective ways to reduce industry emissions of N₂O. N₂O emissions can be minimized when combustion temperatures are kept high (above 1,475°F) and excess O₂ is kept to a minimum (less than 1%). The control of N₂O emissions is primarily achieved through reductions in fossil fuel consumption through energy efficiency and energy

saving measures. Because N₂O emissions will be a small fraction of the GHG emissions produced, installing controls for N₂O 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. CO₂e 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 CO₂e 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 CO₂e 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 CO₂ 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 CO₂e 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 CO₂ 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 CO₂ 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 CO₂ 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 CO₂ 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 CO₂ storage project³⁴ was conducted to examine the feasibility of injecting CO₂ 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 CO₂ 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 with sufficient CO₂ storage capacity³⁵ 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 CO₂ from industrial sources, transport of the captured CO₂ (usually in pipelines), and storage of that CO₂ in suitable geologic reservoirs. There are neither geologic reservoirs, nor pipelines dedicated to CO₂ 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 CO₂ 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 CO₂ emissions from the Melting Furnace are shown in Appendix D-1. At approximately \$176 per ton of CO₂e 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 NO _x .	melting process to optimize complete combustion.

RBLC entries for various combustion sources were reviewed. These entries support a CO₂e 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 CO₂e 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 CO₂ 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

CO₂e 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 CO₂ during the combustion process. This conversion is relatively independent of combustor type. Unconverted fuel carbon results in emissions of CH₄, CO, and/or other VOC emissions due to incomplete combustion. Even boilers and heaters operating with poor combustion efficiency produce insignificant amounts of CH₄, CO, and VOC compared to CO₂ levels. Thus, the following control analysis focuses on CO₂ 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 CO₂e 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 CO₂ emissions.

Carbon Capture with Dedicated Sequestration

Dedicated geological sequestration of CO₂ 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 CO₂ 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 CO₂ from power plants or industrial sources, transport of the captured CO₂ (usually in pipelines), and storage of that CO₂ in suitable geologic reservoirs. Post-combustion capture through amine absorption is available for CO₂ separation processes. Utilizing a long-distance pipeline to deliver captured CO₂ to sequestration sites would virtually eliminate CO₂ emissions from these combustion sources.

Approximate costs for capturing, transporting, and storing the CO₂ emissions from the natural gas combustion units are shown in Appendix D-1. At approximately \$595 per ton of CO₂e 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 CO₂ 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 CO₂ 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 O₂ 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 O₂ 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 CO₂e 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 CO₂e 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 CO₂e 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 CO₂e 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 CO₂.

Step 1 - Identify Potential Control Technologies

The following technologies and innovative processes were identified as potential control measures for CO₂e.

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 CO₂ needed to clean the filter and no more. CO₂ is the most feasible cleaning material because the cooling effect created by the sublimation of the CO₂ 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. CO₂ pellet blasting protects the integrity of the filter net. Alternative blasting materials, such as water, are used when possible, whereas CO₂ pellets are used when a more abrasive substance is required to remove particles. The use of CO₂ pellets results in a smaller volume of solid waste for disposal.

Step 5 – Selection of BACT

For CO₂e emissions from dry ice cleaning, BACT is selected to be energy efficiency measures, including the use of CO₂ pellets for cleaning efficiency and waste reduction. No adverse energy, environmental, or economic impacts are associated with this option. Numerical BACT limits for CO₂e 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 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 CO₂e 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.

CO₂ emissions from the emergency fire pump engine will be produced from the combustion of hydrocarbons present in the diesel fuel. CH₄ emissions result from incomplete combustion of hydrocarbons present in the diesel fuel. N₂O 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 CO₂e 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 CO₂e 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 III is proposed as BACT for CO₂e. 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 CO₂e emissions and maximize energy efficiency.

Step 5 - Select BACT

For emissions of CO₂e 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 III). Numerical BACT limits for CO₂e 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 represents a small fraction of GHG emissions at the facility.

Best Available Control Technology – Supporting Tables
Appendix D-1

November 2017
Project No. 0408003

Environmental Resources Management
204 Chase Drive
Hurricane, West Virginia 25526
304-757-4777

Table D-1. MELTING FURNACE - CO - TO Control Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM—THERMAL INCINERATORS

COST BASE DATE: April 1988 [1]	
VAPCCI (First Quarter 2007—Preliminary: [2])	149.4 Updated 1st Quarter 2007
CEPCI (January 2007)	509.7
CEPCI (February 2017)	558.3

INPUT PARAMETERS

– Gas flowrate (scfm):	21414	Exhaust	
– Reference temperature (oF):	77	Ambient	
– Inlet gas temperature (oF):	302	Roxul	
– Inlet gas density (lb/scf):	0.0739	Calculated	
– Primary heat recovery (fraction):	0.70	Default for TO	
– Waste gas heat content (BTU/scf):	0.0381	Based on (lb/hr):	11 21
– Waste gas heat content (BTU/lb):	0.516	Calculated	
– Gas heat capacity (BTU/lb-oF):	0.255	Default	
– Combustion temperature (oF):	1400	Roxul	
– Preheat temperature (oF):	1071	Calculated	
– Fuel heat of combustion (BTU/lb):	21502	Methane	
– Fuel density (lb/ft3):	0.0408	Methane	

DESIGN PARAMETERS

– Auxiliary Fuel Requirement (lb/min):	8,780	Calculated
(scfm):	215.2	Calculated
– Total Gas Flowrate (scfm):	21629	Calculated

CAPITAL COSTS

Equipment Costs (\$):	
– Incinerator:	
@ 0 % heat recovery:	0
@ 35 % heat recovery:	0
@ 50 % heat recovery:	0
@ 70 % heat recovery:	258,818
– Other (auxiliary equipment, etc.):	0
Total Equipment Cost—base:	258,818
—escalated:	529,763
Purchased Equipment Cost (\$):	625,121
Total Capital Investment (\$):	1,011,444 <u>Includes Monitoring Equip</u>

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760	TO hr/yr
Operating labor rate (\$/hr):	28.00	Operator wage
Maintenance labor rate (\$/hr):	40.00	Maintenance wage
Operating labor factor (hr/sh):	1.5	Default
Maintenance labor factor (hr/sh):	1.5	Default
Electricity price (\$/kwh):	0.066	EIA, July 2017
Natural gas price (\$/mscf):	5.00	EIA, 10 Year Avg
Annual interest rate (fraction):	0.07	Default
Control system life (years):	20	Default
Capital recovery factor:	0.0944	Default
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. w.c.):	19.0	Default

ANNUAL COSTS

item	Cost (\$/yr)	Wt. Factor	W.F.(cond.)
Operating labor	45,990	0.044	---
Supervisory labor	6,899	0.007	---
Maintenance labor	65,700	0.063	---
Maintenance materials	65,700	0.063	---
Natural gas	565,366	0.542	---
Electricity	46,334	0.044	---
Overhead	110,573	0.106	0.283
Taxes, insurance, administrative	40,458	0.039	---
Capital recovery	95,473	0.092	0.130
Total Annual Cost	1,042,493	1.000	1.000

[1] Original equipment costs reflect this date.

[2] VAPCCI = Vatevuk Air Pollution Control Cost Index (for thermal incinerators) corresponding to year and quarter shown. Original equipment cost, purchased equipment cost, and total capital investment have been escalated to this data via the VAPCCI and control equipment vendor data.

[3] Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017.

[4] CEPCI = Chemical Engineering Plant Cost Index.

Melting Furnace CO Controlled by TO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$529,763
Instrumentation & Controls	0.10A	(2)	\$52,976
Sales Taxes	0.03A	(2)	\$15,893
Freight	0.05A	(2)	\$26,488
Total Purchased Equipment Cost		B =	\$625,121
Direct Installation Costs:			
Foundations & Supports	0.08B	(2)	\$50,010
Handling & Erection	0.14B	(2)	\$87,517
Electrical	0.04B	(2)	\$25,005
Piping	0.02B	(2)	\$12,502
Insulation for Ductwork	0.01B	(2)	\$6,251
Painting	0.01B	(2)	\$6,251
Total Direct Installation Costs			\$187,536
Indirect Installation Costs:			
Engineering	0.10B	(2)	\$62,512
Construction & Field Expenses	0.05B	(2)	\$31,256
Contractor Fees	0.10B	(2)	\$62,512
Start-up	0.02B	(2)	\$12,502
Performance Test	0.01B	(2)	\$6,251
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.03B	(2)	\$18,754
Total Indirect Installation Costs			\$198,787
TOTAL CAPITAL COSTS:		C =	\$1,011,444
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$565,366
Electricity		(1)	\$46,334
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$40,458
TOTAL OPERATION AND MAINTENANCE COSTS			\$947,019
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Capital Recovery System:	\$95,473		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$1,042,493		

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Note: USEPA OAQPS Cost Spreadsheets calculate Total Capital Investment for Thermal Incinerators.

Melting Furnace Controlled by TO
Case 1 - CO Emissions

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
TOTAL CAPITAL COSTS:		C =	\$1,011,444
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$565,366
Electricity		(1)	\$46,334
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$40,458
TOTAL OPERATION AND MAINTENANCE COSTS			\$947,019
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Total Capital Recovery System:	\$95,473		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$1,042,493		
Tons CO removed =	48.12		
Cost Per Ton Removed =	\$21,664		

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO&T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-2. MELTING FURNACE - VOC - TO Control Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM—THERMAL INCINERATORS

COST BASE DATE: April 1988 [1]	
VAPCCI (First Quarter 2007—Preliminary: [2])	149.4 Updated 1st Quarter 2007
CEPCI (January 2007)	509.7
CEPCI (February 2017)	558.3

INPUT PARAMETERS

— Gas flowrate (scfm):	21414	Exhaust	
— Reference temperature (oF):	77	Ambient	
— Inlet gas temperature (oF):	302	Roxul	
— Inlet gas density (lb/scf):	0.0739	Calculated	
— Primary heat recovery (fraction):	0.70	Default for TO	
— Waste gas heat content (BTU/scf):	0.1044	Based on (lb/hr):	11.66
— Waste gas heat content (BTU/lb):	1.41	Calculated	
— Gas heat capacity (BTU/lb-oF):	0.255	Default	
— Combustion temperature (oF):	1400	Roxul	
— Preheat temperature (oF):	1071	Calculated	
— Fuel heat of combustion (BTU/lb):	21502	Methane	
— Fuel density (lb/ft ³):	0.0408	Methane	

DESIGN PARAMETERS

— Auxiliary Fuel Requirement (lb/min):	8.713	Calculated
(scfm):	213.6	Calculated
— Total Gas Flowrate (scfm):	21627	Calculated

CAPITAL COSTS

Equipment Costs (\$):	
— Incinerator:	
@ 0 % heat recovery:	0
@ 35 % heat recovery:	0
@ 50 % heat recovery:	0
@ 70 % heat recovery:	258,813
— Other (auxiliary equipment, etc.):	0
Total Equipment Cost—base:	258,813
—escalated:	529,753
Purchased Equipment Cost (\$):	625,109
Total Capital Investment (\$):	1,011,425 <u>Includes Monitoring Equip</u>

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760	TO hr/yr
Operating labor rate (\$/hr):	26.00	Operator wage
Maintenance labor rate (\$/hr):	40.00	Maintenance wage
Operating labor factor (hr/sh):	1.5	Default
Maintenance labor factor (hr/sh):	1.5	Default
Electricity price (\$/kwh):	0.068	EIA, July 2017
Natural gas price (\$/mscf):	5.00	EIA, 10 Year Avg
Annual interest rate (fraction):	0.07	Default
Control system life (years):	20	Default
Capital recovery factor:	0.0944	Default
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. w.c.):	19.0	Default

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F.(cond.)
Operating labor	45,990	0.044	—
Supervisory labor	8,899	0.007	—
Maintenance labor	65,700	0.063	—
Maintenance materials	65,700	0.063	—
Natural gas	561,043	0.540	—
Electricity	46,331	0.045	—
Overhead	110,573	0.107	0.284
Taxes, insurance, administrative	40,457	0.039	—
Capital recovery	95,471	0.092	0.131
Total Annual Cost	1,038,163	1.000	1.000

[1] Original equipment costs reflect this date.

[2] VAPCCI = Vatavik Air Pollution Control Cost Index (for thermal incinerators) corresponding to year and quarter shown. Original equipment cost, purchased equipment cost, and total capital investment have been escalated to this data via the VAPCCI and control equipment vendor data.

[3] Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017

[4] CEPCI = Chemical Engineering Plant Cost Index.

Melting Furnace VOC Controlled by TO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$529,753
Instrumentation & Controls	0.10A	(2)	\$52,975
Sales Taxes	0.03A	(2)	\$15,893
Freight	0.05A	(2)	\$26,488
Total Purchased Equipment Cost		B =	\$625,109
Direct Installation Costs:			
Foundations & Supports	0.08B	(2)	\$50,009
Handling & Erection	0.14B	(2)	\$87,515
Electrical	0.04B	(2)	\$25,004
Piping	0.02B	(2)	\$12,502
Insulation for Ductwork	0.01B	(2)	\$6,251
Painting	0.01B	(2)	\$6,251
Total Direct Installation Costs			\$187,533
Indirect Installation Costs:			
Engineering	0.10B	(2)	\$62,511
Construction & Field Expenses	0.05B	(2)	\$31,255
Contractor Fees	0.10B	(2)	\$62,511
Start-up	0.02B	(2)	\$12,502
Performance Test	0.01B	(2)	\$6,251
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.03B	(2)	\$18,753
Total Indirect Installation Costs			\$198,784
TOTAL CAPITAL COSTS:		C =	\$1,011,425
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$561,043
Electricity		(1)	\$46,331
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$40,457
TOTAL OPERATION AND MAINTENANCE COSTS			\$942,692
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Capital Recovery System:	\$95,471		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$1,038,163		

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Note: USEPA OAQPS Cost Spreadsheets calculate Total Capital Investment for Thermal Incinerators.

Melting Furnace Controlled by TO
Case 2 - VOC Emissions

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
TOTAL CAPITAL COSTS:		C =	\$1,011,425
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$561,043
Electricity		(1)	\$46,331
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$40,457
TOTAL OPERATION AND MAINTENANCE COSTS			\$942,692
Capital Recovery System:	0.0944 Assumes 7% compound interest rate and system useful life of 20 years.		
Total Capital Recovery System:	\$95,471		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$1,038,163		
Tons VOC removed =	50.05		
Cost Per Ton Removed =	\$20,743		

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO&T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-3. MELTING FURNACE - CO - RTO Control Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM--REGENERATIVE THERMAL OXIDIZERS

COST BASE DATE: December 1988 [1]

VAPCCI (First Quarter 2007--Preliminary); [2]	141.5	Updated 1st Quarter 2007
CEPCI (January 2007)	509.7	
CEPCI (February 2017)	558.3	

INPUT PARAMETERS

- Gas flowrate (scfm):	21414	Exhaust
- Reference temperature (oF):	77	Ambient
- Inlet gas temperature (oF):	302	Roxul
- Inlet gas density (lb/scf):	0.0739	Calculated
- Primary heat recovery (fraction):	0.95	Default for RTO
- Waste gas heat content (BTU/scf):	0.0361	Based on (lb/hr): 11.21
- Waste gas heat content (BTU/lb):	0.516	Calculated
- Gas heat capacity (BTU/lb-oF):	0.255	Default
- Combustion temperature (oF):	1400	Roxul
- Heat loss (fraction):	0.01	Default
- Exit temperature (oF):	357	Calculated
- Fuel heat of combustion (BTU/lb):	21502	Methane
- Fuel density (lb/ft3):	0.0408	Methane

DESIGN PARAMETERS

Auxiliary Fuel Requirement (lb/min):	1.245	Calculated
(scfm):	30.5	Calculated
Total Gas Flowrate (scfm):	21444	Calculated

TOTAL CAPITAL INVESTMENT (\$) [3]

(Cost correlations range: 5000 to 500,000 scfm)

@ 85 % heat recovery--base:	0	
' ' ' --escalated:	0	
@ 95 % heat recovery--base:	1,048,302	
' ' ' --escalated:	1,781,999	Includes Monitoring Equip

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760	RTO hr/yr
Operating labor rate (\$/hr):	28.00	Operator wage
Maintenance labor rate (\$/hr):	40.00	Maintenance wage
Operating labor factor (hr/sh):	1.5	Default
Maintenance labor factor (hr/sh):	1.5	Default
Electricity price (\$/kwh):	0.066	EIA, July 2017
Natural gas price (\$/mscf):	5.00	EIA, 10 Year Avg
Annual interest rate (fraction):	0.07	Default
Control system life (years):	20	Default
Capital recovery factor:	0.0944	Default
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. w.c.):	20.0	Default

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F.(cond.)
Operating labor	45,990	0.069	----
Supervisory labor	6,899	0.010	----
Maintenance labor	65,700	0.099	----
Maintenance materials	65,700	0.099	----
Natural gas	80,184	0.121	----
Electricity	48,353	0.073	----
Overhead	110,573	0.167	0.445
Taxes, insurance, administrative	71,280	0.108	----
Capital recovery	168,208	0.254	0.361
Total Annual Cost	662,887	1.000	1.000

[1] Base total capital investment reflects this date.

[2] VAPCCI = Valavuk Air Pollution Control Cost Index (for regenerative thermal oxidizers) corresponding to year and quarter shown. Base total capital investment has been escalated to this date via VAPCCI and control equipment vendor data.

[3] Source: Valavuk, William M. ESTIMATING COSTS OF AIR POLLUTION CONTROL. Boca Raton, FL Lewis Publishers, 1990.

[4] Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017.

[5] CEPCI = Chemical Engineering Plant Cost Index.

Melting Furnace CO Controlled by RTO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$935,361
Instrumentation & Controls	0.10A	(2)	\$93,536
Sales Taxes	0.03A	(2)	\$28,061
Freight	0.05A	(2)	\$46,768
Total Purchased Equipment Cost		B =	\$1,103,726
Direct Installation Costs:			
Foundations & Supports	0.08B	(2)	\$88,298
Handling & Erection	0.14B	(2)	\$154,522
Electrical	0.04B	(2)	\$44,149
Piping	0.02B	(2)	\$22,075
Insulation for Ductwork	0.01B	(2)	\$11,037
Painting	0.01B	(2)	\$11,037
Total Direct Installation Costs			\$331,118
Indirect Installation Costs:			
Engineering	0.10B	(2)	\$110,373
Construction & Field Expenses	0.05B	(2)	\$55,186
Contractor Fees	0.10B	(2)	\$110,373
Start-up	0.02B	(2)	\$22,075
Performance Test	0.01B	(2)	\$11,037
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.03B	(2)	\$33,112
Total Indirect Installation Costs			\$347,155
TOTAL CAPITAL COSTS:		C =	\$1,781,999
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$80,184
Electricity		(1)	\$48,353
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$71,280
TOTAL OPERATION AND MAINTENANCE COSTS			\$494,679
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Capital Recovery System:	\$168,208		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$662,887		

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
(2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
(3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Melting Furnace Controlled by RTO
Case 1 - CO Emissions

<u>CAPITAL COST (Pollution Control Equipment)</u>	<u>Unit Cost</u>	<u>Basis</u>	<u>Total (\$)</u>
TOTAL CAPITAL COSTS:		C =	\$1,781,999
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$80,184
Electricity		(1)	\$48,353
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$71,280
TOTAL OPERATION AND MAINTENANCE COSTS			\$494,679

Capital Recovery System: 0.0944 Assumes 7% compound interest rate and system useful life of 20 years.
 Total Capital Recovery System: \$168,208

Amortized Annual Costs = Annual O & M Costs + System Capital Recovery
 Amortized Annual Costs = \$662,887

Tons CO removed = 48.12
Cost Per Ton Removed = \$13,776

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO\$T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-4. MELTING FURNACE - VOC - RTO Control Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM-REGENERATIVE THERMAL OXIDIZERS

COST BASE DATE: December 1988 [1]

VAPCCI (First Quarter 2007--Preliminary): [2] 141.5 Updated 1st Quarter 2007

CEPCI (January 2007) 509.7

CEPCI (February 2017) 558.3

INPUT PARAMETERS

- Gas flowrate (scfm):	21414	Exhaust	
- Reference temperature (oF):	77	Ambient	
- Inlet gas temperature (oF):	302	Roxul	
- Inlet gas density (lb/scf):	0.0739	Calculated	
- Primary heat recovery (fraction):	0.95	Default for RTO	
- Waste gas heat content (BTU/scf):	0.1044	Based on (lb/hr):	11.66
- Waste gas heat content (BTU/lb):	1.412	Calculated	
- Gas heat capacity (BTU/lb-oF):	0.255	Default	
- Combustion temperature (oF):	1400	Roxul	
- Heat loss (fraction):	0.01	Default	
- Exit temperature (oF):	357	Calculated	
- Fuel heat of combustion (BTU/lb):	21502	Methane	
- Fuel density (lb/ft3):	0.0408	Methane	

DESIGN PARAMETERS

Auxiliary Fuel Requirement (lb/min):	1.241	Calculated
(scfm):	30.4	Calculated
Total Gas Flowrate (scfm):	21444	Calculated

TOTAL CAPITAL INVESTMENT (\$) [3]

(Cost correlations range: 5000 to 500,000 scfm)

@ 85 % heat recovery--base:	0
--escalated:	0
@ 95 % heat recovery--base:	1,048,300
--escalated:	1,781,996 Includes Monitoring Equip

ANNUAL COST INPUTS

Operating factor (hr/yr):	8780	RTO hr/yr
Operating labor rate (\$/hr):	28.00	Operator wage
Maintenance labor rate (\$/hr):	40.00	Maintenance wage
Operating labor factor (hr/sh):	1.5	Default
Maintenance labor factor (hr/sh):	1.5	Default
Electricity price (\$/kwh):	0.066	EIA, July 2017
Natural gas price (\$/mscf):	5.00	EIA, 10 Year Avg
Annual interest rate (fraction):	0.07	Default
Control system life (years):	20	Default
Capital recovery factor:	0.0944	Default
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. w.c.):	20.0	Default

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F. (cond.)
Operating labor	45,990	0.069	---
Supervisory labor	6,899	0.010	---
Maintenance labor	65,700	0.099	---
Maintenance materials	65,700	0.099	---
Natural gas	79,941	0.121	---
Electricity	48,353	0.073	---
Overhead	110,573	0.167	0.445
Taxes, insurance, administrative	71,280	0.108	---
Capital recovery	168,208	0.254	0.361
Total Annual Cost	662,643	1.000	1.000

[1] Base total capital investment reflects this date.

