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SUPREME COURT OF TEXAS
BLAKE A. HAWTHORNE, CLERK

No. 23-0456

IN THE SUPREME COURT OF TEXAS

FRIENDS OF DRY COMAL CREEK and STOP 3009 VULCAN QUARRY,
Petitioners

v.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY and VULCAN CONSTRUCTION MATERIALS, LLC,
Respondents

On Petition for Review from the
Third Court of Appeals at Austin, Texas
No. 03-21-00204-CV

PETITION FOR REVIEW

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RECORD REFERENCES

This case is an administrative appeal. Therefore, almost all factual references are to the administrative record transferred from the agency to the district court. This record was organized in five sections. This record was Joint Exhibit No. 1 at the trial court and, except for the reporter's transcript of oral argument made by the parties to the trial court on the day Joint Exhibit No. 1 was submitted to that court is the "Reporter's Record."

References to the administrative record transferred from the agency to the district court are cited, in this Petition, "section"-"subsection" A.R. "item number". For example, the direct testimony before the agency of Howard Gebhart is cited as "2-B3 A.R. 240."

There is an earlier set of documents that is also referred to at the agency level as the "administrative record." This is the set of documents on basis of which the executive director of the agency had recommended, long before the contested hearing was held in the case, the draft permit be approved. This set of documents is "2-A A.R. 180" to the full administrative record, Joint Exhibit No. 1, admitted before the trail court. The set of documents is organized in tabs. Some very important documents, for example, Vulcan's Air Quality Analysis prepared by witness Knollhoff, are in this set of documents. Documents in this set are cited in this manner: "2-A A.R. 180, Tab D, Ex. 22, internal pp. 9, 10, 19 and 20 (narrative) and 44 (plot)."

ACRONYMS AND SHORTHAND REFERENCES

APDG	Air Permits Division Guidance
ESL	Effects Screening Level
MERA	Modeling and Effects Review Applicability
NAAQS	National Ambient Air Quality Standards
NSR	New Source Review
TCEQ or Commission	Texas Commission on Environmental Quality
Vulcan	Vulcan Construction Materials, LLC

STATEMENT OF THE CASE

Nature of the Case and Parties:	This is an administrative appeal of a final order by the Texas Commission on Environmental Quality, which granted Vulcan Construction Materials, LLC's application for an air pollution permit for a rock crusher at its proposed quarry. 1 AR 173.
Trial Court:	The Honorable Maya Guerra Gamble, 353rd District Court, Travis County.
Trial Court's Disposition:	TCEQ's final order reversed in part and remanded. CR 540-46 (App. A).
Court of Appeals:	Third Court of Appeals, Austin, Texas. Before Chief Justice Byrne, Justices Kelly and Jones. Opinion authored by Justice Jones (retired, sitting by assignment).
Court of Appeals' Disposition:	The court reversed the trial court's judgement (App. B & C).

STATEMENT OF JURISDICTION

The Supreme Court has jurisdiction of this case under Government Code Section 22.001(a)(6) because this case presents an important issue of constitutional law of first impression to this Court that is likely to recur in future cases.

ISSUES PRESENTED

1. Is it arbitrary and capricious for an agency to create by guidance document a *de minimis*-impact exemption to the statutory and regulatory command that compliance with the National Ambient Air Quality Standards be demonstrated as a condition of permit issuance?

2. May a categorical exclusion, created by agency guidance, for rock crushers from statutory and regulatory commands that the health effects of facility air emissions be evaluated constitute substantial evidence of compliance with the statutory and regulatory commands?

REASONS TO GRANT REVIEW

Separation of powers. The freedoms of and options available to Texans are, today, controlled to very high levels of detail by administrative agencies. This case merits a petition grant, because, at the core of this case is the question of how much power administrative agencies may arrogate to themselves *via* guidance documents and regulatory practices nominally derived from those documents. Clearly, Texas has already moved a great distance from the strict separation of governmental powers contemplated by our founders. The Texas Constitutions of 1845 and 1876, Art. II, Sec. 1, similar to their 1836 predecessor, provided: "no person, or collection of persons, being of one of [the three] departments, shall exercise any power properly attached to either of the others, except in the instances herein expressly permitted."

State-wide issue. This case also merits a petition grant, because the power of agency guidance presents itself repeatedly in the decision-making of virtually all state agencies and across the breadth of the State.

Confusion among the courts and members of the public. Further, the court of appeals opinion risks confusing other courts and the public. Here, the opinion pronounces twice that one of the guidance documents at issue "itself provides substantial evidence" supporting an agency finding. Slip Op., at 18 and 37. This is the same guidance document that the court of appeals opinion found not to set out a rule, because the agency heads, the Commissioners, could disregard the guidance document. Slip Op., at 18. How one evaluates the "substantial" or otherwise character of evidence that agency heads are free to disregard invites further confusion.

STATEMENT OF FACTS

Procedural Facts

The case began as a two-day contested hearing at the State Office of Administrative Hearings. The administrative law judge recommended Respondents prevail on all 19 factual issues that had been referred by the TCEQ for trial.[1] The TCEQ Commissioners affirmed the recommendation of the administrative law judge.[2]

Petitioners appealed to Travis County district court. Respondent Vulcan intervened.[3] This case was consolidated with another appeal that had been lodged by other landowner group.[4] After hearing, the trial court judge ruled generally in favor of Petitioners and the other landowner group.[5]

Respondents appealed to the Third Court of Appeals. That court issued a judgment and an opinion September 29, 2022 (revised October 18, 2022), favorable

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1 1 A.R. 167 (the Proposal for Decision).

2 1 A.R. 173. (App. D.)

3 C.R. pp. 4 and 32.

4 C.R. p. 61.

5 C.R. p. 540.

in all respects to the Respondents. The Petitioners filed a motion for rehearing, which led March 31, 2023, to withdrawal of the initial opinion and issuance of a second opinion that, like the first, was favorable in all respects to the Respondents. Petitioners sought, unsuccessfully, reconsideration of the second court of appeals opinion.

Proposed operations and general setting

The rock-crushing facility and associated emission sources at issue in this Petition would be located in Comal County. Vulcan Construction Materials, LLC, ("Vulcan") is the permittee for the facility. The permit application drew considerable neighbor opposition. The aerial photo, below, of the area of the proposed facility was prepared by TCEQ staff.[6] Vulcan's rock crusher product stockpiles will be accessed from FM 3009 (the north-south roadway in the photo) by a roughly 0.62-mile driveway.[7] The crusher will be co-located with a Vulcan limestone quarry operation, which operation, itself, includes a number of emission sources.[8]

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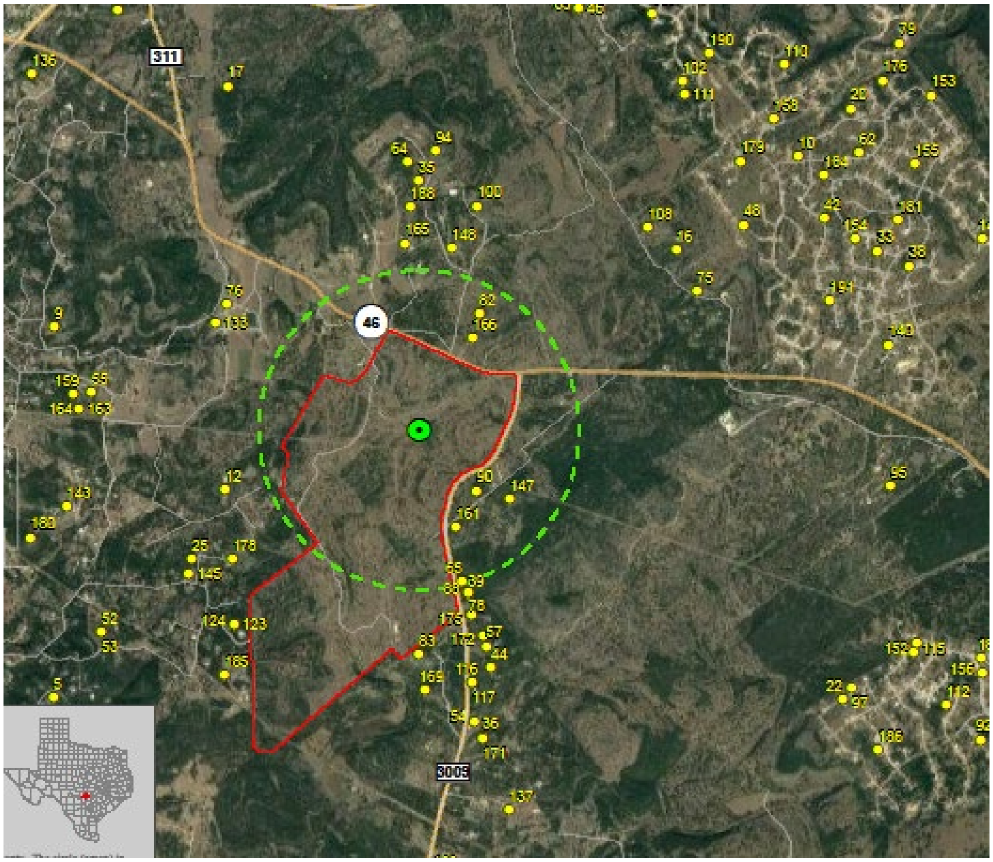
6 1 A.R. 51 (TCEQ Executive Director's Response to Hearing Requests).

7 2-A A.R. 180, Tab D, Ex. 22, p. 44. Also at 1 A.R. 26, p. 44. (App. G.)

8 2-B 1 A.R. 183, pp. 30:7-9; 30:12-14; 56:1-3; 56:18-24; 58:4-7.