[2] VAPCCI = Vatavuk Air Pollution Control Cost Index (for regenerative thermal oxidizers) corresponding to year and quarter shown. Base total capital investment has been escalated to this date via VAPCCI and control equipment vendor data.

[3] Source: Vatavuk, William M. ESTIMATING COSTS OF AIR POLLUTION CONTROL. Boca Raton, FL Lewis Publishers, 1980.

[4] Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017.

[5] CEPCI = Chemical Engineering Plant Cost Index.

Melting Furnace VOC Controlled by RTO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$935,359
Instrumentation & Controls	0.10A	(2)	\$93,536
Sales Taxes	0.03A	(2)	\$28,061
Freight	0.05A	(2)	\$46,768
Total Purchased Equipment Cost		B =	\$1,103,724
Direct Installation Costs:			
Foundations & Supports	0.08B	(2)	\$88,298
Handling & Erection	0.14B	(2)	\$154,521
Electrical	0.04B	(2)	\$44,149
Piping	0.02B	(2)	\$22,074
Insulation for Ductwork	0.01B	(2)	\$11,037
Painting	0.01B	(2)	\$11,037
Total Direct Installation Costs			\$331,117
Indirect Installation Costs:			
Engineering	0.10B	(2)	\$110,372
Construction & Field Expenses	0.05B	(2)	\$55,186
Contractor Fees	0.10B	(2)	\$110,372
Start-up	0.02B	(2)	\$22,074
Performance Test	0.01B	(2)	\$11,037
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.03B	(2)	\$33,112
Total Indirect Installation Costs			\$347,154
TOTAL CAPITAL COSTS:		C =	\$1,781,996
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$79,941
Electricity		(1)	\$48,353
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$71,280
TOTAL OPERATION AND MAINTENANCE COSTS			\$494,435

Capital Recovery System: 0.0944 Assumes 7% compound interest rate and system useful life of 20 years.
Capital Recovery System: \$168,208

Amortized Annual Costs = Annual O & M Costs + System Capital Recovery
Amortized Annual Costs = \$662,643

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
(2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
(3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Melting Furnace Controlled by RTO
Case 2 - VOC Emissions

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
TOTAL CAPITAL COSTS:		C =	\$1,781,996
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$79,941
Electricity		(1)	\$48,353
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$71,280
TOTAL OPERATION AND MAINTENANCE COSTS			\$494,435
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Total Capital Recovery System:	\$168,208		
Amoritized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amoritized Annual Costs =			\$662,643
Tons VOC removed =	50.05		
Cost Per Ton Removed =			\$13,240

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO&T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-5. SPINNING CHAMBER - VOC - TO Control Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM—THERMAL INCINERATORS

COST BASE DATE: April 1988 [1]

VAPCCI (First Quarter 2007—Preliminary; [2] 149.4 Updated 1st Quarter 2007

CEPCI (January 2007) 509.7

CEPCI (February 2017) 558.3

INPUT PARAMETERS

-- Gas flowrate (scfm):	258986	Exhaust	
-- Reference temperature (oF):	77	Ambient	
-- Inlet gas temperature (oF):	140	Roxul	
-- Inlet gas density (lb/scf):	0.0739	Calculated	
-- Primary heat recovery (fraction):	0.70	Default for TO	
-- Waste gas heat content (BTU/scf):	0.0577	Based on (lb/hr):	78.02
-- Waste gas heat content (BTU/lb):	0.78	Calculated	
-- Gas heat capacity (BTU/lb-oF):	0.255	Default	
-- Combustion temperature (oF):	1400	Roxul	
-- Preheat temperature (oF):	1022	Calculated	
-- Fuel heat of combustion (BTU/lb):	21502	Methane	
-- Fuel density (lb/ft3):	0.0408	Methane	

DESIGN PARAMETERS

-- Auxiliary Fuel Requirement (lb/min):	117.174	Calculated
(scfm):	2871.9	Calculated
-- Total Gas Flowrate (scfm):	261858	Calculated

CAPITAL COSTS

Equipment Costs (\$):			
-- Incinerator:			
@ 0 % heat recovery:	0		
@ 35 % heat recovery:	0		
@ 50 % heat recovery:	0		
@ 70 % heat recovery:	482,783		
-- Other (auxiliary equipment, etc.):	0		
Total Equipment Cost—base:	482,783		
—escalated:	988,188		
Purchased Equipment Cost (\$):	1,166,062		
Total Capital Investment (\$):	1,882,360	Includes Monitoring Equip	

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760	TO hr/yr
Operating labor rate (\$/hr):	28.00	Operator wage
Maintenance labor rate (\$/hr):	40.00	Maintenance wage
Operating labor factor (hr/sh):	1.5	Default
Maintenance labor factor (hr/sh):	1.5	Default
Electricity price (\$/kwh):	0.066	EIA, July 2017
Natural gas price (\$/mscf):	5.00	EIA, 10 Year Avg
Annual interest rate (fraction):	0.07	Default
Control system life (years):	20	Default
Capital recovery factor:	0.0944	Default
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. w.c.):	19.0	Default

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F.(cond.)
Operating labor	45,990	0.005	—
Supervisory labor	6,899	0.001	—
Maintenance labor	65,700	0.008	—
Maintenance materials	65,700	0.008	—
Natural gas	7,545,072	0.872	—
Electricity	560,963	0.065	—
Overhead	110,573	0.013	0.034
Taxes, insurance, administrative	75,294	0.009	—
Capital recovery	177,681	0.021	0.029
Total Annual Cost	8,653,872	1.000	1.000

[1] Original equipment costs reflect this date.

[2] VAPCCI = Valavuk Air Pollution Control Cost Index (for thermal incinerators) corresponding to year and quarter shown. Original equipment cost, purchased equipment cost, and total capital investment have been escalated to this data via the VAPCCI and control equipment vendor data.

[3] Because VAPCC updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017.
[4] CEPCI = Chemical Engineering Plant Cost Index.

Spinning Chamber VOC Controlled by TO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$988,188
Instrumentation & Controls	0.10A	(2)	\$98,819
Sales Taxes	0.03A	(2)	\$29,646
Freight	0.05A	(2)	\$49,409
Total Purchased Equipment Cost		B =	\$1,166,062
Direct Installation Costs:			
Foundations & Supports	0.08B	(2)	\$93,285
Handling & Erection	0.14B	(2)	\$163,249
Electrical	0.04B	(2)	\$46,642
Piping	0.02B	(2)	\$23,321
Insulation for Ductwork	0.01B	(2)	\$11,661
Painting	0.01B	(2)	\$11,661
Total Direct Installation Costs			\$349,819
Indirect Installation Costs:			
Engineering	0.10B	(2)	\$116,606
Construction & Field Expenses	0.05B	(2)	\$58,303
Contractor Fees	0.10B	(2)	\$116,606
Start-up	0.02B	(2)	\$23,321
Performance Test	0.01B	(2)	\$11,661
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.03B	(2)	\$34,982
Total Indirect Installation Costs			\$366,479
TOTAL CAPITAL COSTS:		C =	\$1,882,360
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$7,545,072
Electricity		(1)	\$560,963
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$75,294
TOTAL OPERATION AND MAINTENANCE COSTS			\$8,476,191
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Capital Recovery System:	\$177,681		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$8,653,872		

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Note: USEPA OAQPS Cost Spreadsheets calculate Total Capital Investment for Thermal Incinerators.

Spinning Chamber Controlled by TO
Case 2 - VOC Emissions

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
TOTAL CAPITAL COSTS:		C =	\$1,882,360
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$7,545,072
Electricity		(1)	\$560,963
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$75,294
TOTAL OPERATION AND MAINTENANCE COSTS			\$8,476,191
Capital Recovery System:	0.0944 Assumes 7% compound interest rate and system useful life of 20 years.		
Total Capital Recovery System:	\$177,681		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$8,653,872		
VOC removed =	334.88		
Cost Per Ton Removed =	\$25,842		

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO&T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-6. SPINNING CHAMBER - VOC - RTO Control Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM—REGENERATIVE THERMAL OXIDIZERS

COST BASE DATE: December 1988 [1]

VAPCCI (First Quarter 2007—Preliminary): [2] 141.5 Updated 1st Quarter 2007

CEPCI (January 2007) 509.7

CEPCI (February 2017) 558.3

INPUT PARAMETERS

– Gas flowrate (scfm):	258986	Spinning Chamber exhaust
– Reference temperature (oF):	77	Ambient
– Inlet gas temperature (oF):	140	Roxul
– Inlet gas density (lb/scf):	0.0739	Calculated
– Primary heat recovery (fraction):	0.95	Default for RTO
– Waste gas heat content (BTU/scf):	0.0577	Based on (lb/hr): 78.02
– Waste gas heat content (BTU/lb):	0.781	Calculated
– Gas heat capacity (BTU/lb-oF):	0.255	Default
– Combustion temperature (oF):	1400	Roxul
– Heat loss (fraction):	0.01	Default
– Exit temperature (oF):	203	Calculated
– Fuel heat of combustion (BTU/lb):	21502	Methane
– Fuel density (lb/ft3):	0.0408	Methane

DESIGN PARAMETERS

Auxiliary Fuel Requirement (lb/min):	16.638	Calculated
(scfm):	407.8	Calculated
Total Gas Flowrate (scfm):	259394	Calculated

TOTAL CAPITAL INVESTMENT (\$) [3]

(Cost correlations range: 5000 to 500,000 scfm)

@ 85 % heat recovery—base:	0
' ' ' --escalated:	0
@ 95 % heat recovery—base:	6,502,108
' ' ' --escalated:	11,026,861

Includes Monitoring Equip

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760	RTO hr/yr
Operating labor rate (\$/hr):	28.00	Operator wage
Maintenance labor rate (\$/hr):	40.00	Maintenance wage
Operating labor factor (hr/sh):	1.50	Default
Maintenance labor factor (hr/sh):	1.50	Default
Electricity price (\$/kwh):	0.066	EIA, July 2017
Natural gas price (\$/mscf):	5.00	EIA, 10 Year Avg
Annual interest rate (fraction):	0.07	Default
Control system life (years):	20	Default
Capital recovery factor:	0.0944	Default
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. w.c.):	20.0	Default

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F. (cond.)
Operating labor	45,990	0.013	---
Supervisory labor	6,899	0.002	---
Maintenance labor	65,700	0.019	---
Maintenance materials	65,700	0.019	---
Natural gas	1,071,346	0.312	---
Electricity	584,888	0.170	---
Overhead	110,573	0.032	0.086
Taxes, insurance, administrative	441,074	0.128	---
Capital recovery	1,040,658	0.303	0.432
Total Annual Cost	3,433,028	1.000	1.000

[1] Base total capital investment reflects this date.

[2] VAPCCI = Vatavuk Air Pollution Control Cost Index (for regenerative thermal oxidizers) corresponding to year and quarter shown. Base total capital investment has been escalated to this date via VAPCCI and control equipment vendor data.

[3] Source: Vatavuk, William M. ESTIMATING COSTS OF AIR POLLUTION CONTROL. Boca Raton, FL Lewis Publishers, 1990.

[4] Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017.

[5] CEPCI = Chemical Engineering Plant Cost Index.

Spinning Chamber VOC Controlled by RTO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$5,801,590
Instrumentation & Controls	0.10A	(2)	\$580,159
Sales Taxes	0.03A	(2)	\$174,048
Freight	0.05A	(2)	\$290,080
Total Purchased Equipment Cost		B =	\$6,845,877
Direct Installation Costs:			
Foundations & Supports	0.08B	(2)	\$547,670
Handling & Erection	0.14B	(2)	\$958,423
Electrical	0.04B	(2)	\$273,835
Piping	0.02B	(2)	\$136,918
Insulation for Ductwork	0.01B	(2)	\$68,459
Painting	0.01B	(2)	\$68,459
Total Direct Installation Costs			\$2,053,763
Indirect Installation Costs:			
Engineering	0.10B	(2)	\$684,588
Construction & Field Expenses	0.05B	(2)	\$342,294
Contractor Fees	0.10B	(2)	\$684,588
Start-up	0.02B	(2)	\$136,918
Performance Test	0.01B	(2)	\$68,459
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.03B	(2)	\$205,376
Total Indirect Installation Costs			\$2,127,222
TOTAL CAPITAL COSTS:		C =	\$11,026,861
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$1,071,346
Electricity		(1)	\$584,888
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$441,074
TOTAL OPERATION AND MAINTENANCE COSTS			\$2,392,170

Capital Recovery System: 0.0944 Assumes 7% compound interest rate and system useful life of 20 years.
Capital Recovery System: \$1,040,858

Amortized Annual Costs = Annual O & M Costs + System Capital Recovery
Amortized Annual Costs = \$3,433,028

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Spinning Chamber Controlled by RTO
Case 2 - VOC Emissions

<u>CAPITAL COST (Pollution Control Equipment)</u>	<u>Unit Cost</u>	<u>Basis</u>	<u>Total (\$)</u>
TOTAL CAPITAL COSTS:		C =	\$11,026,861
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$1,071,346
Electricity		(1)	\$584,888
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$441,074
TOTAL OPERATION AND MAINTENANCE COSTS			\$2,392,170
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Total Capital Recovery System:	\$1,040,858		
Amoritized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amoritized Annual Costs =	\$3,433,028		
Tons VOC removed =	334.88		
Cost Per Ton Removed =	\$10,252		

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO&T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-7. Cooling Section - CO - TO Control Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM—THERMAL INCINERATORS

COST BASE DATE: April 1988 [1]	
VAPCCI (First Quarter 2007--Preliminary) [2]	149.4 Updated 1st Quarter 2007
CEPCI (January 2007)	509.7
CEPCI (February 2017)	558.3

INPUT PARAMETERS

-- Gas flowrate (scfm):	50534	Exhaust	
-- Reference temperature (oF):	77	Ambient	
-- Inlet gas temperature (oF):	194	Roxul	
-- Inlet gas density (lb/scf):	0.0739	Calculated	
-- Primary heat recovery (fraction):	0.70	Default for TO	
-- Waste gas heat content (BTU/scf):	0.0002	Based on (lb/hr):	0.17
-- Waste gas heat content (BTU/lb):	0.003	Calculated	
-- Gas heat capacity (BTU/lb-oF):	0.255	Default	
-- Combustion temperature (oF):	1400	Roxul	
-- Preheat temperature (oF):	1038	Calculated	
-- Fuel heat of combustion (BTU/lb):	21502	Methane	
-- Fuel density (lb/ft3):	0.0408	Methane	

DESIGN PARAMETERS

-- Auxiliary Fuel Requirement (lb/min):	22.271	Calculated
(scfm):	545.8	Calculated
-- Total Gas Flowrate (scfm):	51080	Calculated

CAPITAL COSTS

Equipment Costs (\$):		
-- Incinerator:		
@ 0 % heat recovery:	0	
@ 35 % heat recovery:	0	
@ 50 % heat recovery:	0	
@ 70 % heat recovery:	320,846	
-- Other (auxiliary equipment, etc.):	0	
Total Equipment Cost--base:	320,846	
--escalated:	656,728	
Purchased Equipment Cost (\$):	774,939	
Total Capital Investment (\$):	1,252,651	Includes Monitoring Equip

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760	TO hr/yr
Operating labor rate (\$/hr):	28.00	Operator wage
Maintenance labor rate (\$/hr):	40.00	Maintenance wage
Operating labor factor (hr/sh):	1.5	Default
Maintenance labor factor (hr/sh):	1.5	Default
Electricity price (\$/kwh):	0.066	EIA, July 2017
Natural gas price (\$/mmscf):	5.00	EIA, 10 Year Avg
Annual interest rate (fraction):	0.07	Default
Control system life (years):	20	Default
Capital recovery factor:	0.0944	Default
Taxes, insurance, admin factor:	0.04	Default
Pressure drop (in. w.c.):	19.0	Default

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F.(cond.)
Operating labor	45,990	0.023	---
Supervisory labor	6,899	0.003	---
Maintenance labor	65,700	0.033	---
Maintenance materials	65,700	0.033	---
Natural gas	1,434,052	0.715	---
Electricity	109,425	0.055	---
Overhead	110,573	0.055	0.147
Taxes, insurance, administrative	50,106	0.025	----
Capital recovery	118,241	0.059	0.084
Total Annual Cost	2,006,686	1.000	1.000

[1] Original equipment costs reflect this date.

[2] VAPCCI = Vatavik Air Pollution Control Cost Index (for thermal incinerators) corresponding to year and quarter shown. Original equipment cost, purchased equipment cost, and total capital investment have been escalated to this data via the VAPCCI and control equipment vendor data.

[3] Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017.

[4] CEPCI = Chemical Engineering Plant Cost Index.

Cooling Section CO Controlled by TO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$656,728
Instrumentation & Controls	0.10A	(2)	\$65,673
Sales Taxes	0.03A	(2)	\$19,702
Freight	0.05A	(2)	\$32,836
Total Purchased Equipment Cost		B =	\$774,939
Direct Installation Costs:			
Foundations & Supports	0.08B	(2)	\$61,995
Handling & Erection	0.14B	(2)	\$108,491
Electrical	0.04B	(2)	\$30,998
Piping	0.02B	(2)	\$15,499
Insulation for Ductwork	0.01B	(2)	\$7,749
Painting	0.01B	(2)	\$7,749
Total Direct Installation Costs			\$232,482
Indirect Installation Costs:			
Engineering	0.10B	(2)	\$77,494
Construction & Field Expenses	0.05B	(2)	\$38,747
Contractor Fees	0.10B	(2)	\$77,494
Start-up	0.02B	(2)	\$15,499
Performance Test	0.01B	(2)	\$7,749
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.03B	(2)	\$23,248
Total Indirect Installation Costs			\$245,231
TOTAL CAPITAL COSTS:		C =	\$1,252,651
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$1,434,052
Electricity		(1)	\$109,425
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$50,106
TOTAL OPERATION AND MAINTENANCE COSTS			\$1,888,445
Capital Recovery System: 0.0944 Assumes 7% compound interest rate and system useful life of 20 years.			
Capital Recovery System:			\$118,241
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =			\$2,006,686

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Note: USEPA OAQPS Cost Spreadsheets calculate Total Capital Investment for Thermal Incinerators.

Cooling Section Controlled by TO
Case 1 - CO Emissions

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
TOTAL CAPITAL COSTS:		C =	\$1,252,651
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$1,434,052
Electricity		(1)	\$109,425
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$50,106
TOTAL OPERATION AND MAINTENANCE COSTS			\$1,888,445
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Total Capital Recovery System:	\$118,241		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$2,006,686		
Tons CO removed =	0.71		
Cost Per Ton Removed =	\$2,827,380		

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO\$T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-8. COOLING SECTION - VOC - TO Control Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM—THERMAL INCINERATORS

COST BASE DATE: April 1988 [1]	
VAPCCI (First Quarter 2007—Preliminary. [2])	149.4 Updated 1st Quarter 2007
CEPCI (January 2007)	509.7
CEPCI (February 2017)	558.3

INPUT PARAMETERS

— Gas flowrate (scfm):	50534	Exhaust	
— Reference temperature (oF):	77	Ambient	
— Inlet gas temperature (oF):	194	Roxul	
— Inlet gas density (lb/scf):	0.0739	Calculated	
— Primary heat recovery (fraction):	0.70	Default for TO	
— Waste gas heat content (BTU/scf):	0.0334	Based on (lb/hr):	8.82
— Waste gas heat content (BTU/lb):	0.45	Calculated	
— Gas heat capacity (BTU/lb-oF):	0.255	Default	
— Combustion temperature (oF):	1400	Roxul	
— Preheat temperature (oF):	1038	Calculated	
— Fuel heat of combustion (BTU/lb):	21502	Methane	
— Fuel density (lb/ft3):	0.0408	Methane	

DESIGN PARAMETERS

— Auxiliary Fuel Requirement (lb/min):	22.191	Calculated
(scfm):	543.9	Calculated
— Total Gas Flowrate (scfm):	51078	Calculated

CAPITAL COSTS

Equipment Costs (\$):	
— Incinerator:	
@ 0 % heat recovery:	0
@ 35 % heat recovery:	0
@ 50 % heat recovery:	0
@ 70 % heat recovery:	320,843
— Other (auxiliary equipment, etc.):	0
Total Equipment Cost—base:	320,843
—escalated:	656,721
Purchased Equipment Cost (\$):	774,931
Total Capital Investment (\$):	1,252,639 <u>Includes Monitoring Equip</u>

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760	TO hr/yr
Operating labor rate (\$/hr):	28.00	Operator wage
Maintenance labor rate (\$/hr):	40.00	Maintenance wage
Operating labor factor (nr/sh):	1.5	Default
Maintenance labor factor (hr/sh):	1.5	Default
Electricity price (\$/kwh):	0.066	EIA, July 2017
Natural gas price (\$/mscf):	5.00	EIA, 10 Year Avg
Annual interest rate (fraction):	0.07	Default
Control system life (years):	20	Default
Capital recovery factor:	0.0944	Default
Taxes, insurance, admin factor:	0.04	Default
Pressure drop (in. w.c.):	19.0	Default

ANNUAL COSTS

Item	Cost (\$/yr)	WL Factor	W.F.(cond.)
Operating labor	45,990	0.023	—
Supervisory labor	6,899	0.003	—
Maintenance labor	65,700	0.033	—
Maintenance materials	65,700	0.033	—
Natural gas	1,428,938	0.714	—
Electricity	109,421	0.055	—
Overhead	110,573	0.055	0.147
Taxes, insurance, administrative	50,106	0.025	—
Capital recovery	118,240	0.059	0.084
Total Annual Cost	2,001,566	1.000	1.000

[1] Original equipment costs reflect this date.

[2] VAPCCI = Vataavuk Air Pollution Control Cost Index (for thermal incinerators) corresponding to year and quarter shown. Original equipment cost, purchased equipment cost, and total capital investment have been escalated to this data via the VAPCCI and control equipment vendor data.

[3] Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017.

[4] CEPCI = Chemical Engineering Plant Cost Index.

Cooling Section VOC Controlled by TO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$656,721
Instrumentation & Controls	0.10A	(2)	\$65,672
Sales Taxes	0.03A	(2)	\$19,702
Freight	0.05A	(2)	\$32,836
Total Purchased Equipment Cost		B =	\$774,931
Direct Installation Costs:			
Foundations & Supports	0.08B	(2)	\$61,994
Handling & Erection	0.14B	(2)	\$108,490
Electrical	0.04B	(2)	\$30,997
Piping	0.02B	(2)	\$15,499
Insulation for Ductwork	0.01B	(2)	\$7,749
Painting	0.01B	(2)	\$7,749
Total Direct Installation Costs			\$232,479
Indirect Installation Costs:			
Engineering	0.10B	(2)	\$77,493
Construction & Field Expenses	0.05B	(2)	\$38,747
Contractor Fees	0.10B	(2)	\$77,493
Start-up	0.02B	(2)	\$15,499
Performance Test	0.01B	(2)	\$7,749
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.03B	(2)	\$23,248
Total Indirect Installation Costs			\$245,229
TOTAL CAPITAL COSTS:		C =	\$1,252,639
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$1,428,938
Electricity		(1)	\$109,421
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$50,106
TOTAL OPERATION AND MAINTENANCE COSTS			\$1,883,326
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Capital Recovery System:	\$118,240		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$2,001,566		

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Note: USEPA OAQPS Cost Spreadsheets calculate Total Capital Investment for Thermal Incinerators.

Cooling Section Controlled by TO
Case 2 - VOC Emissions

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
TOTAL CAPITAL COSTS:		C =	\$1,252,639
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$1,428,938
Electricity		(1)	\$109,421
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$50,106
TOTAL OPERATION AND MAINTENANCE COSTS			\$1,883,326
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Total Capital Recovery System:	\$118,240		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$2,001,566		
Tons VOC removed =	37.85		
Cost Per Ton Removed =	\$52,878		

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards COST-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-9. COOLING SECTION- CO - RTO Control Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM--REGENERATIVE THERMAL OXIDIZERS

COST BASE DATE: December 1988 [1]

VAPCCI (First Quarter 2007--Preliminary): [2]	141.5	Updated 1st Quarter 2007
CEPCI (January 2007)	509.7	
CEPCI (February 2017)	558.3	

INPUT PARAMETERS

- Gas flowrate (scfm):	50534	Exhaust
- Reference temperature (oF):	77	Ambient
- Inlet gas temperature (oF):	194	Roxul
- Inlet gas density (lb/scf):	0.0739	Calculated
- Primary heat recovery (fraction):	0.95	Default for RTO
- Waste gas heat content (BTU/scf):	0.0002	Based on (lb/hr): 0.17
- Waste gas heat content (BTU/lb):	0.003	Calculated
- Gas heat capacity (BTU/lb-oF):	0.255	Default
- Combustion temperature (oF):	1400	Roxul
- Heat loss (fraction):	0.01	Default
- Exit temperature (oF):	254	Calculated
- Fuel heat of combustion (BTU/lb):	21502	Methane
- Fuel density (lb/ft3):	0.0408	Methane

DESIGN PARAMETERS

Auxiliary Fuel Requirement (lb/min):	3.264	Calculated
(scfm):	80.0	Calculated
Total Gas Flowrate (scfm):	50614	Calculated

TOTAL CAPITAL INVESTMENT (\$) [3]

(Cost correlations range: 5000 to 500,000 scfm)

@ 85 % heat recovery--base:	0	
' ' ' --escalated:	0	
@ 95 % heat recovery--base:	1,716,870	
' ' ' --escalated:	2,915,303	Includes Monitoring Equip

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760	RTO hr/yr
Operating labor rate (\$/hr):	28.00	Operator wage
Maintenance labor rate (\$/hr):	40.00	Maintenance wage
Operating labor factor (hr/sh):	1.5	Default
Maintenance labor factor (hr/sh):	1.5	Default
Electricity price (\$/kwh):	0.066	EIA, July 2017
Natural gas price (\$/mscf):	5.00	EIA, 10 Year Avg
Annual interest rate (fraction):	0.07	Default
Control system life (years):	20	Default
Capital recovery factor:	0.0944	Default
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. w.c.):	20.0	Default

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F.(cond.)
Operating labor	45,990	0.045	---
Supervisory labor	6,899	0.007	---
Maintenance labor	65,700	0.065	---
Maintenance materials	65,700	0.065	---
Natural gas	210,174	0.208	---
Electricity	114,125	0.113	---
Overhead	110,573	0.109	0.292
Taxes, insurance, administrative	116,612	0.115	---
Capital recovery	275,184	0.272	0.388
Total Annual Cost	1,010,957	1.000	1.000

[1] Base total capital investment reflects this date.

[2] VAPCCI = Vatavuk Air Pollution Control Cost Index (for regenerative thermal oxidizers) corresponding to year and quarter shown. Base total capital investment has been escalated to this date via VAPCCI and control equipment vendor data.

[3] Source: Vatavuk, William M. ESTIMATING COSTS OF AIR POLLUTION CONTROL. Boca Raton, FL Lewis Publishers, 1990.

[4] Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017.

[5] CEPCI = Chemical Engineering Plant Cost Index.

Cooling Section CO Controlled by RTO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$1,531,900
Instrumentation & Controls	0.10A	(2)	\$153,190
Sales Taxes	0.03A	(2)	\$45,957
Freight	0.05A	(2)	\$76,595
Total Purchased Equipment Cost		B =	\$1,807,641
Direct Installation Costs:			
Foundations & Supports	0.08B	(2)	\$144,611
Handling & Erection	0.14B	(2)	\$253,070
Electrical	0.04B	(2)	\$72,306
Piping	0.02B	(2)	\$36,153
Insulation for Ductwork	0.01B	(2)	\$18,076
Painting	0.01B	(2)	\$18,076
Total Direct Installation Costs			\$542,292
Indirect Installation Costs:			
Engineering	0.10B	(2)	\$180,764
Construction & Field Expenses	0.05B	(2)	\$90,382
Contractor Fees	0.10B	(2)	\$180,764
Start-up	0.02B	(2)	\$36,153
Performance Test	0.01B	(2)	\$18,076
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.03B	(2)	\$54,229
Total Indirect Installation Costs			\$565,369
TOTAL CAPITAL COSTS:		C =	\$2,915,303
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$210,174
Electricity		(1)	\$114,125
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$116,612
TOTAL OPERATION AND MAINTENANCE COSTS			\$735,773

Capital Recovery System: 0.0944 Assumes 7% compound interest rate and system useful life of 20 years.
Capital Recovery System: \$275,184

Amortized Annual Costs = Annual O & M Costs + System Capital Recovery

Amortized Annual Costs = \$1,010,957

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Cooling Section Controlled by RTO
Case 1 - CO Emissions

<u>CAPITAL COST (Pollution Control Equipment)</u>	<u>Unit Cost</u>	<u>Basis</u>	<u>Total (\$)</u>
TOTAL CAPITAL COSTS:		C =	\$2,915,303
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$210,174
Electricity		(1)	\$114,125
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$116,612
TOTAL OPERATION AND MAINTENANCE COSTS			\$735,773
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Total Capital Recovery System:	\$275,184		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$1,010,957		
Tons CO removed =	0.71		
Cost Per Ton Removed =	\$1,424,419		

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO\$T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-10. COOLING SECTION - VOC - RTO Control Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM--REGENERATIVE THERMAL OXIDIZERS

COST BASE DATE: December 1988 [1]

VAPCCI (First Quarter 2007--Preliminary): [2] 141.5 Updated 1st Quarter 2007

CEPCI (January 2007) 509.7

CEPCI (February 2017) 558.3

INPUT PARAMETERS

-- Gas flowrate (scfm):	50534	Exhaust
-- Reference temperature (oF):	77	Ambient
-- Inlet gas temperature (oF):	194	Roxul
-- Inlet gas density (lb/scf):	0.0739	Calculated
-- Primary heat recovery (fraction):	0.95	Default for RTO
-- Waste gas heat content (BTU/scf):	0.0334	Based on (lb/hr): 8.82
-- Waste gas heat content (BTU/lb):	0.453	Calculated
-- Gas heat capacity (BTU/lb-oF):	0.255	Default
-- Combustion temperature (oF):	1400	Roxul
-- Heat loss (fraction):	0.01	Default
-- Exit temperature (oF):	254	Calculated
-- Fuel heat of combustion (BTU/lb):	21502	Methane
-- Fuel density (lb/ft3):	0.0408	Methane

DESIGN PARAMETERS

Auxiliary Fuel Requirement (lb/min):	3.186	Calculated
(scfm):	78.1	Calculated
Total Gas Flowrate (scfm):	50612	Calculated

TOTAL CAPITAL INVESTMENT (\$) [3]

(Cost correlations range: 5000 to 500,000 scfm)

@ 85 % heat recovery--base:	0
' ' --escalated:	0
@ 95 % heat recovery--base:	1,716,826
' ' --escalated:	2,915,228

Includes Monitoring Equip

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760	RTO hr/yr
Operating labor rate (\$/hr):	28.00	Operator wage
Maintenance labor rate (\$/hr):	40.00	Maintenance wage
Operating labor factor (hr/sh):	1.5	Default
Maintenance labor factor (hr/sh):	1.5	Default
Electricity price (\$/kwh):	0.066	EIA, July 2017
Natural gas price (\$/mscf):	5.00	EIA, 10 Year Avg
Annual interest rate (fraction):	0.07	Default
Control system life (years):	20	Default
Capital recovery factor:	0.0944	Default
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. w.c.):	20.0	Default

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F. (cond.)
Operating labor	45,990	0.046	---
Supervisory labor	6,899	0.007	---
Maintenance labor	65,700	0.065	---
Maintenance materials	65,700	0.065	---
Natural gas	205,137	0.204	---
Electricity	114,121	0.113	---
Overhead	110,573	0.110	0.293
Taxes, insurance, administrative	116,609	0.116	---
Capital recovery	275,177	0.274	0.389
Total Annual Cost	1,005,906	1.000	1.000

[1] Base total capital investment reflects this date.

[2] VAPCCI = Vatavuk Air Pollution Control Cost Index (for regenerative thermal oxidizers) corresponding to year and quarter shown. Base total capital investment has been escalated to this date via VAPCCI and control equipment vendor data.

[3] Source: Vatavuk, William M. ESTIMATING COSTS OF AIR POLLUTION CONTROL. Boca Raton, FL Lewis Publishers, 1990.

[4] Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017.

[5] CEPCI = Chemical Engineering Plant Cost Index.

Cooling Section VOC Controlled by RTO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$1,531,860
Instrumentation & Controls	0.10A	(2)	\$153,186
Sales Taxes	0.03A	(2)	\$45,956
Freight	0.05A	(2)	\$76,593
Total Purchased Equipment Cost		B =	\$1,807,595
Direct Installation Costs:			
Foundations & Supports	0.08B	(2)	\$144,608
Handling & Erection	0.14B	(2)	\$253,063
Electrical	0.04B	(2)	\$72,304
Piping	0.02B	(2)	\$36,152
Insulation for Ductwork	0.01B	(2)	\$18,076
Painting	0.01B	(2)	\$18,076
Total Direct Installation Costs			\$542,279
Indirect Installation Costs:			
Engineering	0.10B	(2)	\$180,760
Construction & Field Expenses	0.05B	(2)	\$90,380
Contractor Fees	0.10B	(2)	\$180,760
Start-up	0.02B	(2)	\$36,152
Performance Test	0.01B	(2)	\$18,076
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.03B	(2)	\$54,228
Total Indirect Installation Costs			\$565,355
TOTAL CAPITAL COSTS:		C =	\$2,915,228
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$205,137
Electricity		(1)	\$114,121
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$116,609
TOTAL OPERATION AND MAINTENANCE COSTS			\$730,729

Capital Recovery System: 0.0944 Assumes 7% compound interest rate and system useful life of 20 years.
 Capital Recovery System: \$275,177

Amortized Annual Costs = Annual O & M Costs + System Capital Recovery
Amortized Annual Costs = \$1,005,906

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Cooling Section Controlled by RTO
Case 2 - VOC Emissions

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
TOTAL CAPITAL COSTS:		C =	\$2,915,228
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$205,137
Electricity		(1)	\$114,121
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$116,609
TOTAL OPERATION AND MAINTENANCE COSTS			\$730,729
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Total Capital Recovery System:	\$275,177		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =			\$1,005,906
Tons VOC removed =	37.85		
Cost Per Ton Removed =			\$26,574

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO&T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-11. Fleece Application Station - VOC - TO Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM-THERMAL INCINERATORS

COST BASE DATE: April 1988 [1]	
VAPCCI (First Quarter 2007--Preliminary [2])	149.4 Updated 1st Quarter 2007
CEPCI (January 2007)	509.7
CEPCI (February 2017)	558.3

INPUT PARAMETERS

- Gas flowrate (scfm):	500 Exhaust	
- Reference temperature (oF):	77 Ambient	
- Inlet gas temperature (oF):	68 Roxul	
- Inlet gas density (lb/scf):	0.0739 Calculated	
- Primary heat recovery (fraction):	0.70 Default for TO	
- Waste gas heat content (BTU/scf):	2.50 Based on (lb/hr):	6.53
- Waste gas heat content (BTU/lb):	33.85 Calculated	
- Gas heat capacity (BTU/lb-oF):	0.255 Default	
- Combustion temperature (oF):	1400 Roxul	
- Preheat temperature (oF):	1000 Calculated	
- Fuel heat of combustion (BTU/lb):	21502 Methane	
- Fuel density (lb/ft3):	0.0408 Methane	

DESIGN PARAMETERS

- Auxiliary Fuel Requirement (lb/min):	0.178 Calculated
(scfm):	4.4 Calculated
- Total Gas Flowrate (scfm):	504 Calculated

CAPITAL COSTS

Equipment Costs (\$):	
- Incinerator:	
@ 0 % heat recovery:	0
@ 35 % heat recovery:	0
@ 50 % heat recovery:	0
@ 70 % heat recovery:	101,139
- Other (auxiliary equipment, etc.):	0
Total Equipment Cost--base:	101,139
--escalated:	207,018
Purchased Equipment Cost (\$):	223,580
Total Capital Investment (\$):	284,475 <u>Includes Monitoring Equip</u>

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760 TO hr/yr
Operating labor rate (\$/hr):	28.00 Operator wage
Maintenance labor rate (\$/hr):	40.00 Maintenance wage
Operating labor factor (hr/sh):	1.5 Default
Maintenance labor factor (hr/sh):	1.5 Default
Electricity price (\$/kwh):	0.056 EIA, July 2017
Natural gas price (\$/mscf):	5.00 EIA, 10 Year Avg
Annual interest rate (fraction):	0.07 Default
Control system life (years):	20 Default
Capital recovery factor:	0.0944 Default
Taxes, insurance, admin. factor:	0.04 Default
Pressure drop (in. w.c.):	19.0 Default

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F. (cond.)
Operating labor	45,990	0.133	---
Supervisory labor	8,899	0.020	---
Maintenance labor	65,700	0.190	---
Maintenance materials	65,700	0.190	---
Natural gas	11,461	0.033	---
Electricity	1,080	0.003	---
Overhead	110,573	0.320	0.853
Taxes, insurance, administrative	11,379	0.033	---
Capital recovery	26,862	0.078	0.111
Total Annual Cost	345,634	1.000	1.000

[1] Original equipment costs reflect this date.

[2] VAPCCI = Vatavik Air Pollution Control Cost Index (for thermal incinerators) corresponding to year and quarter shown. Original equipment cost, purchased equipment cost, and total capital investment have been escalated to this data via the VAPCCI and control equipment vendor data.

[3] Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017.

[4] CEPCI = Chemical Engineering Plant Cost Index.

Fleece Application Station VOC Controlled by TO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$207,018
Instrumentation & Controls	0.0A	(2)	\$0
Sales Taxes	0.03A	(2)	\$6,211
Freight	0.05A	(2)	\$10,351
Total Purchased Equipment Cost		B =	\$223,580
Direct Installation Costs:			
Foundations & Supports	0.0B	(2)	\$0
Handling & Erection	0.03B	(2)	\$6,707
Electrical	0.02B	(2)	\$4,472
Piping	0.01B	(2)	\$2,236
Insulation for Ductwork	0.01B	(2)	\$2,236
Painting	0.01B	(2)	\$2,236
Total Direct Installation Costs			\$17,886
Indirect Installation Costs:			
Engineering	0.05B	(2)	\$11,179
Construction & Field Expenses	0.05B	(2)	\$11,179
Contractor Fees	0.05B	(2)	\$11,179
Start-up	0.01B	(2)	\$2,236
Performance Test	0.01B	(2)	\$2,236
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.0B	(2)	\$0
Total Indirect Installation Costs			\$43,009
TOTAL CAPITAL COSTS:		C =	\$284,475
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$11,461
Electricity		(1)	\$1,080
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$11,379
TOTAL OPERATION AND MAINTENANCE COSTS			\$318,782
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Capital Recovery System:	\$26,852		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$345,634		

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Note: USEPA OAQPS Cost Spreadsheets calculate Total Capital Investment for Thermal Incinerators.

Fleece Application Station Controlled by TO
VOC Emissions

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
TOTAL CAPITAL COSTS:		C =	\$284,475
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$11,461
Electricity		(1)	\$1,080
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$11,379
TOTAL OPERATION AND MAINTENANCE COSTS			\$318,782
Capital Recovery System:	0.0944 Assumes 7% compound interest rate and system useful life of 20 years.		
Total Capital Recovery System:	\$26,852		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$345,634		
Tons VOC removed =	28.01		
Cost Per Ton Removed =	\$12,339		

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO&T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-12. Hot Press & Cure - VOC - TO Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM—THERMAL INCINERATORS

COST BASE DATE: April 1988 [1]

VAPCCI (First Quarter 2007—Preliminary: [2]

149.4 Updated 1st Quarter 2007

CEPCI (January 2007)

509.7

CEPCI (February 2017)

558.3

INPUT PARAMETERS

– Gas flowrate (scfm):	1895	Exhaust	
– Reference temperature (oF):	77	Ambient	
– Inlet gas temperature (oF):	104	Roxul	
– Inlet gas density (lb/scf):	0.0739	Calculated	
– Primary heat recovery (fraction):	0.70	Default for TO	
– Waste gas heat content (BTU/scf):	0.17	Based on (lb/hr):	1.68
– Waste gas heat content (BTU/lb):	2.30	Calculated	
– Gas heat capacity (BTU/lb-oF):	0.255	Default	
– Combustion temperature (oF):	1400	Roxul	
– Preheat temperature (oF):	1011	Calculated	
– Fuel heat of combustion (BTU/lb):	21502	Methane	
– Fuel density (lb/ft ³):	0.0408	Methane	

DESIGN PARAMETERS

– Auxiliary Fuel Requirement (lb/min):	0.865	Calculated
(scfm):	21.2	Calculated
– Total Gas Flowrate (scfm):	1916	Calculated

CAPITAL COSTS

Equipment Costs (\$):	
– Incinerator:	
@ 0 % heat recovery:	0
@ 35 % heat recovery:	0
@ 50 % heat recovery:	0
@ 70 % heat recovery:	141,204
– Other (auxiliary equipment, etc.):	0
Total Equipment Cost—base:	141,204
—escalated:	289,025
Purchased Equipment Cost (\$):	312,147
Total Capital Investment (\$):	395,183 <u>Includes Monitoring Equip</u>

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760	TO hr/yr
Operating labor rate (\$/hr):	28.00	Operator wage
Maintenance labor rate (\$/hr):	40.00	Maintenance wage
Operating labor factor (hr/sh):	1.6	Default
Maintenance labor factor (hr/sh):	1.5	Default
Electricity price (\$/kwh):	0.068	EIA, July 2017
Natural gas price (\$/mscf):	5.00	EIA, 10 Year Avg
Annual interest rate (fraction):	0.07	Default
Control system life (years):	20	Default
Capital recovery factor:	0.0944	Default
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. w.c.):	19.0	Default

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F.(cond.)
Operating labor	45,990	0.113	—
Supervisory labor	6,899	0.017	—
Maintenance labor	65,700	0.161	—
Maintenance materials	65,700	0.161	—
Natural gas	55,727	0.137	—
Electricity	4,105	0.010	—
Overhead	110,573	0.271	0.723
Taxes, insurance, administrative	15,807	0.039	—
Capital recovery	37,303	0.091	0.130
Total Annual Cost	407,803	1.000	1.000

[1] Original equipment costs reflect this date.