Persons who requested hearings are reflected as yellow dots; the green intermittent circle is the one-mile radius around the initial crusher location. The quarry within which the crusher will sit is reflected by the red boundary.

Particulate matter, i.e., limestone dust, will be the major contaminant of concern to area residents. The particulate emissions will be an aesthetic and potential health problem. Some of the particulate matter is crystalline silica, and that is a recognized carcinogen.

Local citizens refer to the area just south of the Vulcan site as “quarry row.”[9] A hearing exhibit, an annotated aerial photo, showed there are parts of 14 quarries

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9 2-B3 A.R. 256, p. 9:1-6.

and rock crushers within a 20-km radius of the proposed Vulcan crusher.[10] This exhibit, with the kilometer radii added, is in the optional appendix to this Petition. The nearest quarry and rock crusher to the proposed Vulcan site is operated by Martin-Marietta and is, per Vulcan, 9.3 km southwest of the proposed Vulcan crusher.[11]

Facts bearing on, most specifically, the National Ambient Air Quality Standards guidance document issue

Every state must have an EPA-approved State Implementation Plan to protect air quality. Such plans must include procedures by which the State will prevent construction of any stationary source, if operation of the source would interfere with the attainment or maintenance of a National Ambient Air Quality Standard ("NAAQS"). 40 C.F.R. § 51.160(b)(2). The NAAQS set floor standards for six "criteria pollutants" in the air. 40 C.F.R. §§ 50.4 through 50.17. Particulate matter is a criteria pollutant.

Vulcan's demonstration of NAAQS compliance was made with computerized air dispersion modeling. TCEQ has a guidance document regarding how that should be done.[12] The TCEQ document, *Air Quality Modeling Guidelines* (APDG 6232), has not been subjected to notice-and-comment rulemaking.

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10 2-B3 A.R. 242 (App. E).

11 2-A A.R. 180, Tab D, Ex. 23, internal p. 9.

12 2-B2 A.R. 234 (APDG ["Air Permits Division Guidance"] 6232). (App. F.)

TCEQ permits "facilities." "Sources" is a term that encompasses "facilities" and other "points of origins of air contaminants." 30 Tex. Admin. Code § 116.10(4 and 15). Haul roads for quarries and rock crushers like those of Vulcan are not "facilities" and, therefore, are not subject to permitting in Texas. The parties disagree as to whether haul-road emissions, though not subject to permitting, are relevant to the permitting of facilities to which they are proximate. In this case, there was evidence showing that haul-road emissions will have an outsized impact on off-site particulate matter concentrations in the air.

Emission Rates. Vulcan voluntarily calculated $PM_{2.5}$ and PM_{10} annual emissions arising from the driveway, i.e., a haul road, to the edge of the plant.[13] (PM_{10} is particulate matter with a diameter of 10 millimeters or less. $PM_{2.5}$ is particulate matter with a diameter of 2.5 millimeters or less.)

The calculations showed that the driveway PM_{10} emissions are almost five times the rock crusher "facility" PM_{10} emissions. That is, the calculations showed 19.10 tons/year[14] vs. 4.08 tons/year.[15] Driveway $PM_{2.5}$ emissions were calculated to be almost twice rock crusher "facility" $PM_{2.5}$ emissions.[16] The following table provides this information with more detail.

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13 2-A A.R. 180, Tab D, Ex. 22, internal pp. 9, 10, 19 and 20 (narrative) and 44 (plot).

14 2-A A.R. 180, Tab D, Ex. 22, PDF pp. 66-67 (Tables EC-4 and EC-5).

15 2-A A.R. 180, Tab D, Ex. 23, p. 29.

16 2-A A.R. 180, Tab D, Ex. 22, PDF pp. 66-67; 2-A A.R. 180, Tab D, Ex. 23, p. 29.

Annual PM Emissions (Vulcan rock crusher & entrance road)		
Source	**Tons/year**	**Reference**
Permitted facility		
PM_{10}	4.08	footnote 1515
$PM_{2.5}$	1.07	footnote 15
Entrance drive, unpaved		
PM_{10}	18.24	footnote14, EC-4
$PM_{2.5}$	1.82	Footnote14, EC-4
Entrance drive, paved		
PM_{10}	0.86	Footnote 14, EC-5
$PM_{2.5}$	0.21	Footnote 14, EC-5
Entrance drive, total		
PM_{10}	19.10	18.24 + 0.86
$PM_{2.5}$	2.03	1.82 + 0.21

Off-site Impacts. If both the rock crusher and the entrance/exit driveway emissions are modeled for their off-site impacts, the maximum expected off-site $PM_{2.5}$ concentration would be 14 times the concentration expected, if only the rock crusher emissions are modeled.[17] (For off-site impacts from PM driveway emissions, Vulcan reported only the $PM_{2.5}$ impacts.)