[2] VAPCCI = Vatavuk Air Pollution Control Cost Index (for thermal incinerators) corresponding to year and quarter shown. Original equipment cost, purchased equipment cost, and total capital investment have been escalated to this data via the VAPCCI and control equipment vendor data.

[3] Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017.

[4] CEPCI = Chemical Engineering Plant Cost Index.

Hot Press & Cure VOC Controlled by TO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$289,025
Instrumentation & Controls	0.0A	(2)	\$0
Sales Taxes	0.03A	(2)	\$8,671
Freight	0.05A	(2)	\$14,451
Total Purchased Equipment Cost		B =	\$312,147
Direct Installation Costs:			
Foundations & Supports	0.0B	(2)	\$0
Handling & Erection	0.03B	(2)	\$9,364
Electrical	0.02B	(2)	\$6,243
Piping	0.01B	(2)	\$3,121
Insulation for Ductwork	0.01B	(2)	\$3,121
Painting	0.01B	(2)	\$3,121
Total Direct Installation Costs			\$24,972
Indirect Installation Costs:			
Engineering	0.05B	(2)	\$15,607
Construction & Field Expenses	0.05B	(2)	\$15,607
Contractor Fees	0.05B	(2)	\$15,607
Start-up	0.01B	(2)	\$3,121
Performance Test	0.01B	(2)	\$3,121
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.0B	(2)	\$0
Total Indirect Installation Costs			\$58,065
TOTAL CAPITAL COSTS:		C =	\$395,183
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$55,727
Electricity		(1)	\$4,105
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$15,807
TOTAL OPERATION AND MAINTENANCE COSTS			\$370,500
Capital Recovery System:	0.0944 Assumes 7% compound interest rate and system useful life of 20 years.		
Capital Recovery System:	\$37,303		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$407,803		

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Note: USEPA OAQPS Cost Spreadsheets calculate Total Capital Investment for Thermal Incinerators.

Hot Press & Cure Controlled by TO
VOC Emissions

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
TOTAL CAPITAL COSTS:		C =	\$395,183
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$55,727
Electricity		(1)	\$4,105
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$15,807
TOTAL OPERATION AND MAINTENANCE COSTS			\$370,500
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Total Capital Recovery System:	\$37,303		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$407,803		
Tons VOC removed =	7.21		
Cost Per Ton Removed =	\$56,551		

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO&T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-13. Drying Oven 1 - VOC - TO Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM—THERMAL INCINERATORS

COST BASE DATE: April 1988 [1]

VAPCCI (First Quarter 2007—Preliminary [2] 149.4 Updated 1st Quarter 2007

CEPCI (January 2007) 509.7

CEPCI (February 2017) 558.3

INPUT PARAMETERS

– Gas flowrate (scfm):	3158	Exhaust	
– Reference temperature (oF):	77	Ambient	
– Inlet gas temperature (oF):	320	Roxul	
– Inlet gas density (lb/scf):	0.0739	Calculated	
– Primary heat recovery (fraction):	0.70	Default for TO	
– Waste gas heat content (BTU/scf):	0.43	Based on (lb/hr):	7.01
– Waste gas heat content (BTU/lb):	5.75	Calculated	
– Gas heat capacity (BTU/lb-oF):	0.255	Default	
– Combustion temperature (oF):	1400	Roxul	
– Preheat temperature (oF):	1076	Calculated	
– Fuel heat of combustion (BTU/lb):	21502	Methane	
– Fuel density (lb/ft ³):	0.0408	Methane	

DESIGN PARAMETERS

– Auxiliary Fuel Requirement (lb/min):	1.222	Calculated
(scfm):	29.9	Calculated
– Total Gas Flowrate (scfm):	3188	Calculated

CAPITAL COSTS

Equipment Costs (\$):		
– Incinerator:		
@ 0 % heat recovery:	0	
@ 35 % heat recovery:	0	
@ 50 % heat recovery:	0	
@ 70 % heat recovery:	160,371	
– Other (auxiliary equipment, etc.):	0	
Total Equipment Cost—base:	160,371	
—escalated:	328,256	
Purchased Equipment Cost (\$):	354,517	
Total Capital Investment (\$):	448,146	Includes Monitoring Equip

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760	TO hr/yr
Operating labor rate (\$/hr):	28.00	Operator wage
Maintenance labor rate (\$/hr):	40.00	Maintenance wage
Operating labor factor (hr/sh):	1.5	Default
Maintenance labor factor (hr/sh):	1.5	Default
Electricity price (\$/kwh):	0.066	EIA, July 2017
Natural gas price (\$/mscf):	5.00	EIA, 10 Year Avg
Annual interest rate (fraction):	0.07	Default
Control system life (years):	20	Default
Capital recovery factor:	0.0944	Default
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. w.c.):	19.0	Default

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F. (cond.)
Operating labor	45,990	0.104	—
Supervisory labor	6,899	0.016	—
Maintenance labor	65,700	0.149	—
Maintenance materials	65,700	0.149	—
Natural gas	78,667	0.179	—
Electricity	8,830	0.016	—
Overhead	110,573	0.251	0.669
Taxes, insurance, administrative	17,926	0.041	—
Capital recovery	42,302	0.096	0.137
Total Annual Cost	440,587	1.000	1.000

[1] Original equipment costs reflect this date.

[2] VAPCCI = Vatauvuk Air Pollution Control Cost Index (for thermal incinerators) corresponding to year and quarter shown. Original equipment cost, purchased equipment cost, and total capital investment have been escalated to this data via the VAPCCI and control equipment vendor data.

[3] Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from January 2007 to February 2017.

[4] CEPCI = Chemical Engineering Plant Cost Index.

Drying Oven 1 VOC Controlled by TO

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$328,256
Instrumentation & Controls	0.0A	(2)	\$0
Sales Taxes	0.03A	(2)	\$9,848
Freight	0.05A	(2)	\$16,413
Total Purchased Equipment Cost		B =	\$354,517
Direct Installation Costs:			
Foundations & Supports	0.0B	(2)	\$0
Handling & Erection	0.03B	(2)	\$10,636
Electrical	0.02B	(2)	\$7,090
Piping	0.01B	(2)	\$3,545
Insulation for Ductwork	0.01B	(2)	\$3,545
Painting	0.01B	(2)	\$3,545
Total Direct Installation Costs			\$28,361
Indirect Installation Costs:			
Engineering	0.05B	(2)	\$17,726
Construction & Field Expenses	0.05B	(2)	\$17,726
Contractor Fees	0.05B	(2)	\$17,726
Start-up	0.01B	(2)	\$3,545
Performance Test	0.01B	(2)	\$3,545
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.0B	(2)	\$0
Total Indirect Installation Costs			\$65,268
TOTAL CAPITAL COSTS:		C =	\$448,146
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural Gas		(1)	\$78,667
Electricity		(1)	\$6,830
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$17,926
TOTAL OPERATION AND MAINTENANCE COSTS			\$398,285
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Capital Recovery System:	\$42,302		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$440,587		

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Note: USEPA OAQPS Cost Spreadsheets calculate Total Capital Investment for Thermal Incinerators.

Drying Oven 1 Controlled by TO
VOC Emissions

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
TOTAL CAPITAL COSTS:		C =	\$448,146
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$45,990
Supervisory Labor (15% of operating labor)		(1)	\$6,899
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Natural gas		(1)	\$78,667
Electricity		(1)	\$6,830
Overhead		(1)	\$110,573
Taxes, Insurance, Administrative Costs		(1)	\$17,926
TOTAL OPERATION AND MAINTENANCE COSTS			\$398,285
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Total Capital Recovery System:	\$42,302		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$440,587		
Tons VOC removed =	30.08		
Cost Per Ton Removed =	\$14,648		

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO&T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-14. MELTING FURNACE - PM10 and CPM - High Energy Venturi Scrubber Evaluation

TOTAL ANNUAL COST SPREADSHEET PROGRAM--HI-ENERGY (VENTURI) SCRUBBERS [1]

COST BASE DATE: June 1988 [2]

VAPCCI (Fourth Quarter 1998--FINAL): [3]	109.8
CEPCI (1998 - Final)	389.5
CEPCI (February 2017)	558.3

INPUT PARAMETERS

-- Inlet stream flowrate (acfm):	30904	Exhaust
-- Inlet stream temperature (oF):	302	Roxul
-- Inlet moisture content (molar, fraction):	0.06	Default
-- Inlet absolute humidity (lb/lb b.d.a.): [4]	0.040	Calculated
-- Inlet water flowrate (lb/min):	60.0	Calculated
-- Saturation formula parameters: [5]		
	Slope, B:	3.335 Default
	Intercept, A:	9.405000E-09 Default
		0.0875 Iterations
-- Saturation absolute humidity (lb/lb b.d.a.):	121.9	
-- Saturation enthalpy temperature term (oF):[6]	122.9	
-- Saturation temperature (oF):	0.05	
-- Inlet dust loading (gr/dscf):	0.90	
-- Overall control efficiency (fractional):	0.10	
-- Overall penetration (fractional):	1.7	
-- Mass median particle diameter (microns): [7]	3.4	
-- 84th % aerodynamic diameter (microns): [7]	0.44	
-- Particle cut diameter (microns): [7]	0.25	
-- Scrubber liquid solids content (lb/lb H ₂ O):	5.0	Range 2 - 20
-- Liquid/gas (L/G) ratio (gpm/1000 acfm):	100	Default
-- Recirculation pump head (ft of water):	1	Base Case
-- Material of construction (see list below):[8]		

DESIGN PARAMETERS

-- Scrubber pressure drop (in. w.c.): [9]	24.73
-- Inlet dry air flow rate (dscfm): [10]	20205
-- Inlet (= outlet) air mass rate (lb/min):	1514
-- Recirculation rate (gpm):	155
-- Outlet water mass rate (lb/min):	133
-- Outlet total stream flow rate (acfm):	25354
-- Scrubber liquid bleed rate (gpm):	0.06
-- Scrubber evaporation rate (gpm):	8.71
-- Scrubber liquid makeup rate (gpm):	8.77

CAPITAL COSTS

Equipment Costs (\$):	
-- Scrubber (base)	47,119
(escalated)	84,570
-- Other (auxiliaries, e.g.)	0
-- Total	84,570
Purchased Equipment Cost (\$):	99,793
Total Capital Investment (\$):	195,604

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760
Operating labor rate (\$/hr):	28.00
Maintenance labor rate (\$/hr):	40.00
Operating labor factor (hr/sh):	2
Maintenance labor factor (hr/sh):	1.5

Electricity price (\$/kWhr):	0.068	EIA, July 2017
Chemicals price (specify) (\$/ton):	--	
Process water price (\$/1000 gal):	6.01	Jefferson Utilities Inc., Oct. 2017
Wastewater treatment (\$/1000 gal):	3.80	
Overhead rate (fractional):	0.60	
Annual interest rate (fractional):	0.07	
Control system life (years):	20	
Capital recovery factor (system):	0.0944	
Taxes, insurance, admin. factor:	0.04	

Item	ANNUAL COSTS	Cost (\$/yr)	Wt. Fact.	W.F.(cond.)
Operating labor		61,320	0.138	---
Supervisory labor		9,198	0.021	---
Maintenance labor		65,700	0.148	---
Maintenance materials		65,700	0.148	---
Electricity--fan		65,524	0.147	---
Electricity--recirculation pump		2,582	0.006	---
Chemicals		0	0.000	---
Process water		27,896	0.062	---
Wastewater treatment		125	0.000	---
Overhead		121,151	0.272	0.726
Taxes, insurance, administrative		7,824	0.018	---
Capital recovery		18,464	0.041	0.059
Total Annual Cost (\$/yr)		445,283	1.000	1.000

Notes:

[1] Data used to develop this program were taken from 'Estimating Costs of Air Pollution Control' (CRC Press/Lewis Publishers, 1990).

[2] Base equipment costs reflect this date.

[3] VAPCCI = Vatavuk Air Pollution Control Cost Index (for wet scrubbers) corresponding to year and quarter shown. Base equipment cost, purchased equipment cost, and total capital investment have been escalated to this date via the VAPCCI and control equipment vendor data. Because VAPCCI updates are no longer available, CEPCI are used to adjust costs from 1998 to February 2017. CEPCI = Chemical Engineering Plant Cost Index.

[4] Program calculates from the inlet moisture content.

[5] By assumption, the saturation humidity (hs)-temperature (ts) curve is a power function, of the form: $hs = A*(ts)^B$.

[6] To obtain the saturation temperature, iterate on the saturation humidity. Continue iterating until the saturation temperature and the saturation enthalpy term are approximately equal.

[7] Both the 'mass median' and '84th percentile aerodynamic' diameters are obtained from a log-normal distribution of the inlet stream particle diameters. The particle cut diameter is a graphical function of the penetration, the mass median diameter, and the standard deviation of the particle size distribution. (For detailed guidance in determining these particle sizes, see "Wet Scrubbers: A Practical Handbook" by K.C. Schiffner and H.E. Hesketh (CRC Press/Lewis Publishers, 1986). A condensed procedure is given in "Estimating Costs of Air Pollution Control" by W.M. Vatavuk (CRC Press/Lewis Publishers, 1990).)

[8] Enter one of the following numbers: carbon steel--'1'; rubber-lined carbon steel--'1.6'; epoxy-coated carbon steel--'1.6'; fiber-reinforced plastic (FRP)--'1.8'.

[9] The scrubber pressure drop is extremely sensitive to the particle cut diameter. Hence, the user must determine the cut diameter with great care.

[10] Measured at 70 oF and 1 atmosphere.

MELTING FURNACE - PM10 and CPM - High Energy Venturi Scrubber Evaluation

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=	(1)	\$84,570
Instrumentation & Controls	0.10A	(2)	\$8,457
Sales Taxes	0.03A	(2)	\$2,537
Freight	0.05A	(2)	\$4,229
Total Purchased Equipment Cost		B =	\$99,793
Direct Installation Costs:			
Foundations & Supports	0.06B	(2)	\$5,988
Handling & Erection	0.40B	(2)	\$39,917
Electrical	0.01B	(2)	\$998
Piping	0.05B	(2)	\$4,990
Insulation for Ductwork	0.03B	(2)	\$2,994
Painting	0.01B	(2)	\$998
Total Direct Installation Costs			\$55,884
Indirect Installation Costs:			
Engineering	0.10B	(2)	\$9,979
Construction & Field Expenses	0.10B	(2)	\$9,979
Contractor Fees	0.10B	(2)	\$9,979
Start-up	0.01B	(2)	\$998
Performance Test	0.01B	(2)	\$998
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.03B	(2)	\$2,994
Total Indirect Installation Costs			\$39,927
TOTAL CAPITAL COSTS:		C =	\$195,604
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$61,320
Supervisory Labor (15% of operating labor)		(1)	\$9,198
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Process Water		(1)	\$27,696
Wastewater Treatment		(1)	\$125
Electricity		(1)	\$68,106
Overhead		(1)	\$121,151
Taxes, Insurance, Administrative Costs		(1)	\$7,824
TOTAL OPERATION AND MAINTENANCE COSTS			\$426,819
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Capital Recovery System:	\$18,464		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$445,283		

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

Note: USEPA OAQPS Cost Spreadsheets calculate Total Capital Investment for Thermal Incinerators.

MELTING FURNACE - PM10 and CPM - High Energy Venturi Scrubber Evaluation

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
TOTAL CAPITAL COSTS:		C =	\$195,604
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(1)	\$61,320
Supervisory Labor (15% of operating labor)		(1)	\$9,198
Maintenance Labor		(1)	\$65,700
Maintenance Materials (100% of maintenance labor)		(1)	\$65,700
Process Water		(1)	\$27,696
Wastewater Treatment		(1)	\$125
Electricity		(1)	\$68,106
Overhead		(1)	\$121,151
Taxes, Insurance, Administrative Costs		(1)	\$7,824
TOTAL OPERATION AND MAINTENANCE COSTS			\$426,819
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Total Capital Recovery System:	\$18,464		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$445,283		
Tons PM10 Total removed =	32.41		
Cost Per Ton Removed =	\$13,739		

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards CO&T-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

Table D-15. MELTING FURNACE - PM10 and CPM - Wet Electrostatic Precipitator Evaluation

Capital Costs

Direct Costs

Control Equipment Purchase Price	\$320,000
Purchased Equipment Cost	\$377,600
Direct Installation Costs	\$252,992
Total Indirect Costs	\$220,232
Total Capital Investment	\$850,824

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760	
Operating labor rate (\$/hr):	28.00	
Maintenance labor rate (\$/hr):	40.00	
Operating labor factor (hr/sh):	3	
Maintenance labor factor (hr/sh):	1.5	
Electricity price (\$/kWhr):	0.066	EIA, July 2017
Chemicals price (specify) (\$/ton):	-	
Process water price (\$/1000 gal):	6.01	Jefferson Utilities Inc., Oct. 2017
Wastewater treatment (\$/1000 gal):	3.80	
Overhead rate (fractional):	0.60	
Annual interest rate (fractional):	0.07	
Control system life (years):	20	
Capital recovery factor (system):	0.0944	
Taxes, insurance, admin. factor:	0.04	

DESIGN PARAMETERS

- ESP pressure drop (in. w.c.):	4.48	Default
- Exhaust flow rate (acfm):	30904	
- Water (gpm)	155	
- Recirculation pump head (ft of water):	100	Default

ANNUAL COSTS

Item	Cost (\$/yr)
Operating labor	91,980
Supervisory labor	13,797
Maintenance labor	65,700
Maintenance materials (1% PEC)	3,776
Electricity--fan	14,488
Electricity--pump	39,230
Chemicals	0
Process water	488,105
Wastewater treatment	-
Overhead	105,152
Taxes, insurance, administrative	34,033
Capital recovery	80,312
Total Annual Cost (\$/yr)	936,573

NOTES:

- Control Equipment Purchase Price = Estimated from discussions with vendors
- Direct Installation Costs = Purchased Equipment Cost x 0.67
- Total Indirect Costs = Purchased Equipment Cost x 0.57 + Monitoring
- Total Capital Investment = sum of Purchased Equipment Cost, Direct Installation Costs, Total Indirect Costs

MELTING FURNACE - PM10 and CPM - WESP

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
Purchased Equipment:			
Basic Equipment & Auxiliaries	A=		\$320,000
Instrumentation & Controls	0.10A	(2)	\$32,000
Sales Taxes	0.03A	(2)	\$9,600
Freight	0.05A	(2)	\$16,000
Total Purchased Equipment Cost		B =	\$377,600
Direct Installation Costs:			
Foundations & Supports	0.04B	(2)	\$15,104
Handling & Erection	0.50B	(2)	\$188,800
Electrical	0.08B	(2)	\$30,208
Piping	0.01B	(2)	\$3,776
Insulation for Ductwork	0.02B	(2)	\$7,552
Painting	0.02B	(2)	\$7,552
Total Direct Installation Costs			\$252,992
Indirect Installation Costs:			
Engineering	0.20B	(2)	\$75,520
Construction & Field Expenses	0.20B	(2)	\$75,520
Contractor Fees	0.10B	(2)	\$37,760
Start-up	0.01B	(2)	\$3,776
Performance Test	0.01B	(2)	\$3,776
Model Study	.02B	(2)	\$7,552
Emissions Monitoring Equipment		(3)	\$5,000
Contingencies	0.03B	(2)	\$11,328
Total Indirect Installation Costs			\$220,232
TOTAL CAPITAL COSTS:		C =	\$850,824
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(2)	\$91,980
Supervisory Labor (15% of operating labor)		(2)	\$13,797
Maintenance Labor		(2)	\$65,700
Maintenance Materials (100% of maintenance labor)		(2)	\$3,776
Process Water		(2)	\$488,105
Electricity		(2)	\$53,718
Overhead		(2)	\$105,152
Taxes, Insurance, Administrative Costs		(2)	\$34,033
TOTAL OPERATION AND MAINTENANCE COSTS			\$856,261
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Capital Recovery System:	\$80,312		
Amortized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amortized Annual Costs =	\$936,573		

References:

- (1) Factor based on USEPA Office of Air Quality Planning and Standards Cost Spreadsheets, posted on the Internet 7/99
- (2) Factor based on USEPA Office of Air Quality Planning and Standards Control Cost Manual (EPA 453/B-96-001).
- (3) Added an estimate of \$5,000 for emissions monitoring equipment to indirect installation costs.