No Martin-Marietta non-facility modeling. None of Vulcan's air modeling considered quarry or haul-road emissions from the Martin-Marietta project.

Facts bearing on, most specifically, the Health Effects Review guidance document issue

TCEQ by regulation provides that a permit application must include information demonstrating that "[t]he emissions from the proposed facility will comply with all rules and regulations of the commission and with the intent of the Texas Clean Air Act, including protection of the public health and property of the public." 30 Tex. Admin. Code § 116.111(a)(2).

Modeling and Effects Review Applicability ("MERA," APDG 5874)[18] is TCEQ's guidance document on making of the required health effects demonstration. That document disavows regulatory status.[19] Nonetheless, the document states that emissions from certain categories of projects, including, "[e]missions of particulate matter from rock crushers,"[20] do not require a health effects review. TCEQ's staff

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17 2-A A.R. 180, Tab D, Ex. 22, PDF p.50 (Appendix A, Table 1).

18 2-B2 A.R. 223 (the MERA, 2009). (App. H.)

19 2-B2 A.R. 223, p. 1.

20 2-B2 A.R. 223, p. 21.

regularly and uniformly applies this exclusion to emissions from limestone rock crushers,[21] such as Vulcan's crusher.[22]

This exclusion for rock crushers was developed about 20 years ago, and no documentation of the basis for the exclusion exists.[23] The TCEQ Executive Director and, later, the Commission relied on this guidance to determine that no health effects review was required for Vulcan's application, thereby, concluding that modeling of silica impacts was not required.[24]

Crystalline silica. Crystalline silica is the non-criteria pollutant of interest in this case. "Non-criteria pollutants" encompass all air pollutants that are not criteria pollutants. Crystalline silica can be a component of particulate matter.

Crystalline silica is potentially harmful to human health. Acute human impacts can include respiratory tract inflammation,[25] while more long-term impacts can include silicosis, emphysema, obstructive airway disease, and lung cancer.[26]

Vulcan provided limited modeling of the ambient crystalline silica concentrations it claimed would result from the operation of its facility *if* all silica

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21 2-B2 A.R. 211, p. 34:9-11. (**Q**: Does the Executive Director regularly and uniformly apply this policy in reviewing applications for rock crushers? **A:** For limestone crushers, yes.)

22 3 A.R. 272, p. 302:5-21.

23 3 A.R. 272, pp. 270:2-4.

24 1 A.R. 45, p. 18.

25 2-B2 A.R. 239, p. 7.

26 2-B3 A.R. 247, p. 8.

emissions from the remainder of the 1500-acre quarry were ignored and *if* all emissions of silica from use of the quarry and crusher roads, other than the entrance drive, were ignored.[27] This limited modeling indicated silica concentrations in the air that would be below TCEQ's effects screening level ("ESL") for silica.[28] An ESL is the concentration level of a pollutant in the air below which TCEQ does not expect adverse health and welfare effects.[29]

Disagreements with the facts as stated by the court of appeals

1. The court of appeals opinion, at Slip Op. 4, incorrectly says, emphasis added, "A full minor-source NAAQS analysis requires modeling the maximum allowable emissions from all on-property facilities and nearby off-property sources to determine the GLCmax." In fact, the relevant guidance document, APDG 6232, *Air Quality Modeling Guidelines* (2015),[30] does not limit on-site emissions to those from "facilities."

Step 1 of the guidance on air quality modeling is to "model [off-site impacts of] all new and/or modified sources." (emphasis added.) If a *de minimis*-level exceedance is revealed, Step 3 of the guidance is that "off-property sources [within the radius from Step 2] will need to be evaluated." At Step 4, the guidance directs

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27 2-B1 A.R. 185, pp. 9-12.

28 2-B1 A.R. 185, p. 12.

29 2-B2 A.R. 237, p. 6 (testimony of TCEQ chief toxicologist, Jong-Song Lee).

30 2-B2 A.R. 234. The six-step process is at internal pp. 17-18.

one to "model allowable emission rates for all sources [within the Step 2 radius] that emit the criteria pollutant." (Steps 1, 3 and 4 emphases added.) To this result is added the representative background air pollutant concentration to arrive, at Step 6, at the impact that might be experienced by a member of the public. In order to test if the to-be-permitted "facility" might contribute to a NAAQS violation, it is necessary to cumulate its impact with those of other nearby points of origin of air contaminants, i.e., of "sources."

2. At Slip Op. 27-28, the court of appeals opinion discusses what it characterizes as Vulcan's "full minor-source impacts analysis." This overstates the analysis Vulcan undertook. For $PM_{2.5}$, there is both a 24-hour and an annual NAAQS, and for PM_{10} there is an annual NAAQS.[31] For none of these three did Vulcan include the nearby Vulcan or Martin-Marietta quarry emission sources or any of the quarry or rock-crusher haul roads for either project, except for the Vulcan driveway between the highway and the first Vulcan stockpile.[32] (By TCEQ's reckoning, "nearby" is within a 10-kilometer radius of the Vulcan crusher.)