MELTING FURNACE - PM10 and CPM - WESP

CAPITAL COST (Pollution Control Equipment)	Unit Cost	Basis	Total (\$)
TOTAL CAPITAL COSTS:		C =	\$850,824
ANNUAL OPERATION & MAINTENANCE			
Operating Labor		(2)	\$91,980
Supervisory Labor (15% of operating labor)		(2)	\$13,797
Maintenance Labor		(2)	\$65,700
Maintenance Materials (100% of maintenance labor)		(2)	\$3,776
Process Water		(2)	\$488,105
Electricity		(2)	\$53,718
Overhead		(2)	\$105,152
Taxes, Insurance, Administrative Costs		(2)	\$34,033
TOTAL OPERATION AND MAINTENANCE COSTS			\$856,261
Capital Recovery System:	0.0944	Assumes 7% compound interest rate and system useful life of 20 years.	
Total Capital Recovery System:	\$80,312		
Amoritized Annual Costs = Annual O & M Costs + System Capital Recovery			
Amoritized Annual Costs =	\$936,573		
Tons PM10 Total removed =	34.21		
Cost Per Ton Removed =	\$27,378		

References:

(1) Factor based on USEPA Office of Air Quality Planning and Standards COST-AIR Control Cost Spreadsheets, posted on the Clean Air Technology Center webpage 7/99.

GHG BACT Analysis
Table D-16 Conceptual Cost Estimate for Carbon Capture and Sequestration
Melting Furnace & Pre-heat Burner

Post-Combustion CO ₂ Capture and Compression		
Max Rated Heat Input	MMBtu/hr	104
Capital & O&M		
Capital ¹	\$78,530/MMBtu/hr	\$9,767,145
Annual O&M ¹	\$14,320/MMBtu/hr/yr	\$1,493,616

Pipeline Cost Breakdown ²		
L, Pipeline Length (miles)		150
D, Pipeline Diameter (inches)		12
Pipeline Costs		
Materials	$\$64,632 + \$1.85 \times L \times (330.5 \times D^2 + 686.7 \times D + 26,960)$	\$23,039,523
Labor	$\$341,627 + \$1.85 \times L \times (343.2 \times D^2 + 2074 \times D + 170,013)$	\$68,140,927
Miscellaneous	$\$150,166 + \$1.58 \times L \times (8,417 \times D + 7,234)$	\$25,802,572
Right of Way	$\$48,037 + \$1.2 \times L \times (577 \times D + 29,788)$	\$6,656,197
Other Capital		
CO ₂ Surge Tank	Fixed	\$1,150,636
Pipeline Control System	Fixed	\$110,632
O&M		
Fixed O&M (\$/year)	$\$8,632 \times L$	\$1,294,800

Annualized Cost Estimate	
Economic Life, years	20
Interest Rate (%)	7
Capital Costs	\$134,667,632
O&M Costs (Annual)	\$2,788,416
Capital Recovery	\$12,711,670
Total Annualized Cost	\$15,500,086
Total CO ₂ Controlled (tpy) ³	87,846
CO ₂ Cost Effectiveness (\$/ton)	176

¹ Adapted from Vol 1 Chapter 3: Economic and Cost Analysis for CO₂ Capture Costs in the Capture Project Scenarios (<http://www.co2captureproject.com/pubdownload.php?downloadid=155>) (table 15 baseline scenario). Capital costs adjusted using the Chemical Engineering Plant Cost Index to 2017 dollars. O&M costs not adjusted.

² Pipeline and Geologic Storage cost estimates based on National Energy Technology Laboratory (US DOE) document, *Estimating Carbon Dioxide Transport and Storage Costs*, DOE/NETL-2010/1447 (March 2010).

³ Total CO₂ Controlled is based on 90% control efficiency, based on *The Global CCS Institute document, The Global Status of CCS, 2016*.

GHG BACT Analysis
Table D-17 Conceptual Cost Estimate for Carbon Capture and Sequestration
Natural Gas Combustion Units

Post-Combustion CO ₂ Capture and Compression		
Max Rated Heat Input	MMBtu/hr	52
Capital & O&M		
Capital ¹	\$78,530/MMBtu/hr	\$4,842,205
Annual O&M ¹	\$14,320/MMBtu/hr/yr	\$740,482

Pipeline Cost Breakdown ²		
L, Pipeline Length (miles)		150
D, Pipeline Diameter (inches)		12
Pipeline Costs		
Materials	$\$64,632 + \$1.85 \times L \times (330.5 \times D^2 + 686.7 \times D + 26,960)$	\$23,039,523
Labor	$\$341,627 + \$1.85 \times L \times (343.2 \times D^2 + 2074 \times D + 170,013)$	\$68,140,927
Miscellaneous	$\$150,166 + \$1.58 \times L \times (8,417 \times D + 7,234)$	\$25,802,572
Right of Way	$\$48,037 + \$1.2 \times L \times (577 \times D + 29,788)$	\$6,656,197
Other Capital		
CO ₂ Surge Tank	Fixed	\$1,150,636
Pipeline Control System	Fixed	\$110,632
O&M		
Fixed O&M (\$/year)	$\$8,632 \times L$	\$1,294,800

Annualized Cost Estimate	
Economic Life, years	20
Interest Rate (%)	7
Capital Costs	\$129,742,691
O&M Costs (Annual)	\$2,035,282
Capital Recovery	\$12,246,790
Total Annualized Cost	\$14,282,072
Total CO ₂ Controlled (tpy) ³	24,002
CO ₂ Cost Effectiveness (\$/ton)	595

¹ Adapted from Vol 1 Chapter 3: Economic and Cost Analysis for CO₂ Capture Costs in the Capture Project Scenarios (<http://www.co2captureproject.com/pubdownload.php?downloadid=155>) (table 15 baseline scenario). Capital costs adjusted using the Chemical Engineering Plant Cost Index to 2017 dollars. O&M costs not adjusted.

² Pipeline and Geologic Storage cost estimates based on National Energy Technology Laboratory (US DOE) document, *Estimating Carbon Dioxide Transport and Storage Costs*, DOE/NETL-2010/1447 (March 2010).

³ Total CO₂ Controlled is based on 90% control efficiency, based on *The Global CCS Institute document, The Global Status of CCS, 2016*. CO₂ controlled does not include other GHGs.

EXHIBIT I

BEFORE THE ADMINISTRATOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C.

In the Matter of
Hibbing Taconite Company,
Petitioner

PSD APPEAL NO. 87-3

ORDER ON PETITION FOR REVIEW

In a petition dated July 30, 1987, U.S. EPA Region V seeks review of a Prevention of Significant Deterioration (PSD) permit determination that authorizes the Hibbing Taconite Company (Hibbing) to modify its furnaces to burn petroleum coke as a fuel. A final decision to issue the permit was made on July 2, 1987, by the Minnesota Pollution Control Agency (MPCA), pursuant to a delegation of authority from Region V. MPCA's action in issuing the permit is subject to the review provisions of 40 CFR 124.19 because the permit is deemed to be an EPA-issued permit under EPA rules. 40 CFR 124.41; 45 Fed. Reg. 33,413 (May 19, 1980).

In its petition for review, Region V raises seven issues: (1) whether Hibbing's analysis of Best Available Control Technology (BACT) for sulfur dioxide (SO₂) is erroneous; (2) whether

1/ The PSD program was delegated to the State of Minnesota on October 15, 1980, under the authority of 40 CFR §52.21(u). See Letter from John McGuire, Regional Administrator, EPA Region V, to Terry Hoffman, Executive Director, MPCA (October 15, 1980).

Hibbing failed to perform a collateral impacts analysis on unregulated pollutants as required by North County Resource Recovery Associates, PSD Appeal No. 85-2 (June 3, 1986); (3) whether the permit violates section 165 of the Clean Air Act (CAA or Act) by allowing Hibbing to modify its facility and operate for nine months without a prescribed emission limit for SO₂; (4) whether the permit limit of 0.024 grains per dry standard cubic foot (gr/dscf) represents BACT for particulate matter (PM); (5) whether Hibbing improperly excluded its property from the ambient air quality modeling; (6) whether analysis of alternative control technologies is required for carbon monoxide (CO) emissions and whether the permit must contain operating requirements for combustion of CO; and (7) whether Hibbing improperly relied on existing data from distant monitors to meet the preconstruction monitoring requirements under 40 CFR 52.21(m)(1).

For the reasons set forth below and pursuant to 40 CFR 124.19, review of issues (2), (6), and (7) is denied. Issues (1), (3), (4), and (5) are remanded to MPCA to conduct additional BACT analyses and to determine the portion of the Hibbing property (if any) that should be

2/ Both Hibbing and MPCA have filed responses to the Region's Petition for Review. See Comments of Hibbing Taconite Company on the EPA Region V Petition for Review of Minnesota Permit No. 541-87-OT-1 (PSD Appeal No. 87-3)(December 30,1987); Minnesota Pollution Control Agency, Division of Air Quality, Response to U.S. EPA Region V's Petition for Review of Permit No. 541-87-OT-1 Issued to Hibbing Taconite Co. (September 28, 1987). Hibbing's attorney sent a letter dated January 5, 1988, concerning a curtailment of natural gas to the Hibbing plant. For purposes of deciding the issues on appeal, there is no need to consider the matters raised in that letter.

excluded from the ambient air determination, consistent with this opinion.

Background

Hibbing's plant crushes taconite ore, concentrates the iron in the resulting powder, and forms it into pellets for shipment to a primary steel plant. The taconite plant equipment includes ore crushers, concentrating process lines, and pelletizing furnaces. The plant currently uses venturi rod scrubbers as a pollution control technology. Until recently the furnaces burned only natural gas and fuel oil. Now Hibbing plans to switch to petroleum coke as a fuel, thus requiring a physical modification of the plant. The modification will bring Hibbing under the purview of the CAA's PSD requirements for the first time. Hibbing has submitted a PSD applicability analysis that shows the proposed modification is subject to PSD requirements for emissions of SO₂, CO, and PM.

3/ The Hibbing facility was constructed between 1973 and 1977. The PSD requirements of the CAA apply only to facilities on which construction was commenced after August 7, 1977. 42 U.S.C. §7475.

4/ Before an existing major emitting facility located in an area that is meeting the National Ambient Air Quality Standards (NAAQS) can undertake a major modification, i.e., one which would result in a significant net emissions increase of a regulated pollutant, the owner must obtain a PSD permit. 40 CFR §52.21(b)(2)(i). Hibbing is located in an area designated as being in attainment of the NAAQS for SO₂, CO, and TSP -- all regulated pollutants. 40 CFR §81.324. Hibbing's analysis shows that there would be a significant net emissions increase for each of these pollutants.

Discussion

Administrative review of PSD permit decisions is not usually granted unless the permit decision is clearly erroneous or involves an exercise of discretion or policy that is important and therefore should be reviewed by the Administrator as a discretionary matter. 40 CFR 124.19. "This power of review should be only sparingly exercised * * *." 45 Fed. Reg. 33,412 (May 19, 1980). The regulations envision that disputed permit conditions will be resolved for the most part at the regional level. Id. The burden of demonstrating that review should be granted is therefore on the petitioner.

Issue (1): BACT for SO₂

The CAA makes permit issuance contingent on a showing that the proposed facility will employ the Best Available Control Technology (BACT) for each regulated pollutant emitted from it in significant amounts. 42 U.S.C. 7475. Section 169(3) of the CAA defines BACT as an "emission limitation" reflecting the "maximum degree of reduction" that is "achievable" on a "case-by-case basis, taking into account energy, environmental, and economic impacts and other costs." 42 U.S.C. 7479(3). This case-by-case approach provides a mechanism for determining and applying the appropriate technology in each situation.

The Region argues that the BACT analysis for SO₂ is erroneous because Hibbing failed to use the burning of natural gas as its

"base" case; it did not factor in the cost savings from the fuel switch; it did not justify rejecting the burning of natural gas as a viable control strategy; and it did not present an engineering analysis demonstrating how the proposed 1.2 lbs/MMBTU limitation for SO₂ emissions would be achieved or explaining why this limitation represents BACT. According to the Region, the first two arguments present the following question: "When economic problems face a facility, to what degree must that facility use cost savings to minimize environmental degradation if the facility switches to a more polluting fuel that reduces operating costs?" Because PSD guidance for BACT does not directly address this issue, the Region asserts that it is appropriate for review by the Administrator.

Neither the PSD regulations nor the PSD guidance differentiate between BACT analyses for plant modifications and BACT analyses for the construction of new plants. Nevertheless, the Region contends that, because Hibbing has been able to

5/ Use of the base case in performing a BACT analysis is described in the EPA Prevention of Significant Deterioration Workshop Manual at I-B-7 (October 1980). For a definition of the base case, see text infra at 6-7. Cf. note 10 infra.

6/ The Region also argues that Hibbing failed to consider other technologies commonly used to control SO₂ gas streams. Although this argument may have been true with regard to the original BACT analysis, Hibbing remedied this deficiency with its supplemental BACT analysis and its 9/24/87 BACT support study, conducted by Black and Veatch. See Letter from Charles B. Hoffman to David Beil, MPCA Staff Engineer (June 17, 1987); MPCA Response at 9-11 and Attachment 1.

7/ See Response of U.S. EPA, Region V, to Comments of Hibbing Taconite Company at 4 (March 14, 1988).

continue to operate burning natural gas, it must use natural gas as the base case. I disagree. Hibbing's use of the coke burning plant with existing pollution controls as the base case clearly complied with the criteria for choosing a base case in EPA's guidance document. EPA's Prevention of Significant Deterioration Workshop Manual (October 1980) defines the base case as:

[T]he control strategy that, in the absence of BACT decisionmaking, would normally have been applied. The choice of the base case may be dictated by other existing regulations and/or by company practice standards or choices, if they provide a greater degree of emission reduction than that required by existing regulations (such as new source performance standards, national emission standards for hazardous air pollutants, etc.).

Id. at p. I-B-7. The base case chosen here meets the requirements of Minnesota's state permitting regulations, and thus is consistent with this definition. Moreover, Hibbing's choice of the base case is consistent with the practices of other taconite plants in Minnesota. Nothing in the definition requires the base

8/ Minnesota taconite plants operate under permits specifying the SO emission limits based on Minnesota Rules part 7005.2770. These limits are 2.0 lbs/MMBTU when burning a liquid fuel and 4.0 lbs/MMBTU when burning a solid fuel. See MPCA Response at 7. The limit in the base case chosen by Hibbing is 4.0 lbs/MMBTU when burning petroleum coke. But see note 15 infra.

9/ Of the three taconite plants in Minnesota that are equipped and permitted to burn a combination of solid fuel, fuel oil and natural gas in the pellet production process, two plants produce a substantial portion of their production using a solid fuel. See MPCA Response at 6. Hibbing is the first taconite plant in the United States to become subject to PSD review either for original construction or for modification. Id. at 7.

case to be the unmodified plant. The Region has not shown any compelling reason why a permit applicant seeking to modify an existing plant should be subject to a different set of criteria for choosing a base case than a new permit applicant.

Furthermore, I disagree with the Region's argument that Hibbing failed to take into account the cost savings from the fuel switch. An important purpose of any BACT analysis is to provide a comparison of the costs associated with each alternative control technology. This comparison necessarily takes into account the cost-savings associated with less expensive control technologies, as well as the increased costs associated with the more expensive alternatives. Once a proper base case is chosen and alternatives are compared, no additional cost savings analysis is necessary. The Region has not met its burden of showing that the BACT analysis was clearly erroneous or otherwise warrants review with respect to the first two issues. Thus, review is denied on this aspect of the SO₂ BACT issue.

The Region's third argument is that Hibbing failed to justify its rejection of burning natural gas as a viable control

10/ Recognizing the need for a more consistent BACT process, EPA recently began developing specific guidelines on the use of the "top-down" approach, which requires an applicant to justify why it cannot use the most effective pollutant control available. See Memorandum from J. Craig Potter, Assistant Administrator for Air and Radiation, to EPA Regional Administrator's (December 1, 1987). The top-down approach, however, was not applicable here because the permit determination was made prior to the issuance of this memorandum. See in the Matter of Pennsauken County, New Jersey Resource Recovery Facility, PSD Appeal No. 88-8 at 6-7 (November 10, 1988).

strategy. I agree. Hibbing contends that although natural gas was once a financially viable alternative, due to the depressed economic situation in the steel industry, natural gas is now too costly. Nevertheless, Hibbing has been able to continue to operate using natural gas. In my view, Hibbing's ability to continue to operate using natural gas creates a presumption that natural gas is a financially achievable alternative. Of course this presumption can be rebutted, but to do so, Hibbing must provide a detailed consideration of objective economic data. Mere generalizations about the economic woes of the steel industry are not enough. Hibbing's BACT analysis does not contain the level of detail and analysis necessary to overcome the presumption that the natural gas alternative is economically achievable. The BACT analysis shows the cost of burning natural gas is \$1310/ton of SO₂ removed, however, there is no serious discussion of cost effectiveness. Greater efforts must be made by the applicant to show that the natural gas alternative is not economically feasible. This might be done, for example, by comparing the costs of burning natural gas with the costs associated with SO₂ controls used in other similar types of facilities that have gone through PSD review. Thus, on remand, MPCA must ensure that the BACT analysis contains a more detailed economic justification for rejecting the natural gas alternative.

11/ In its petition, the Region states that a control cost of \$1300 per ton is within the cost range found for BACT determinations, and therefore, is reasonable.

Although the parties have not raised it, one argument that could be made is that the Region, by requiring the burning of natural gas to be an alternative to be considered in the BACT analysis, is seeking to "redefine the source." Traditionally, EPA has not required a PSD applicant to redefine the fundamental scope of its project. However, this argument has not been made, and in any event, the argument has no merit in this case.

EPA regulations define major stationary sources by their product or purpose (e.g., "steel mill," "municipal incinerator," "taconite ore processing plant," etc.), not by fuel choice. Here, Hibbing will continue to manufacture the same product (i.e., taconite pellets) regardless of whether it burns natural gas or petroleum coke. Likewise, the PSD guidelines state that in choosing alternatives to be considered in a BACT analysis, the

12/ See In the Matter of Pennsauken County, New Jersey Resource Recovery Facility, PSD Appeal No. 88-8 at 11 (November 10, 1988)(BACT permit conditions "are not intended to redefine the source"). Several important distinctions, however, can be drawn between Pennsauken and the facts here. In Pennsauken, the petitioner was urging EPA to reject the proposed source (a municipal waste combustor) in favor of using existing power plants to co-fire a mixture of 20% refuse derived fuel and 80% coal. In other words, the petitioner was seeking to substitute power plants (having as a fundamental purpose the generation of electricity) for a municipal waste combustor (having as a fundamental purpose the disposal of municipal waste). Moreover, the petitioner was not merely seeking to "condition" the permit; instead, it was urging EPA, in effect, to deny the permit for construction of the proposed source in favor of using existing power plants. The Hibbing situation, however, is quite distinct. Here, the petitioner (the Region) is merely urging the continued burning of natural gas at the same source -- an alternative that will not require any fundamental change to Hibbing's product, purpose, or equipment.

13/ See 40 CFR 52.21(b)(1).

applicant must look to what types of pollution controls other facilities in the industry are using. The record here indicates that there are other taconite plants that burn natural gas, or a combination of natural gas and other fuels. Thus, it is reasonable for Hibbing to consider natural gas as an alternative in its BACT analysis. Moreover, because Hibbing is already equipped to burn natural gas, this alternative would not require a fundamental change to the facility.

The Region's last argument with respect to the BACT analysis for SO₂ is that Hibbing failed to present an engineering analysis demonstrating how the 1.2 lbs/MMBTU limitation for SO₂ emissions would be achieved or explaining why this level represents BACT. I agree. Although BACT is defined as an "emission limitation," it is also, as its name implies, keyed to a specific control technology. In a previous PSD permit decision involving the issue of whether EPA has the authority to prescribe technological process and production requirements, the Administrator stated:

PSD permits and BACT determinations are tailormade for each pollutant emitting facility. Consequently, the case-by-case" evaluation of economic costs and energy and environmental impacts that has to be performed as part of a BACT determination is inextricably tied to a specific set of assumptions regarding the type of pollution control technology that will be in place at each facility. Any change in the control technology would require a reevaluation of those impacts and costs, which, in turn, might necessitate a change in the emission level (lower or higher than the previous one). Therefore, unless the type of control technology that will be used to achieve a particular emission limitation is identified and adhered to by the Applicant, the BACT determination is meaningless. Accordingly, an emission limitation in a PSD permit cannot be established without also relating it to the specific type of control technology that will be used to achieve the limitation.