3. At Slip Op. 29, the court of appeals writes "because the modeling in Vulcan's preliminary-impact analysis showed that crystalline silica levels were below the

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[31] 2-B2 A.R. 234 (*Air Quality Modeling Guidance*), internal p. 38.

[32] 2-A A.R. 180, Tab D, Ex. 23, internal pp. 8 and 9 and Appx. B, Table 8. Table 8 is Mr. Knollhoff's itemization of Martin-Marietta emission sources he included in his "full" monor NAAQS analysis; none of these is, as shown by the table and a preceding plot plan, a road or component of a quarry.

applicable ESL, it was not necessary for Vulcan to conduct a full minor-source NAAQS analysis or health-effects analysis at all …" This conflates the MERA analysis (for crystalline silica) with the minor-NAAQS analysis (*Air Quality Modeling Guidance*). The non-exceedance of an ESL for a non-criteria pollutant does not affect the duty to conduct a minor-source NAAQS analysis.

4. In justifying Vulcan's failure to include quarry emissions and a number of road emissions in its minor-NAAQS and crystalline silica modeling, the court of appeals opinion says, Slip Op. 29, the impacts of those sources are captured in the monitored background pollutant concentrations. Actually, guidance is that nearby (so, within 10 kilometers) sources are supposed to be accounted for separately. When asked, "Was it appropriate for the Applicant to only explicitly include emissions from Martin-Marietta in the model?," replied, "Yes. The Vulcan site would be considered an isolated source …"[33] Mr. Knollhoff's minor-source NAAQS included the same assumption.[34] Finally, it is clear that the quarry and non-driveway road emissions at the Vulcan quarry will not be captured in the background concentrations, because they do not yet exist.

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33 2-B2 A.R. 232 (Melton direct testimony), p. 17:14-22.

34 2-A A.R. 180, Tab D, Ex. 23, internal pp. 9.

SUMMARY OF ARGUMENT

TCEQ has set by guidance document a *de minimis* level for off-site impacts of particular matter emissions that, if not exceeded, allows the agency to forego minor–source NAAQS analysis for that criteria pollutant. There is no legislative authorization for this practice, and the guidance document has not been subjected to notice incoming rulemaking. Vulcan's argument that there can be no harm, because it conducted a voluntary full minor-NAAQS analysis fails, because Vulcan did not include in its analysis important sources of particular matter that must be included.

TCEQ has determined by guidance that a health effects review is not required for any emissions from rock crushers. This categorical exclusion for rock crusher emissions has not been authorized by the legislature. This guidance document also has not been subjected to notice and comment rulemaking. Vulcan's fallback argument that it conducted an adequate review of crystalline silica off-site impacts fails, because it turns on the particulate matter off-site impact analysis that was defective.

This case should be returned to the TCEQ for permit application review with a proper full-minor NAAQS analysis and a health effects review for crystalline silica unincumbered by the MERA categorical exclusion.

ARGUMENT

Regarding the use of *de minimis*-impact thresholds

Texas's air permitting program requires a permit for the construction of stationary sources that are, also, "facilities," a term that excludes mines, quarries, well tests, and roads. Tex. Health & Safety Code §§ 382.0518(a) and 382.003(6). TCEQ may issue a permit only if, among other conditions, it finds "no indication that the emissions from the facility will contravene the intent of [the Act], including protection of the public's health and physical property." Tex. Health & Safety Code § 382.0518(b)(2).

TCEQ has and follows a guidance document that impermissibly truncates the process for the demonstration of NAAQS attainment and protection of the public's health. *Air Quality Modeling Guidelines* "provides a general process and defines minimum criteria for agency staff's consideration of air quality impacts analysis requirements."[35]

Typically, the person applying for a permit makes the statutorily-required showing by presenting air dispersion modeling that estimates whether the emissions from the facility will cause or contribute to a condition of off-site air pollution.

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[35] 2-B2 A.R. 234, internal p. 10.

The court of appeals' opinion, when critiquing the trial court's rejection of Conclusion of Law 14 (related to cumulative impacts and quarry and road emissions) focuses on the question of crystalline silica concentrations, i.e., whether the crystalline silica concentrations exceed ESLs and the role of the MERA. The MERA applies to non-criteria pollutants, such as crystalline silica, and it explicitly does not apply to criteria pollutants, such as PM.[36] The *Air Quality Modeling Guidelines* explicitly do apply to criteria pollutants, e.g., PM.[37]

The *Air Quality Modeling Guidelines* lay out the "preliminary" and "full" NAAQS analyses for minor NSR projects. The court of appeals' opinion does not correctly capture the preliminary NAAQS analysis set by that guidance. There, the preliminary analysis is described in Minor NAAQS Step 1 of the overall minor NAAQS analysis process. That step directs the permit applicant to "[m]odel all new and/or modified sources." So, Minor NAAQS Step 1 directs the permit applicant to include in its modeling not only emissions from new "facilities" but, also, the emissions from new "sources." Vulcan did not do this at Minor NAAQS Step 1. Step 1 concludes with the statement that, "If the sources do not make a significant impact for a pollutant of concern, the demonstration is complete." (emphasis added).