Moreover, EPA regulations require PSD permit applicants to submit "a detailed description as to what system of continuous emission reduction is planned . . . , emission estimates, and any other information necessary to determine that best available control technology would be applied." 40 CFR 52.21(n)(1)(iii)(emphasis added).

Here, the record before me fails to clearly identify the control technology that represents BACT and to explain how MPCA arrived at the 1.2 lbs/MMBTU figure or whether Hibbing will be

14/ In the Matter of CertainTeed Corp., PSD Appeal No. 81-2 at 56 (December 21, 1982)(footnote omitted).

15/ The entire process by which the emission limitation of 1.2 lbs/MMBTU was chosen is confusing. In its initial BACT analysis, Hibbing proposed burning petroleum coke as BACT, using its existing control technology (venturi rod scrubbers). See Letter from Charles B. Hoffman to David Beil, MPCA Staff Engineer (May 20, 1987). In a technical document based on Hibbing's BACT analysis, MPCA concurred with Hibbing. See Request for Authorization to Issue Air Emission Facility Permit No. 541-87-OT-1 for a Taconite Ore Processing Plant and Air Pollution Control Equipment to Hibbing Taconite Company, MPCA, Division of Air Quality, Regulatory Compliance Section at 4-5 (June 23, 1987). However, MPCA did not specify an emission limitation for SO₂ in that document. In the draft permit subject to public notice, MPCA set the BACT emission limit for SO₂ at 2.0 lbs/MMBTU. Subsequently, in response to EPA comments on the permit, MPCA issued the permit with an emission limitation of 1.2 lbs/MMBTU for SO₂. In its brief, MPCA summarily stated that the 1.2 lbs/MMBTU limit "is economically justified." The Black & Veatch support study, which was completed after MPCA issued the permit with the 1.2 limit, also found the existing technology and petroleum coke to be BACT. Based on this study MPCA determined that 1.8 lbs/MMBTU was BACT. The Black & Veatch study indicates that the only control technology that would lower emissions to 1.2 lbs/MMBTU is the addition of a wet limestone scrubber. However, MPCA never determined that wet limestone scrubbers represent BACT.

able to meet the limit using the existing control technology. MPCA's failure to require Hibbing to provide a detailed description of the control technology that represents BACT, including data quantifying its removal efficiency, is clear legal error. Accordingly, on remand, MPCA must ensure that the record identifies the control technology that represents BACT and MPCA must propose an emission limit based on the BACT analysis. If MPCA determines that 1.2 lbs/MMBTU is BACT, the record must specify the control technology upon which the limitation is based and show that such technology will enable Hibbing to meet the 1.2 lbs/MMBTU limit.

Issue (2): Unregulated Pollutants

Region V argues that MPCA's permit review is deficient because there was no consideration of unregulated pollutants as required by North County Resource Recovery Associates, PSD Appeal No. 85-2 (June 3, 1986). In response, MPCA incorrectly argues that North County only applies to PSD permit proceedings for municipal waste combustors. North County interprets an express statutory requirement applicable to all PSD permits, and thus requires the permitting authority to take into account the control technology's impact on unregulated pollutants in every permit proceeding. However, MPCA also responds that it did require Hibbing to analyze petroleum coke for unregulated trace

^{16/} Hibbing contends that it "cannot meet the 1.2 lb. limit in any financially viable way." See Hibbing's Comments (December 30, 1987).

elements of concern. In its response, Region V did not dispute the adequacy of the trace element analysis. Thus, the Region has not met its burden of showing that Hibbing's analysis of unregulated pollutants is clearly erroneous or otherwise warrants review.

Issue (3): CAA's requirement for prescribed emission limits

Region V argues that MPCA erred in issuing a PSD permit that does not prescribe an emission limitation for SO₂ for the first nine months of operation under the permit. The permit must set forth emission limitations for each regulated pollutant that the facility will emit in significant amounts. Section 165(a)(1), 42 U.S.C. 7475(a)(1). Although Hibbing's permit establishes a 1.2 lbs/MMBTU emission limitation for SO₂, Part V.D. of the permit allows Hibbing to operate its facility for nine months after modification while it designs a plan to achieve and comply with this limit. If after nine months Hibbing cannot achieve the 1.2 lbs/MMBTU limit, it must submit an application for a revised emission limit. As a result, the permit has no emission limit prescribed for SO₂ for at least the first nine months.

Last year in another PSD permit decision (involving the threshold question of whether the Administrator should review the permit), the Administrator stated:

^{17/} Hibbing analyzed a large number of trace elements in its Applicability Analysis. See MPCA Response at 18-19 and Attachment 6 (September 28, 1987).

[T]he permit contains a provision allowing a reopening of the BACT determination after construction of the facility has commenced. This provision appears to contravene 165(a)(1) of the Clean Air Act (CAA), which forbids construction of a facility before the emission limitations in the permit have been established. (CAA 169(3) defines BACT as an "emission limitation.")

Similarly, in the instant case, Part V.D. of the permit contravenes section 165(a)(1) of the CAA. Thus, Region V has made a showing of clear error and, on remand, MPCA must ensure that the permit contains an emission limitation for SO₂, based on BACT, for the entire life of the permit.

Issue (4): BACT for (PM)

Region V contends that MPCA erred in setting 0.024 gr/dscf as BACT for PM because the technical document supporting the permit states that the existing scrubbers used by Hibbing "have consistently shown an outlet dust loading of 0.01 gr/dscf when tested by EPA Methods 1-5." Nowhere in this document is the 0.024 gr/dscf limit mentioned.

MPCA's response to the Region is that many BACT and Lowest Achievable Emission Rate (LAER) determinations have been made in the range of 0.02 to 0.05 gr/dscf. Since 0.024 is at the low end of this range, MPCA considered it acceptable. MPCA's argument is unresponsive to the information contained in the technical

18/ In the Matter of Virginia Power (Chesterfield Generating Station), PSD Appeal No. 88-2 at 2-3 (February 1, 1988)(footnote omitted).

19/ See Request for Authorization to Issue Air Emission Facility Permit No. 541-87-OT-1 for a Taconite Ore Processing Plant and Air Pollution Control Equipment to Hibbing Taconite Company, Minnesota Pollution Control Agency, Division of Air Quality, Regulatory Compliance Section at 5 (June 23, 1987).

document and it ignores the site-specific nature of BACT determinations. The argument that many BACT and LAER determinations have been made in the range of 0.02 to 0.05 gr/dscf should not, by itself, be used to justify a less stringent PM limit than is otherwise achievable, taking into account the necessary energy, economic, and environmental impacts. Therefore, on remand, MPCA must provide a detailed justification for not adopting the 0.01 gr/dscf limitation if another less stringent limitation is chosen.

Issue 4: Ambient Air

The Region argues that Hibbing improperly excluded approximately 14,000 acres of its property from ambient air quality monitoring. An EPA screening analysis conducted with receptors located inside the excluded area indicates that the PM and SO₂ PSD increments and the SO₂ NAAQS will be exceeded. To

20/ As MPCA pointed out in its response, EPA guidelines on BACT state that the analysis of alternative strategies is not required in a BACT analysis if the applicant demonstrates that the chosen base case provides the highest degree of emission reduction available. Thus, MPCA may use the 0.01 gr/dscf limit in the permit without considering alternatives if it can show, as it represented in its technical document, that 0.01 gr/dscf represents the highest degree of emission reduction available. See *id.* MPCA also cites EPA's BACT guidelines, which state that the analysis should only be as extensive as the quantity of pollutants emitted and the ambient air impact. MPCA is correct that, under this guideline, it need not necessarily expand the scope of control technology alternatives beyond those previously considered. Nevertheless, MPCA must still explain its reasons for rejecting the 0.01 gr/dscf limit.

21/ Furthermore, the analysis suggests PM concentrations in this area may exceed the de minimis level of 10 µg/m³, thus triggering the requirement for pre-construction monitoring data for TSP.

obtain a PSD permit, an applicant must demonstrate that emission increases from the proposed source or modification will not exceed primary or secondary NAAQS or PSD increments.

In ambient air quality monitoring, mathematical models are used to predict pollutant concentrations at specific locations. To obtain a permit, the models need show only that the NAAQS and PSD increments will not be exceeded in the "ambient air." The rules define ambient air as "that portion of the atmosphere, external to buildings, to which the general public has access." 40 CFR 50.1(e). Thus, emissions that exceed the NAAQS or PSD increments on company property to which the public does not have access are not an impediment to permit issuance. EPA policy has allowed exclusion if public access is barred by fence or other physical barrier. A Memorandum of Law issued by the EPA Office of General Counsel interprets the definition of "ambient" in section 50.1(e) as follows:

That definition, in our view, limits the standards' applicability to the atmosphere outside the fence line, since "access" is the ability to enter. In other words, areas of private property to which the owner or lessee has

22/ See 40 CFR §52.21(c)(increases in pollutant concentrations over baseline limited to specific PSD increments); id. §52.21(d)(no pollutant concentration shall exceed the primary or secondary NAAQS); see also 40 CFR §52.21(k)(2) (the applicant must demonstrate the proposed source or modification will not cause or contribute to air pollution in violation of any PSD increment or NAAQS).

23/ Both the PSD increments and the NAAQS only apply in areas meeting the definition of ambient air. See 42 U.S.C. §§7409 & 7470-7473.

24/ See, e.g., Letter from Douglas M. Castle, EPA Administrator, to Senator Jennings Randolph (December 19, 1980).

not restricted access by physical means such as a fence, wall, or other barrier can be trespassed upon by members of the community at large. Such persons, whether they are knowing or innocent trespassers, will be exposed to and breathe the air above the property.

MPCA argues that it inspected the area and found that effective physical barriers preclude public access. In support of this argument, MPCA has submitted photographs that show access roads blocked by gates and other physical barriers. Hibbing correctly argues that the test for ambient air exclusion does not require a continuous fence around the perimeter of the property. Other types of physical barriers can effectively preclude access. However, based on photographs submitted by EPA, there appears to be at least three, possibly four, locations where physical

25/ Memorandum from Michael A. James, EPA Air Quality and Radiation Division, to Jack R. Farmer, EPA Plans Management Branch (September 28, 1972)(citation omitted)(emphasis added).

26/ MPCA cites a Federal Register notice in which EPA found the operator of the Kennecott smelter in Magma, Utah had effectively precluded public access from its property by a series of no trespassing signs, rugged terrain, and security patrols. See 50 Fed. Reg. 7057 (February 20, 1985). As Region V points out in its response, however, the two situations are not analogous. The Kennecott property was extremely rugged and mountainous. Thus, the physical terrain itself helped to create an effective barrier. Id. Hibbing's property, as described by Hibbing itself, consists of "flat lowland with occasional rolling hills." See Hibbing's Comments at 16. Furthermore, Kennecott apparently did not involve the same type of rights of way as does the Hibbing property.

27/ The three locations not having any apparent physical barriers are the main plant entrance, the rail line into the plant, and the power line into the plant.

28/ It is difficult to ascertain whether the berm around the tailings pond is an effective physical barrier from the photographs submitted.

barriers, natural or otherwise, do not exist along the perimeter of the 14,000 acres. I am remanding this issue to MPCA to reconsider whether public access is effectively precluded at the four locations in question. If MPCA does not find effective barriers to public access at the four identified (or any other) locations, MPCA must impose requirements in the permit that would force Hibbing to erect appropriate barriers or to take other measures that would effectively preclude public access. Alternatively, MPCA may identify a different portion (presumably smaller) of Hibbing's property, from which access is effectively barred. The factual issue of the exact area to which public access is precluded may be ripe for a negotiated settlement.

Issue 6: BACT for CO

Region V argues that the BACT analysis for CO is erroneous because it did not contain an analysis of alternative controls and did not include any operational requirements for combustion of CO. I disagree. The Region acknowledges that alternative controls for CO are limited to combustion with excess air and temperature control. Nevertheless, the Region argues that the BACT analysis must include consideration of alternative combinations of these two variables. Both Hibbing and MPCA have

29/ Region V has indicated that there may be a smaller area that would properly be excluded from the ambient air.

provided reasons why the chosen combination of temperature and excess air was the only acceptable one.

The Region also asserts, without citation, that once the combination of temperature and excess air that represents BACT is established, it should be specified in the permit. Neither the CAA nor EPA regulations absolutely require the permit to specify operational requirements in addition to a numerical emission limitation. Both the CAA and EPA regulations define BACT as an "emission limitation." Hibbing's permit contains this required emission limitation and therefore omission of operational requirements was not clear error. Nevertheless, Hibbing must adhere to the control technology identified as representing BACT in its BACT analysis. Review is denied on this issue.

30/ To produce a high strength abrasion resistant taconite pellet, the pellets must be heated to, and maintained at, a temperature of 2450° F. The amount of excess air that can be used is limited by the need to achieve a high enough temperature in the combustion gases to raise the temperature of the pellet to the required level. Although increasing the temperature would result in a reduction of CO emissions, it would also result in pellets of unacceptable quality. Thus, the chosen combination of temperature and excess air appears to be the only acceptable combination. The Region has not shown that Hibbing's justification of this combination is clearly erroneous.

31/ Furthermore, MPCA represents that combustion control is automatic and not dependent on operator attention.

32/ 42 U.S.C. §7479(3); 40 CFR §52.21(b)(12).

33/ Moreover, there is nothing in the record to indicate that specifying the combination of temperature and excess air is essential to monitor compliance with the emission limitation.

34/ See In the Matter of CertainTeed Corp., PSD Appeal No. 81-2 at 5 (December 21, 1982).

Issue 7: Preconstruction Monitoring

Region V argues that the data used by Hibbing do not meet the preconstruction monitoring requirements of 40 CFR 52.21(m) and EPA's Guidelines on Ambient Monitoring. Section 52.21(m)(1)(iii) of the rules requires applicants to submit continuous air quality monitoring data to determine if emissions of a pollutant would cause or contribute to a violation of a NAAQS or an increment. The data must be gathered over a period of at least a year and must represent at least the year preceding receipt of the application. EPA allows substitution of existing representative air quality data in lieu of having the source generate its own preconstruction monitoring data, provided these data meet the criteria in the "Ambient Monitoring Guidelines for Prevention of Significant Deterioration" (July, 1980).

The guidelines require existing monitoring data to be representative of areas of (1) maximum existing pollutant concentrations, (2) maximum concentration increases from the proposed source or modification, and (3) maximum combined impact from existing and proposed sources. If there are no existing monitors in such areas the guidelines allow monitors located elsewhere to be used on a case-by-case basis. The guidelines provide examples of cases in which it would be appropriate to use

^{35/} Based on Hibbing's modeling results, preconstruction monitoring data is required only for SO₂. However, in light of the remand on the ambient air issue, preconstruction monitoring may also be required for PM. See supra note 17 & accompanying text.

^{36/} See 45 Fed. Reg. 52676 (August 7, 1980).

existing monitors that are located outside the three areas listed above. Id. at 6-8. In one example, the proposed source is in an area that is generally free from the impact of other point sources. Id. at 6. The guideline states that representative data may be obtained from a "regional" site, a site that is characteristic of air quality across a broad region. Id. The use of regional sites should be limited to relatively remote areas and should not be used in areas of multisource emissions or areas of complex terrain. Id.

Hibbing maintains that it properly used representative data from a monitoring site that fits the description in this example. Both Hibbing and the monitoring site are located in an area that is generally flat, sparsely populated, and contains one plant (the Clay Boswell plant) that accounts for 70% to 81% of the total SO₂ emissions. Hibbing contends that because this monitoring site is closer to the Clay Boswell plant than is the Hibbing property, it probably has higher pollutant concentrations than the Hibbing property. Nevertheless, the Region asserts that it is "not convinced that Hibbing qualifies for the use of regional monitoring data." The Region maintains that there are eleven SO sources within 65 kilometers of Hibbing, and thus it is a "multisource" area. The Region also contends that because the Clay Boswell plant has two very tall stacks, it is not expected to cause high ground-level concentrations, and thus the monitoring data may not reflect pollutant levels as high as those in the area closer to the Hibbing plant.

In my view, the Region has not met its burden of showing that MPCA committed clear legal error in interpreting or applying example number one of the guidelines. The guidelines are very broad and leave much to the discretion of the permitting authority. Moreover, the examples provided in the guidelines are not intended to be an exhaustive listing of every conceivable situation in which the use of representative data is appropriate. The Region is not able to point to any specific misinterpretation or misapplication of the guidelines. The mere existence of some other sources in the area and the Clay Boswell plant's tall stacks, without more, is not sufficient to show that MPCA's characterization of the area as non-multisource was clearly erroneous.

Moreover, the Region has not shown that MPCA committed a factual error in evaluating the conditions in the vicinity of the

^{37/} The guidelines state "some examples are included to demonstrate overall intent." Ambient Monitoring Guidelines for Prevention of Significant Deterioration at 6 (July, 1980). The Region also argues that the guidelines require existing representative data to be collected in the three year period preceding the permit application. Hibbing used data from 1980-1983, which clearly was not within three years of the 1987 permit application. The guidelines merely state, however, that "generally" preconstruction data must have been collected within three years prior to the date of permit application. Here, it appears that it would be impossible to do this because MPCA had already permitted Hibbing to do a test burn of petroleum coke during 1985 and 1986. See Citizens Against the Refinery's Effects, Inc. v. United State Environmental Protection Agency, 643 F.2d 178, 181 (4th Cir. 1981)(PSD permit applicant may properly use one year of weather data in its air dispersion model instead of the five years recommended by EPA guidelines because the guidelines were only recommendations and only one year of data was locally obtainable and compatible with the model used).

Hibbing site and monitoring site. Region V has not contested Hibbing's factual assertions that the Clay Boswell plant accounts for the majority of SO₂ emissions in the area or that the other plants in the area account for very small percentages (no source accounting for more than 3.6%) of overall emissions. In sum, far from demonstrating that MPCA committed clear error by allowing Hibbing to use the regional data, Region V has shown nothing more than it is "not convinced" that Hibbing's use of the regional monitoring data was appropriate. Review is denied on this issue.

Conclusion

The deficiencies in the BACT analysis leave two courses of action open at this juncture of the proceedings. One is to grant review of the permit and enter into the briefing phase contemplated by 40 CFR 124.19(c). However, the deficiencies in the record cannot be rectified through the submission of briefs, and any ensuing decision would likely conclude that the permit should be denied (because of the deficiencies) or that it should be remanded to the permit-issuing authority to allow the applicant to supplement the BACT analysis. Considerations of time favor remanding the permit in the first instance. Therefore, rather than receiving additional briefs on appeal, I am remanding the case to MPCA to: include in the permit an emission limitation

^{38/} Moreover, MPCA has included in the permit a requirement that Hibbing design, install, and operate an ambient air monitoring system for SO₂.

for SO₂ based on BACT, for the life of the permit; to provide a detailed economic analysis sufficient to justify rejection of the natural gas alternative; to identify the control technology that the SO₂ limitation is based on and demonstrate that such technology will enable Hibbing to meet the prescribed permit limitation; and to either set the BACT limitation for PM at 0.01 gr/dscf or explain why it rejected this limitation. On remand, MPCA must also determine whether public access is effectively precluded from the four locations identified in this order, and if not, MPCA must either impose conditions in the permit that would require Hibbing to erect appropriate barriers at these locations or identify a smaller area of its property from which public access is effectively precluded.

39/ The Region maintains that MPCA should be required to obtain the Region's concurrence on the permit before issuing the permit. I find no basis for this argument. Regarding the procedures for issuance of PSD permits, the delegation agreement between EPA and MPCA requires MPCA only to forward preliminary determinations to grant or deny a PSD permit to EPA for comment and to send copies of its final action on PSD permits to EPA. In contrast, In the Matter of Honolulu Resource Recovery Facility, PSD Appeal No. 868 (June 22, 1987), the delegation agreement required EPA Region IX and the Hawaii Department of Health (HDOH) concurrence on BACT determinations on the first five permits issued by HDOH.

Nevertheless, MPCA and the Region should communicate during the course of PSD permit proceedings and attempt to reach a consensus on matters of disagreement. Moreover, as previously noted, MPCA's action in issuing the permit is subject to review provisions of 40 CFR §124.19 because the permit is deemed to be an EPA-issued permit under EPA rules. 40 CFR §124.41; 45 Fed. Reg. 33,413 (May 19, 1980).

MPCA's determination on remand will be subject to review under 40 CFR 124.19, an appeal of its decision on remand will be required to exhaust administrative remedies under section 124.19(f)(1)(iii).

So Ordered.

William K. Reilly
Administrator

Dated: [July 19, 1989]

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing Order on Petition for Review in the matter of Hibbing Taconite Company, PSD Appeal No. 87-3, were sent by First Class Mail to the following persons:

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Dated: Jul 20 1989

Brenda H. Selden, Secretary
to the Chief Judicial Officer

EXHIBIT J



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Rockwool Ranson Community

July 31, 2020 · 🌐

July 31, 2020

That's right – we're planning to start up factory operations using natural gas instead of coal. Converting from coal to natural gas for the melting furnace will significantly reduce the environmental impact of our operations – that's great for Jefferson County and beyond. We expect CO2 emissions from the melting furnace to decline by around 30 percent along with reductions in other emissions as well.

Converting to natural gas also means less heavy truck traffic, as we will not need any coal deliveries – another win for Jefferson County and the environment. And in case you're wondering, Mountaineer Gas will supply the gas via the existing pipeline infrastructure, which is already completed and well-functioning. This conversion will not require natural gas truck deliveries to the factory.

That we're able to convert to natural gas is a result of the highly advanced, proprietary, fuel-flexible melting technology that we're deploying here. To our knowledge, no one else in our industry has this capability. The air permit authorizing our operations allows for using both fuel sources – and it has always been part of the plan to eventually convert to natural gas for the melting process. We're extremely pleased that we're able to start up on gas, thus reaping the environmental benefits of doing so straight away.

Converting to natural gas is also something that has been a priority for Ranson Mayor Duke Pierson. He has long encouraged us to go this route. We're delighted to deliver on our commitment to Mayor Pierson and the Jefferson County community to continuously work to reduce the environmental impact of our operations.

We look forward to start of operations in early 2021!



EXHIBIT K



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WVDEP Information About The Rockwool Facility In Jefferson County, WV

1/11/2019

PLEASE NOTE: Some of these documents are large files. Please be patient and allow time for download.

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Enforcement Action

- Oct. 1, 2018: Notice of Violation
- Oct. 25, 2018: Response to NOV

Air Permit

This permit was issued by the WVDEP Division of Air Quality.

- Nov. 20, 2017: Application for permit to construct
- Dec. 2017: Air Quality Assessment
- Jan. 2018: PSD Application
- March 2, 2018: Air Quality Impact Analysis Review
- March 8, 2018: Preliminary Determination
- March 28, 2018: Interim Permit Review
- March 28, 2018: Spirit of Jefferson public notice and Certificate of Publication
- Draft Permit
- April 25, 2018: EPA comments to WVDEP
- April 27, 2018: WVDEP response to EPA comments
- April 30, 2018: Final Determination
- April 30, 2018: Permit to Construct

Construction Stormwater Permit

This permit was issued by the WVDEP Division of Water and Waste Management.

- Location Map
- Soil Map
- Construction Narrative
- Construction Sequence
- Structure Hydrology
- Precondition Hydrology
- Public Notice Sign
- Stormwater Pollution Prevention Plan (SWPPP)
- Construction Permit Application
- Erosion and Sediment Control Phases I and II
- Chesapeake Bay Form
- Construction Stormwater Permit Signature Page
- West Virginia MS4 Stormwater Spreadsheet

NPDES Permit

The National Pollutant Discharge Elimination System (NPDES) permit is administered by

NPDES Permit

The National Pollutant Discharge Elimination System (NPDES) permit is administered by the WVDEP Division of Water and Waste Management.

- Charles Town Issued Modification WV0022349
- Charles Town Modification Comments WV0022349
- Charles Town Modification Response to Comments WV0022349
- Oct. 2, 2018: Charles Town NPDES permit modification application
- Oct. 31, 2018: Charles Town NPDES public notice and modification
- Dec. 10, 2018: Charles Town NPDES public notice permit modification public hearing transcript

Voluntary Remediation Program (VRP)

The VRP is administered by the WVDEP Division of Land Restoration. The site where the Rockwool plant is being constructed is part of a larger VRP site, which was originally filed under the "Jefferson Orchards" name but was amended to become the "Rockwool" VRP site.

- June 2017: VRP Application
- July 6, 2017: VRP Application Acceptance Letter
- July 2017: Sampling and Analysis Plan
- July 17, 2017: Jefferson Orchards VRP Press Release
- July 18, 2017: Certificate of Publication of Public Notice
- Aug. 14, 2017: Voluntary Remediation Agreement
- Sept. 2017: VRP Site Characterization Report
- Oct. 24, 2017: Sampling and Analysis Report
- Jan. 31, 2018: VRP Application Amendment
- March 9, 2018: VRP Application Amendment Accepted

Additional Documentation

- July 2, 2018: Sierra Club letter to WVDEP-DAQ
- July 20, 2018: WVDEP-DAQ response to Sierra Club letter
- Aug. 16, 2018: Letter from Ranson City Manager to WVDEP
- Aug. 23, 2018: Letter from WVDEP to Ranson City Manager
- Aug. 29, 2018: Letter from Concerned Citizens to WVDEP
- Sept. 4, 2018: Letter from WVDEP to Concerned Citizens
- Sept. 18, 2018: WVDEP Statement on Rockwool Facility
- Timeline of events for Rockwool's air quality permit
- Frequently Asked Questions about the Rockwool project
- News Release - Public Hearing Canceled
- Mar. 8, 2019: Letter from PSC to Charles Town Utility Board
- Mar. 29, 2019: Response to Comments for Mountaineer Gas Route 9 Extension
- April 4, 2019: Statement on Mountaineer Gas Route 9 Extension Approval

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Charleston, WV 25304
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EXHIBIT L

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.

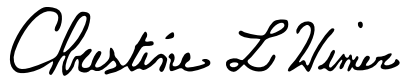
1. Rockwool and the DEP need to entirely re-do the BACT analysis with natural gas as the sole fuel source for the Melting Furnace.
2. At minimum a Class II administrative change with public notice needs to be made for this modification.
3. The redacted information from the permit application needs to 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,



Dr. Christine Wimer
President
Jefferson County Foundation

Cc: Scott Mandirola, WVDEP Deputy Secretary for External Affairs
West Virginia Department of Environmental Protection
scott.g.mandirola@wv.gov

Bev McKeone, Program Manager, New Source Review Permitting
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Joseph Kessler, New Source Review Permitting
Joseph.R.Kessler@wv.gov

Cosmo Servidio, Regional Administrator
Region III
R3_RA@epa.gov

Cristina Fernandez, Director
Air and Radiation Division, Region III
Fernandez.cristina@Epa.gov

Mary Cate Opila, Acting Associate Director, Branch Chief,
Permits Branch
opila.marycate@epa.gov

Cynthia Stahl
RACT, WV Permitting, MD Permitting, ACHD RACT
Stahl.cynthia@epa.gov

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 SO₂ BACT, and the use of natural gas fuel only for the the greenhouse gas (GHG or CO₂e) 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 CO₂e from the Melting Furnace¹, 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 CO₂e 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 CO₂e 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 CO₂e, 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

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, SO₂, 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 AP42⁴ 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 CO₂e (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 M



west virginia department of environmental protection

Division of Air Quality
601 57th Street, SE
Charleston, WV 25304

Austin Caperton, Cabinet Secretary
dep.wv.gov

August 5, 2020

Dr. Christine Wimer, President
Jefferson County Foundation
PO Box 460
Ranson, WV 25438

Via email: JeffersonCountyFoundation@gmail.com

Re: Rockwool Mineral Wool Production Facility, Ranson, WV
Facility ID: 037-00180, Permit No.: R14-0037

Dear Dr. Wimer,

The Division of Air Quality (DAQ) has received your July 29, 2020 letter concerning Rockwool's Ranson Facility. After internal review and consultation with U.S. Environmental Protection Agency (EPA), Permit R14-0037, as issued on April 30, 2018, is and remains valid for the construction and proposed operation of the facility. It is important to note that no Administrative Updates, regardless of class, have been issued, or are warranted by, the subject of your letter.

Sincerely,

Laura M. Crowder
Director

cc: Cosmo Servidio, Regional Administrator
US EPA Region III
R3_RA@epa.gov

Cristina Fernandez, Director
Air and Radiation Division, US EPA Region III
Fernandez.Cristina@epa.gov

Scott Mandirola, WVDEP Deputy Secretary for External Affairs
Scott.G.Mandirola@wv.gov

Promoting a healthy environment.

EXHIBIT N

Appointment

From: McKeone, Beverly D [Beverly.D.Mckeone@wv.gov]
Sent: 7/30/2020 5:04:35 PM
To: McKeone, Beverly D [Beverly.D.Mckeone@wv.gov]; Opila, MaryCate [Opila.MaryCate@epa.gov]; Stahl, Cynthia [Stahl.Cynthia@epa.gov]; Crowder, Laura M [laura.m.crowder@wv.gov]; Wandling, Jason E [Jason.E.Wandling@wv.gov]; Kessler, Joseph R [Joseph.R.Kessler@wv.gov]; Scott.G.Mandirola@wv.gov

Subject: Canceled: Rockwool - Jefferson County Foundation Submittal discussion with EPA Region 3

Location: Microsoft Teams Meeting

Start: 8/4/2020 6:30:00 PM

End: 8/4/2020 7:00:00 PM

Show Time As: Free

Recurrence: (none)

EPA Region 3 has agreed that we don't need this meeting. Any response to Jefferson County Foundation will come from WV.

From: Finn, Cara [Finn.Cara@epa.gov]
Sent: 8/4/2020 12:06:59 PM
Subject: ARD's Salient Report for the Week Ending August 7th

**Salient Issues
for Regional Administrator and Deputy Regional Administrator
Air & Radiation Division**

Nonresponsive based on revised scope

PERMITS BRANCH

Improper Permitting Process alleged for Rockwool Facility in West Virginia

In a July 28, letter to the West Virginia Department of Environmental Protection (WVDEP), the Jefferson County Foundation alleged that WVDEP improperly processed a permit modification for the Rockwool Facility (formerly, Roxul), mineral wool facility located in Ranson, WV. The permit change removed the option of Rockwool from burning coal in its Melting Furnace. Jefferson County Foundation seeks a new public notice period, including additional materials from the facility, which could result in a new analysis for Best Available Control Technology (BACT) requirements. Rockwool was permitted in 2018 as a new major stationary source and BACT was applied. At the time of the 2018 permit issuance, there was significant public interest and EPA determined that WVDEP had appropriately issued that permit. Region 3 will follow up with WVDEP regarding this letter. **Contact:** Cynthia Stahl, 215-814-2180.

Nonresponsive based on revised scope

Cara Finn
Program Analyst
U.S. EPA Region 3
Air and Radiation Division (3AD00)
215-814-2261



Message

From: Opila, MaryCate [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=8A751913473A4B44B71F1280D4DAAE7A-OPILA, MARY]
Sent: 2/2/2021 5:52:37 PM
To: Supplee, Gwendolyn [Supplee.Gwendolyn@epa.gov]
Subject: FW: PRESS QUERY: Rockwool Plant in West Virginia

H:\Permits\WV\PSD-NSRpermits\R14 Permits\R14-0037 - ROXUL USA Inc-RAN Facility\2020 correspondence

Proposed response:

Q: Jefferson County community residents have stated EPA Region 3 needs to provide more oversight on the WVDEP, including forcing Rockwool to submit a new air quality permit reflective of a change in fuel sources (from coal and natural gas to just natural gas to ensure the use of best available control technologies for natural gas). Has EPA Region 3 determined whether or not Rockwool should submit a new air quality permit? If so, why? If not, why not?

A: As mentioned previously, the permitting program is fully delegated to WVDEP, and EPA is a co-regulator. In regards to the "change in fuel sources" mentioned in the question, Roxul provided notification to WVDEP in a letter dated March 2, 2020 that it planned "to operate the Melt Furnace using only natural gas, as allowed under Permit No. R14-0037." On August 5, 2020, WVDEP replied to the Jefferson County Foundation letter (dated July 29, 2020) regarding the same topic, saying that "Permit R14-0037, as issued on April 30, 2018 is and remains valid for the construction and proposed operation of the facility. It is important to note that no Administrative Updates, regardless of class, have been issued, or are warranted..." WVDEP consulted with EPA prior to issuing this letter- EPA reviewed the permit and associated letters, and found WVDEP's conclusion that the proposed operation of the Melt Furnace using only natural gas is allowable under Permit No. R14-0037 to be reasonable.

Mary Cate Opila, P.E., Ph.D.
Chief, Permits Branch
Air & Radiation Division
EPA Region 3
Mail Code: 3AD10
1650 Arch Street
Philadelphia, PA 19103
215-814-2041



From: Sternberg, David <Sternberg.David@epa.gov>
Sent: Tuesday, February 02, 2021 11:10 AM
To: Landis, Jeffrey <Landis.Jeffrey@epa.gov>; Seneca, Roy <Seneca.Roy@epa.gov>
Cc: White, Terri-A <White.Terri-A@epa.gov>; Nitsch, Chad <Nitsch.Chad@epa.gov>; Delgrosso, Karen <Delgrosso.Karen@epa.gov>; Fernandez, Cristina <Fernandez.Cristina@epa.gov>; Febbo, Carol <febbo.carol@epa.gov>; Chow, Alice <chow.alice@epa.gov>; Opila, MaryCate <Opila.MaryCate@epa.gov>; Ferrell, Mark <Ferrell.Mark@epa.gov>
Subject: RE: PRESS QUERY: Rockwool Plant in West Virginia

EXHIBIT O

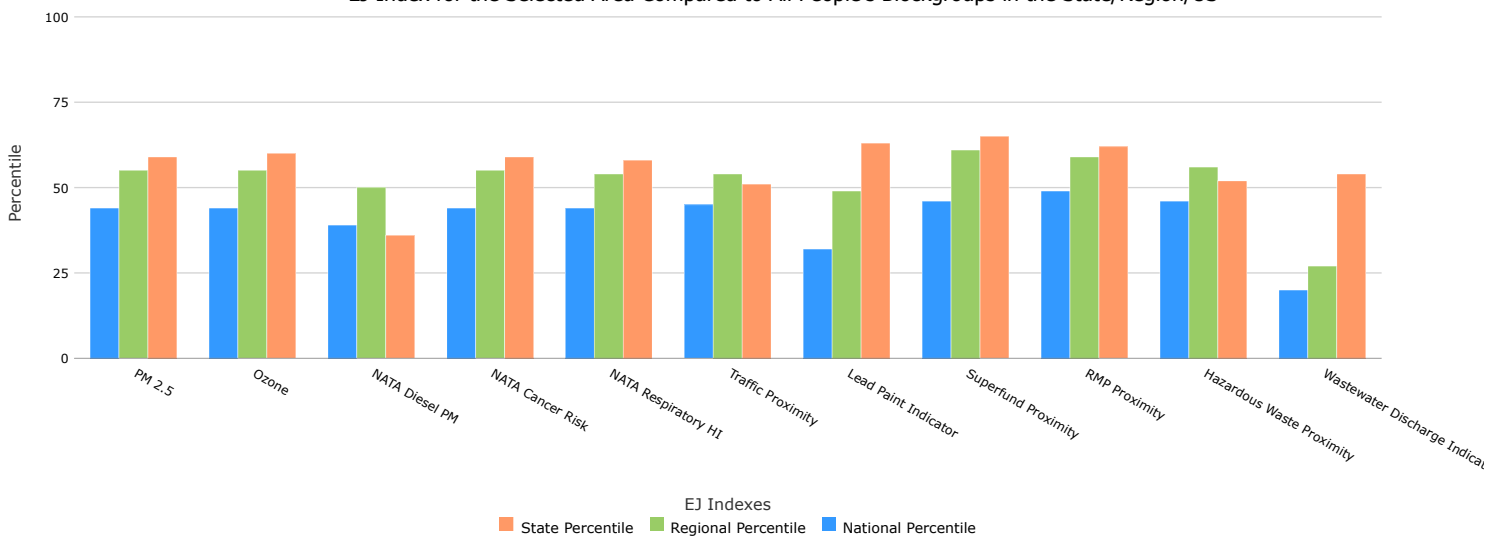
Save as PDF



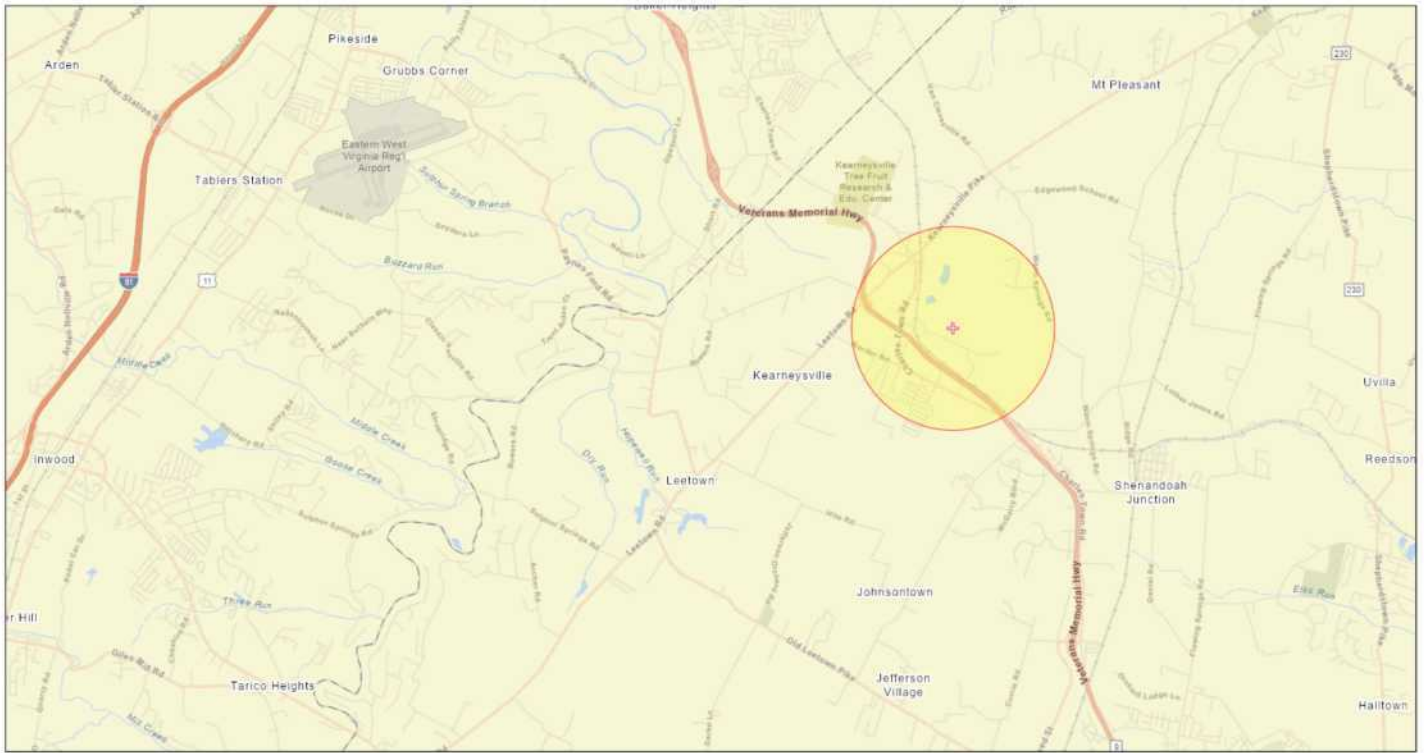
EJSCREEN Report (Version 2020)
1 mile Ring Centered at 39.377540,-77.878440
WEST VIRGINIA, EPA Region 3
Approximate Population: 954
Input Area (sq. miles): 3.14

Selected Variables	Percentile in State	Percentile in EPA Region	Percentile in USA
EJ Indexes			
EJ Index for Particulate Matter (PM 2.5)	59	55	44
EJ Index for Ozone	60	55	44
EJ Index for NATA* Diesel PM	36	50	39
EJ Index for NATA* Air Toxics Cancer Risk	59	55	44
EJ Index for NATA* Respiratory Hazard Index	58	54	44
EJ Index for Traffic Proximity and Volume	51	54	45
EJ Index for Lead Paint Indicator	63	49	32
EJ Index for Superfund Proximity	65	61	46
EJ Index for RMP Proximity	62	59	49
EJ Index for Hazardous Waste Proximity	52	56	46
EJ Index for Wastewater Discharge Indicator	54	27	20

EJ Index for the Selected Area Compared to All People's Blockgroups in the State/Region/US



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.



April 27, 2021

- + Project 1
- + Search Result (point)

1:72,224



Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Sites reporting to EPA

Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0

Selected Variables	Value	State		EPA Region		USA	
		Avg.	%tile	Avg.	%tile	Avg.	%tile
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	8.29	8.02	61	8.63	34	8.55	40
Ozone (ppb)	42.1	41.4	77	43.2	27	42.9	43
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	0.355	0.246	79	0.477	<50th	0.478	<50th
NATA* Air Toxics Cancer Risk (risk per MM)	28	30	56	31	<50th	32	<50th
NATA* Respiratory Hazard Index	0.36	0.36	57	0.4	<50th	0.44	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	58	200	50	650	26	750	26
Lead Paint Indicator (% pre-1960s housing)	0.22	0.34	37	0.36	43	0.28	54
Superfund Proximity (site count/km distance)	0.029	0.083	34	0.15	11	0.13	26
RMP Proximity (facility count/km distance)	0.1	0.44	35	0.62	17	0.74	15
Hazardous Waste Proximity (facility count/km distance)	0.25	0.83	54	2	27	5	29
Wastewater Discharge Indicator (toxicity-weighted concentration/m distance)	0.00091	3.1	35	34	62	9.4	65
Demographic Indicators							
Demographic Index	29%	23%	75	30%	59	36%	48
People of Color Population	23%	8%	92	33%	51	39%	41
Low Income Population	35%	39%	41	27%	69	33%	60
Linguistically Isolated Population	0%	0%	88	3%	55	4%	45
Population with Less Than High School Education	21%	13%	82	10%	87	13%	80
Population under Age 5	9%	5%	87	6%	85	6%	82
Population over Age 64	13%	19%	21	16%	39	15%	45

*The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

For additional information, see: www.epa.gov/environmentaljustice (<http://www.epa.gov/environmentaljustice>)

EXHIBIT P

Date: July 9, 2020

Memorandum

To: Division of Air Quality of the West Virginia Department of Environmental Protection

From: Jefferson County Foundation

Subject: Requests for Air Modeling and Regulation of the Ranson Rockwool Facility

Pursuant to the meeting of the DEP and Jefferson County Foundation (JCF) regarding, in addition to other things, the Air permit for the Rockwool facility in Ranson, JCF respectfully requests that the following measures be taken to improve our understanding of the effect Rockwool will have on the air quality of Jefferson County in an effort to better protect our air and residents. These requests are being updated from their initial presentation following a meeting on June 30 between Mr. Maguire and Jefferson County Foundation.