36 2-B2 A.R. 223, internal p. 1 and flow diagram on p. 3.

37 2-B2 A.R. 234, internal p. 16.

This is in accord with the agency's testimony that the emissions from "sources" are the emissions to be modeled.[38]

The preliminary NAAQS analysis was defective. The larger problem, however, is with TCEQ's having allowed the guidance document to establish a *de facto* rule that, if the results of a preliminary NAAQS analysis for $PM_{2.5}$ shows off-site concentrations that are below a *de minimis* level, then, there is no need to demonstrate that the emissions will not cause or contribute to a violation of the NAAQS. This is the sort of general principle that must be established, if at all, by notice-and-comment rulemaking.

At the federal level, there has been controversy and considerable litigation over the past decade as to whether, even by regulation, an agency may apply *de minimis* levels to exclude from the "cause or contribute" analysis a source's $PM_{2.5}$ emissions. *Sierra Club v. EPA, et al*., 705 F.3d 458 (D.C. Cir. 2013) and subsequent related cases.[39] The difficulty posed by exempting sources from review on the bases of their low individual impacts, can be seen (noted the D.C. Circuit court) by a scenario where there are a number of small-emission sources, all of which benefit from the exemption but that might collectively cause a NAAQS exceedance.

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38 2-B2 A.R. 232 (Direct testimony of Rachel Melton), internal p. 16:24-27.

39 *See, also,* 82 Fed. Reg. 5182, 5199 (Jan. 17, 2017).

The court of appeals' opinion, at footnote 8, distinguished the Significant Impact Level discussion in the *Sierra Club* case by saying the MERA (not the relevant *Air Quality Modeling Guidelines*) claims to leave discretion with the agency, while the EPA modeling guidance was binding. The *Air Quality Modeling Guidelines* announces "a general process and defines minimum criteria for agency staff's consideration of air quality impacts analysis requirements."[40] It is difficult to believe that agency staff or permit applicants or members of the public will treat the *Air Quality Modeling Guidelines* as leaving the agency with any discretion, insofar as concerns the role of *de minimis* levels.

The court of appeals opinion, Slip Op. 27 and 28, also offers a "no harm" response to Petitioners' complaint. The response is that Vulcan voluntarily undertook a full NAAQS review, TCEQ guidance notwithstanding. For one of the three PM NAAQS, the $PM_{2.5}$ annual NAAQS, Vulcan voluntarily undertook a modified "full" NAAQS analysis. It did not include driveway emissions at the Martin-Marietta rock crusher, and it did not include the PM emissions from the Martin-Marietta quarry or from its own quarry.

The guidelines for the full minor NSR NAAQS analysis note, "[o]ff-property <u>sources</u> will need to be evaluated."[41] (emphasis added). The guidelines direct the

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[40] 2-B2 A.R. 234, internal p. 10.

[41] 2-B2 A.R. 234, internal p. 16.

applicant to "[m]odel allowable emission rates for all sources that emit the criteria pollutant."[42] (emphasis added). The guidance definition of "source" is the regulatory definition[43] and does not exclude roads and quarries. The testimony[44] of TCEQ's air quality modeling witness, quoted by the court of appeals at Slip Op. 28, mis-stated the guidance by substituting the word "facility" for the word actually used in the guidance, "source."[45]

The one of three PM NAAQS analyses undertaken left out clearly-relevant nearby sources of PM. It is not credible to argue that that one analysis insulated Petitioners from the harm of the agency's routinely truncating all NAAQS analyses on the bases of *de minimis* thresholds.

Regarding the categorical exclusion, by guidance document, of rock crushers from health effects review

The Texas Clean Air Act requires, as a condition of permit issuance, there be "no indication that the emissions from the facility will contravene the intent of [the Act], including protection of the public's health and physical property." Tex. Health & Safety Code § 382.0518(b)(2). TCEQ regulation requires a demonstration that

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42 2-B2 A.R. 234, internal p. 16.

43 30 Tex. Admin. Code § 116.10(15). "A point of origin of air contaminants, whether privately or publicly owned or operated."

44 2-B2 A.R. 232, internal p. 17:1-5.

45 The guidance text is at 2-B2 A.R. 234 (the *Air Quality Modeling Guidelines*), internal p. 17, Steps 1 and 3.

"[t]he emissions from the proposed facility will comply with all rules and regulations of the commission and with the intent of the [Act], including protection of the health and property of the public." 30 Tex. Admin. Code § 116.111(a)(2)(A)(i). To be sure any air contaminants emitted meet this standard, the Act provides that a person may not cause, without TCEQ authorization, the emission of any air contaminant that causes or contributes to, or that will cause or contribute to, air pollution. Tex. Health & Safety Code § 382.085(a).