Specific requests:

1. RE-DO THE AIR DISPERSION MODEL USING AIR MONITORING DATA FROM MORE APPROPRIATE, CLOSER PROXIMITY MONITORS, AS REQUIRED BY EPA GUIDELINES.

BACKGROUND

As admitted by Jon McClung in our meeting of January 27, 2020, errors and misrepresentations exist in the DEP memo dated March 2, 2018, "Air Quality Impact Analysis Review—Roxul USA, Inc. PSD Application R14-0037, Facility ID# 037-00108," with respect to the monitoring data used in the Rockwool PSD dispersion modelling. The table below summarizes those "mistakes."

Air Monitors Used by Rockwool vs. What DEP Air Modeling Memo Claims

	Rockwool Used:	DEP Said:
PM2.5 Monitor	Piney Run, Garrett County, Maryland (ID #24-023-0002) 104 km (65 miles) from Rockwool.	Background 24-hour and annual PM2.5 monitored data were obtained from the Clarksburg WV monitor (ID #54-033-0003). [note: monitor is 212 km (132 miles) from Rockwool.]

Air Monitors Used by Rockwool vs. What DEP Air Modeling Memo Claims

<p>PM10 Monitor</p>	<p>Winchester City, Frederick County, VA (#51-840-0002) 21 km (13 miles) from Rockwool.</p>	<p>Background concentration for the 24-hour PM10 standard was from a monitor in Washington County, PA (#42-125-0005) [note: this corresponds to the monitor at the CHARLEROI WASTE TREATMENT PLANT (PA SIP Monitor Code #351) on the Monongahela River south of Pittsburgh, 296 km (184 miles) from Rockwool.]</p>
<p>NO2 Monitor</p>	<p>Arendtsville monitor (ID # 42-01-0001) in Adams County, PA, 77 km (48 miles) from Rockwool.</p>	<p>Background NO2 monitoring for the cumulative analysis for the 1-hr and annual NO2 standard are from a monitor in Washington County, PA (ID # 42-125-0005). [note: monitor is at the CHARLEROI WASTE TREATMENT PLANT (PA SIP Monitor Code #351) on the Monongahela River south of Pittsburgh, 296 km (184 miles) from Rockwool.]</p>
<p>SO2 Monitor</p>	<p>Piney Run, Garrett County, Maryland (ID #24-023-0002) 104 km (65 miles) from Rockwool.</p>	<p>Does not say.</p>

That March 2, 2018, memo served as the basis for the Preliminary Determination/Fact Sheet for Rockwool's PSD Permit, signed by Permit Writer, Joseph Kessler, P.E. on March 27, 2018; it is included in the Preliminary Determination as Attachment B.

EPA Guidelines discourage the use of distant monitors in dispersion modeling when closer, more representative monitors are available. In particular, the Piney Run, Garrett County,

MD, monitor is noted on the 2019 Maryland SIP monitoring plan as a scientific, long-distance transport, specialty monitor, not approved for use in NAAQS comparison PSD modeling. The most logical, representative, and appropriate monitor to use for Rockwool's PSD dispersion modelling is the Martinsburg, WV, PM2.5 monitor, 11km (6.8 miles) away.

The NO2 monitor in Arendtsville, PA, is 77 km and two states away. Moreover, it is not in the same Metropolitan Statistical Area (MSA)—one of the selection criteria mentioned by EPA in guidance for appropriate comparison monitors. Jefferson County is in the Greater Washington MSA.¹ As such, the more appropriate comparison monitor for NO2 would be the one in Ashburn, VA, at Broad Run High School, 51 km (32 miles) away.

The PM10 monitor in Winchester, VA, 21 km (13 miles) away, is acceptable.

The SO2 monitor at Piney Run, Garrett County, MD, should be excluded from use in the dispersion modeling for the same reason as PM2.5, noted above. A monitor within the Greater Washington MSA would be acceptable.

While we understand and appreciate your explanation of why the monitors that were used were allowed. We respectfully disagree and continue to request that the modeling be repeated with the monitors we believe would be more appropriate.

¹ The Washington-Arlington-Alexandria, D.C.-Va.-Md.-W.Va. Metropolitan Statistical Area (MSA) includes the District of Columbia; Arlington, Clarke, Fairfax, Fauquier, Loudoun, Prince William, Spotsylvania, Stafford, and Warren Counties, and Alexandria, Fairfax, Falls Church, Fredericksburg, Manassas, and

2. DISALLOW EXCLUDED EMISSIONS IN ROCKWOOL'S PSD REGIONAL SOURCE INVENTORY AND RE-DO THE AIR DISPERSION MODEL WITH ALL APPROPRIATE EMISSIONS FROM NEARBY SOURCES.

Rockwool developed a regional emissions inventory of major air sources for the PSD modelling effort. It was set at a 20 km radius, with consideration for some more distant sources. DEP approved that inventory list in its Final Modeling Protocol approval memo of Nov. 3, 2017. That protocol does not talk about methods of excluding emissions from the inventory, yet in the actual PSD modeling, it was done. The exclusion metric was a manipulation of the Significant Impact Area plus 10 km, which effectively moved the boundary of sources to be considered to 10 km, for most of the categories of modeled pollutants. With Argos USA being at 10.73 km and Knauf Insulation Inc. at 12.83 km from Rockwool, these major air source inputs were excluded from the analysis for PM2.5 (both 24-hr. and annual), PM10 (annual) and NO2 (annual); of course, all other sources from 10-20 km were also excluded.

Since the “rationale” for choosing the Piney Run, Garrett County, Maryland monitor was to avoid the “problem” of double counting—the fact that the majority of the emissions of nearby sources were never even included in the “cumulative impact” model, we maintain that other sources were not even single counted in this flawed PSD modeling effort. Essentially, what got modeled is Rockwool, single source. And that is not the point of a cumulative impact model.

DEP needs to input all regional inventory emissions (with the exception of fugitive sources and intermittent generators) into the PSD model and re-run.

This was not addressed and we continue to ask that air dispersion model be repeated with all appropriate emissions from nearby sources.

3. THE RECEPTOR GRID WAS TOO COARSE; RE-DO WITH MORE REFINED GRID

In the DEP-approved Knauf Insulation Inc. PSD permit—as with most other PSD permits we have examined—the gridding for receptors is shown as below for Knauf. Rockwool, however, used an overall coarser gridding, which affected modeling results. The significant population centers that such gridding does not sufficiently well represent are listed in the table. We request that DEP redo the PSD model with a more refined grid, similar to that of Knauf, in order to model significant population receptors more appropriately. We especially would like to see a 25 meter receptor spacing at the fenceline and a 50 meter spacing for 0-1 km. The later would allow the bike trail and the North Jefferson Elementary School population to have the most protective gridding in the assessment.

Comparison of Receptor Gridding

Sub-Grid Type	receptor spacing (Knauf)	distance range (Knauf)	receptor spacing (Rockwool)	distance range (Rockwool)	Community/receptors at Rockwool grid distance
Along Fenceline	25 m		50 m		
Extra Fine	50 m	0-1 km			
Fine	100 m	1-5 km	100 m	0-3 km	Walkers on Northport Ave.; Rte. 9 Bike trail; NJES; Fox Glen; Bardane, Shenandoah Junction (some)
Coarse	500 m	2-25 km	250 m	3-5 km	Kearneysville area, Duffields
Coarse			500 m	5-10 km	Shepherdstown
Very Coarse			1000 m	10-20 km	Ranson, Charles Town, Harper’s Ferry, Summit Point, Martinsburg; Sharpsburg, MD
Maximum Coarse			2000 m	20-50 km	Purcellville, VA; Hagerstown, MD

This was not addressed and we continue to ask that air dispersion model be repeated with a more refined grid.

4. Determine why emissions in Rockwool’s PSD permit application are not scaled proportionally to emissions from their facility in Mississippi. If the difference is due to a substantially different technology employed at Ranson, then it is inappropriate to use Byhalia stack tests, scaled or otherwise for the Ranson PSD.

In its PSD application, Rockwool asserts that emission rates provided for the Ranson (RAN) facility (one mineral wool line) are derived from stack testing at the Byhalia Mississippi (MAR) facility (two mineral wool lines), “scaled appropriately for the RAN process.” While a 50 percent (plus/minus 10%) scaling criteria is met for NOx and CO2E, as the table below shows, it is not met for SO2, CO, PM10, and PM2.5. For example, the SO2 emission numbers for RAN are only 19% of the MAR values. This needs to be explained. Both mineral wool lines (RAN and MAR) are said to be configured the same and have the same operating parameters, material inputs, and pollution control technologies. If so, how does one explain such a variance in emissions? Our research suggests that Rockwool is using a new, proprietary technology at Ranson, one that has not been used at other facilities. An aspect of his new technology is reinsertion of waste material (e.g., crushed waste mineral wool, baghouse particulate matter) back into the furnace without the preparatory step of “briquetting.” The furnace itself is of a innovative design, with multi-level insertion points and multi-port fuel injectors. The method of melting is fundamentally different, as explained in the Rockwool patents we examined. If this is the first use of a new method of making mineral wool, then the stack tests from Byhalia (which uses the old method) must be disallowed. They are fundamentally different. We are concerned that Rockwool has not been transparent with DEP about this new technology and we ask that DEP clarify this issue.

Rockwool MAR vs RAN

Annual Facility-Wide Potential-to-Emit in Tons per Year (TPY)

	MAR	RAN	difference	% difference	Meets criteria?
NOx	410	239	171	0.58	Yes
SO2	759	148	611	0.19	No
CO	291	74	217	0.25	No
VOCs	1890	472	1418	0.25	No
PM-10	425	154	271	0.36	No
PM-2.5	209	134	75	0.64	No
CO2e	332,398	153,000	179,398	0.46	Yes

This was not addressed and we continue to request a further explanation and either that Rockwool be required to appropriately adjust the scaling or not use Byhalia stack tests, scaled or otherwise for the Ranson PSD

5. Factor in Start-up, Shut-down, and Malfunction (SSM) emissions into the PSD modeling and emission limit setting.

Rockwool claims that maximum emissions occur during full, optimized, steady-state production of their insulation product. The stack test at Byhalia and the tests that will be run within the first year of production here in Ranson would only occur during those peak flow, steady-state times. However, data indicate that significant emissions of regulated pollutants occur not during the optimized run times, but during SSM modes. These emissions were not considered in the PSD modeling, nor during BACT emission limit setting.

Rockwool states that they shut down production lines at least once a week for clean-out. A document² provided to DEP by our team at the January 27, 2020, meeting in Charleston, shows that melting furnace shutdown at Rockwool's Saint-Eloy-Les-Mines, France, occurs each week and lasts from a minimum of 8 hours to a maximum of 19 hours (ave. duration of shutdown = 15 hours). Shutdowns typically occur in the midnight to mid-morning time period.

Atmo Auvergne-Rhône-Alpes is the organization approved by the Ministry of Ecological and Inclusive Transition, for monitoring air quality in the vicinity of Rockwool's plant. Authorities conducting ambient air monitoring in the fall of 2017 found that the highest particulate matter excursions in concentration happen *during the shutdowns*. "On several production line stops, increases in particulate concentrations are observed. These increases reached 80 ug/m³ during the shutdown on October 25." This concerned Atmo Auvergne-Rhône-Alpes so much that they petitioned the Ministry to fund a full year study, with multiple pollutant monitors around the plant and to correlate observations with the periods of production shutdown. That monitoring is now complete and the report is expected soon (<https://www.atmo-auvergnerhonealpes.fr/fiche-etude/etude-de-la-qualite-de-lair-saint-ely-les-mines-63>).

This was not addressed and we continue to request that the Start-up, Shut-down, and Malfunction emissions be factored into the PSD modeling and emission limit setting.

² https://www.atmo-auvergnerhonealpes.fr/sites/ra/files/atoms/files/rapport_atmo_rockwool_2017_v1.pdf

6. The BACT analysis must be redone by DEP

BACT is an emission limit for each emission unit and pollutant subject to PSD regulation. The BACT emission limit must be met at all times, contain appropriate averaging periods, and have proper compliance procedures and recordkeeping for the averaging periods. Situations arise where the emission limit identified as BACT for steady state operation cannot be met at all times. For example, during start-up of the Ranson melting furnace, when conditions are not steady state and emissions can change sporadically, BACT must still be met. The way to do this—and it is an approach that DEP is very familiar with for PSD permitting of boilers and gas turbines—is to develop a separate BACT limit or standard applicable during SSM conditions. This can include operating procedures and practices in cases where a numerical limit is not practical. The issue with ignoring SSM—as the Ranson air permit does—is that compliance across all phases of operation cannot be determined and BACT for the melting furnace fails the federally-enforceable limit test.

The de-NO_x pollution-control method chosen as BACT by Rockwool and agreed to by DEP is effective only at optimum—i.e., steady state—conditions. Data from Rockwool's two facilities in Denmark and their Moss facility in Norway indicate that Rockwool has consistently had difficulty meeting emission limits for NO_x during any non-optimum times. The key condition is that the de-NO_x effectiveness is temperature dependent and during the lower temperature (and fluctuating ranges of temperature) at start-up and shut-down, NO_x removal is severely hampered. DEP must look more closely at the SSM aspects of Rockwool's BACT limits, especially those in-process (as opposed to after process) pollution controls that are dependent on temperature and flow optimization. In addition, the Continuous Emission Monitoring (CEM) must occur during the entire production run, not just during optimum conditions, as it now is written in the permit.

This was not addressed and we continue to have the following two asks.

With respect to BACT, we have at least two asks:

1) DEP must conduct a Short-term Best Available Control Technology (BACT) Analysis

Source compliance with the 30 day rolling average emission limit does not adequately demonstrate compliance with the short-term NAAQS and PSD increments. Consequently, enforceable limits pertaining to the performance of BACT pollution control options on a short-term basis must be established.

2) DEP must re-examine the assumptions provided by Rockwool in their BACT analysis, specifically, the rejection of Wet Electrostatic Precipitation (WESP) as a control for particulate matter emitted from the melting furnace.

Rockwool rejected WESP for control of PM₁₀ and CPM for the melting furnace based on cost. But the cost was highly dependent on the purchase cost of potable water, which

accounted for 52 percent of the Total Annual Operation & Maintenance Cost for a WESP system. However, it did select WESP for the Cooling Line, Spinners, and Drying Oven, on technical merit, ignoring the cost. The cost for the installation of the WESP system is already there, so the argument comes down to incremental O&M for emissions coming off the furnace. Rockwool also states that "Process water will consist of storm water from outside areas and supplemental water from the public water supply." Taking full credit for the cost of water purchase is not appropriate; DEP should factor in this discount of both an existing WESP system already to be installed, along with the significant use of free rainwater. We believe WESP should be BACT for both of these main pollutant-generating emission sources at Rockwool.

EXHIBIT Q

Public Notice
Mississippi Environmental Quality Permit Board
P. O. Box 2261 | Jackson, MS 39225
515 East Amite St. | Jackson, MS 39201
Telephone No. (601) 961-5171

Public Notice Start Date: April 22, 2021

MDEQ Contact: Carla Brown

Roxul USA, Inc. d/b/a ROCKWOOL, located at 4594 Cayce Road in Byhalia, MS, (662) 629-0803, has applied to the Mississippi Department of Environmental Quality (MDEQ) for the following permitting actions: Issuance of the initial Title V Operating Permit (TVOP) and modification to the Prevention of Significant Deterioration (PSD) Construction Permit first issued on August 22, 2012 (Air Permit Ref. No. 1780-00052).

Roxul USA, Inc. d/b/a ROCKWOOL (ROCKWOOL) is a subsidiary of Rockwool International and manufactures mineral wool insulation and associated products for residential, commercial, and industrial applications. ROCKWOOL's operations fall within SIC Code 3296 – Mineral Wool Manufacturing. ROCKWOOL was issued a PSD Construction Permit on August 22, 2012, allowing construction of air emissions equipment related to two Mineral Wool Lines, a Recycle Plant, a Bitumen Line, a Rockfon Line, and other ancillary air emissions equipment supporting these operations. The PSD Construction Permit was subsequently modified on February 25, 2014 and February 1, 2017 to address “as-built” changes. Construction of Mineral Wool Line 1, the Recycle Plant, the Rockfon Line, and ancillary support equipment for these operations has been completed. However, ROCKWOOL did not undertake the second phase of construction allowed by the PSD Construction Permit; therefore, the PSD Construction Permit is being modified to reflect the final “as built” conditions. The proposed changes to the PSD Construction Permit generally address the removal of equipment that has not been constructed, including the second Mineral Wool Line and the Bitumen Line. Because equipment is being removed, the Air Quality Analysis was not revisited and impacts to air quality will be less than previously permitted. A Preliminary Determination has been prepared that summarizes the proposed changes to the PSD Construction Permit.

The MDEQ is also proposing to issue the initial TVOP, which incorporates the emission limits and standards in the PSD Construction Permit and addresses additional monitoring, recordkeeping, and reporting requirements to demonstrate compliance with the emission limits and standards. ROCKWOOL must obtain a TVOP because the potential emissions of all criteria pollutants (i.e. particulate matter less than 10 microns, particulate matter less than 2.5 microns, sulfur dioxide, carbon monoxide, nitrogen oxides, and volatile organic compounds) exceed the Title V major source threshold of 100 tons per year. The emission of individual and total hazardous air pollutants also exceed the Title V major source thresholds of 10 and 25 tons per year, respectively. The TVOP also addresses applicable federal standards, including New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants. An Information Relative to the TVOP has been prepared that contains a discussion of the decision-making that went into the development of the TVOP and provides the permitting authority, the public, and other government bodies a record of the technical issues surrounding issuance of the permit.

The staff of the Permit Board has developed this draft permit based on information submitted to the Permit Board by the applicant, appropriate State and Federal agencies and other interested parties. The staff of the Permit Board is soliciting all relative information pertaining to the proposed activity, including public comment, to ensure that the final staff recommendation on the draft permit complies with all State and Federal regulations. Public review and comment on the draft permit and supporting documentation is an important element in the staff evaluation and resulting recommendation to the Permit Board. The draft permit conditions have been developed to ensure compliance with all State and Federal regulations but are subject to change based on information received as a result of public participation.

Persons wishing to comment upon or object to the proposed determinations are invited to submit comments in writing to Carla Brown at <https://www.mdeq.ms.gov/brown-carla/> or to the Permit Board address shown above no later than the end of the thirty (30) day public notice. All comments received by this date will be considered in the formulation of final determinations regarding the applications. A public hearing will be held if the Permit Board finds a significant degree of public interest in the proposed permits. Persons wishing to request a public hearing may do so by submitting that request in writing to Carla Brown at <https://www.mdeq.ms.gov/brown-carla/> or to the Permit Board address shown above. The Permit Board is limited in the scope of its analysis to environmental impact. Any comments relative to zoning or economic and social impacts are within the jurisdiction of local zoning and planning authorities and should be addressed to them.

After receipt of public comments and thorough consideration of all comments, the staff will formulate its recommendations for permit issuance and a proposed permit if that is the recommendation. The Title V Permit to Operate is a permit that is required by Title V of the Federal Clean Air Act and the Mississippi Air and Water Pollution Control Law. The Title V permit is a Federally-enforceable permit as well as a State permit. Therefore, the U.S. Environmental Protection Agency (EPA) will also be allowed an opportunity to review the application, proposed permit, and all comments received during the public comment period prior to Permit Board action on the application. The status regarding EPA's 45-day review of this project and the deadline for citizen's petitions can be found at the following website address: <https://www.epa.gov/caa-permitting/mississippi-proposed-title-v-permits>.

Additional details about the application, including a copy of the draft permits, are available by writing or calling the Public Records Request Officer at the above Permit Board address and telephone number or by completing the form at the following website: <https://www.mdeq.ms.gov/about-mdeq/public-records-request/public-records-request-form/>. Additionally, a copy of the draft permits, Preliminary Determination, and Information Relative to the TVOP may be found on the MDEQ's website at: <https://opc.deq.state.ms.us/publicnotice.aspx> and a copy of the application and related information is available at <https://www.mdeq.ms.gov/permits/environmental-permits-division/additional-information-for-permits-at-public-notice/>. This information is also available for review at the office of the MDEQ at the Permit Board address shown above during normal business hours. Please bring the foregoing to the attention of persons whom you know will be interested.