TCEQ's Conclusion of Law 12 that emissions of crystalline silica from the facility will not violate 30 Tex. Admin. Code § 116.111(a)(2)(A) is founded on general policies nowhere set forth in rule or statute.

The agency justified its finding of no adverse impact to human health by the guidance exclusion of all rock crusher emissions from a health effects review. This exclusion is found in Appendix B of the MERA. That document was not the result of notice and comment rulemaking. While the text of the MERA disclaims regulatory authority, TCEQ's Work Leader for the Air Permits division testified that this exemption of rock crushers from a health effects review was applied by the agency regularly and uniformly for limestone crushers,[46] such as the proposed Vulcan crusher.[47]

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46 2-B2 A.R. 211, p. 33.

47 3 A.R. 272, p. 302:5-21.

The court of appeals wrote that the MERA does not set out an agency "rule," because the MERA does not purport to bind the TCEQ Commissioners, themselves. This is a more restrictive standard than the one on which the court earlier relied in the *Witcher* case.[48] There, at 538, the court said, "This Court has held that, to constitute a "rule" under [the APA] definition, 'an agency statement interpreting law must bind the agency *or otherwise represent its authoritative position in matters that impact personal rights.*'" (emphasis in the original). The MERA categorical exclusion of limestone rock crushers from health effects reviews has been regularly and uniformly applied, and it is set out in a significant agency guidance document, so it clearly meets the second prong of the test set out in *Witcher*.

The court of appeals' opinion argues, as a second basis for reversing the trial court, that the voluntary health effects analysis Vulcan undertook cures any harm caused by the MERA exclusion. But, this analysis is just a calculation that starts with the PM NAAQS analyses for Vulcan sources, alone,[49] and multiplies the maximum PM off-site concentration for those sources by a conversion factor that is based on Vulcan's estimate of the crystalline silica content of the limestone.[50] Because the PM NAAQS analyses are defective, so are the crystalline silica analyses.

---

48 *Texas State Bd. of Pharmacy v. Witcher*, 447 S.W.3d 520 (Tex. App.—Austin 2014, pet. denied).

49 2-A A.R. 180, Tab D, Ex. 22, pp. 10 and Appx. A, Table 4.

50 2-A A.R. 180, Tab D, Ex. 22, pp. 10, 35 and 36 and tables referenced, there.

There is simply no logical link between the "full" crystalline silica concentrations Vulcan developed and a demonstration that the public health and general welfare will be protected. Too many sources of crystalline silica emissions, e.g., quarry and haul-road emissions, were omitted from the modeling.

PRAYER

Following full briefing, Petitioners seek a judgment remanding the case to the TCEQ with instructions that the Vulcan permit application be processed in accord with the principles laid out in this Court's opinion. Petitioners pray the Court make clear (1) that TCEQ may not, by guidance document, truncate Clean Air Act "cause or contribute" demonstrations by reliance on *de minimis* thresholds or NAAQS analyses that omit nearby emission sources and (2) that TCEQ may not, by guidance document, create a categorical exclusion from health effects review for rock crushers or any other category of facilities that require air quality permits.

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

Based on a word count run by the computer program used to prepare this document, this Petition for Review contains 4,297 words, excluding the portions of the Petition exempt from the word count under Texas Rule of Appellate Procedure 9.4(i)(1).

/s/ Eric Allmon
Eric Allmon

CERTIFICATE OF SERVICE

By my signature below, I hereby certify that a true and correct copy of the foregoing document was served in accordance with the Texas Rules of Appellate Procedure by electronic mail to the following parties on July 31, 2023.

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APPENDIX A

Cause No. D-1-GN-20-000941

FRIENDS OF DRY COMAL CREEK and STOP 3009 VULCAN QUARRY, *Plaintiffs*,	§	
v.	§	IN THE DISTRICT COURT OF TRAVIS COUNTY, TEXAS 353RD JUDICIAL DISTRICT
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY, *Defendant*	§	
and	§	
VULCAN CONSTRUCTION MATERIALS, LLC, *Defendant-Intervenor*	§	

FINAL JUDGMENT

On December 8, 2020, came on to be heard this matter. All parties appeared through counsel and announced ready, and the administrative record was admitted into evidence.

Based on the pleadings, the administrative record, the parties' briefs and the parties' arguments, it is the opinion of the Court that the Texas Commission on Environmental Quality's November 21, 2019, "ORDER GRANTING THE APPLICATION BY VULCAN CONSTRUCTION MATERIALS, LLC FOR PERMIT NO. 147392L001; TCEQ DOCKET NO. 2018-1303-AIR; SOAH DOCKET NO. 582-19-1955" ("Final Order") should be REVERSED in part and REMANDED.

The Court finds and rules as follows:

1. TCEQ's Conclusion of Law No. 12 (concluding that there is no indication that emissions from the plant will contravene the intent of the Texas Clean Air Act, including the protection of the public's health and physical property) is reversed because i) TCEQ's determination that the Plant's crystalline silica emissions will not negatively affect human health or welfare is not supported by substantial evidence; ii) Vulcan's silica emissions

calculations are not based on representative site conditions, and TCEQ's determination that Vulcan's silica emissions calculations are representative of those to be expected from the site is not supported by substantial evidence; and iii) TCEQ's rejection of Reeh Plaintiffs' assertions regarding ways the Permit allegedly is not sufficiently protective of public health or property is arbitrary and capricious and not supported by substantial evidence.

2. TCEQ's Conclusion of Law No. 14 (concluding that Vulcan has made all demonstrations required under applicable statutes and regulations, including 30 Texas Administrative Code § 116.111 regarding air permit applications, to be issued an air quality permit with conditions as set forth in the Draft Permit) is reversed because i) TCEQ's determination that Vulcan's air dispersion modeling adequately accounts for or addresses cumulative impacts; ii) TCEQ's determination that quarry and road emissions were adequately considered; and iii) TCEQ's determination that Vulcan's choice of the relevant background concentrations used in its voluntary Full Minor National Ambient Air Quality Standard ("NAAQS") Analyses were appropriate, is arbitrary and capricious, and not supported by substantial evidence.

3. TCEQ's Best Available Control Technology ("BACT") reviews for Vulcan's Application met the standards of Texas Health and Safety Code § 382.0518 and 30 Texas Administrative Code § l16.11l(a)(2)(C), were properly conducted, supported by substantial evidence, and not arbitrary, capricious, or unlawful. TCEQ's BACT determination is affirmed.

4. The Administrative Law Judge abused her discretion by ruling that Vulcan could maintain information from its 2016 subsurface investigation at the property where the Plant will be located as confidential under the trade secret privilege.

5. Plaintiffs were denied due process such that their substantial rights were prejudiced by: (1) the Administrative Law Judge's ruling that Vulcan could maintain information from its 2016 subsurface investigation at the property where the Plant will be located as confidential under the trade secret privilege; (2) the Administrative Law Judge's denial of Plaintiffs' discovery and cross-examination of the "privileged" information; and (3) TCEQ's not requiring Vulcan to input emissions from quarries and roads into its modeling for the AQAs for 24-hour PM_{10}, 24-hour $PM_{2.5}$, and Annual $PM_{2.5}$.

IT IS THEREFORE ORDERED, ADJUDGED, AND DECREED that the Final Order is AFFIRMED IN PART and REVERSED IN PART and REMANDED.

Signed this 1st day of April, 2021

JUDGE MAYA GUERRA GAMBLE
JUDGE, 459TH DISTRICT COURT

Approved as to form only:

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APPENDIX B

TEXAS COURT OF APPEALS, THIRD DISTRICT, AT AUSTIN

NO. 03-21-00204-CV

Texas Commission on Environmental Quality and Vulcan Construction Materials LLC, Appellants

v.

Friends of Dry Comal Creek, Stop 3009 Vulcan Quarry, Jeffrey Reeh, Terry Olson, Mike Olson, and Comal Independent School District, Appellees

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FROM THE 353RD DISTRICT COURT OF TRAVIS COUNTY, NO. D-1-GN-20-000941, THE HONORABLE MAYA GUERRA GAMBLE, JUDGE PRESIDING

OPINION

We withdraw the opinion and judgment issued in this cause on September 29, 2022, and issue the following opinion in lieu of the previous one.

The Texas Commission on Environmental Quality (TCEQ) granted Vulcan Construction Materials LLC a permit to construct a rock-crushing plant in Comal County. Various parties who had opposed Vulcan's permit application before the agency, including Friends of Dry Comal Creek (Friends), Jeffrey Reeh, and others (collectively, Protestants), filed separate suits for judicial review of the Commissioners' decision in Travis County District Court. Those suits were later consolidated. The trial court reversed the bulk of the Commissioners' decision and remanded the case to the agency. Vulcan and the TCEQ perfected this appeal. We will reverse the trial court's judgment and render judgment affirming the Commissioners' order.

Factual and Procedural Background

The TCEQ regulates air pollution from stationary sources pursuant to a delegation of authority under the Federal Clean Air Act (FCAA). *See* 42 U.S.C. § 7410(a). The FCAA requires the U.S. Environmental Protection Agency (EPA) to identify emissions that cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare. The EPA sets primary and secondary National Ambient Air Quality Standards (NAAQS) for certain pollutants, identified as "criteria pollutants." *See id.* §§ 7408(a), 7409(a). NAAQS are levels of air quality determined to protect the public health and welfare. The six criteria pollutants for which the EPA has promulgated NAAQS include particulate matter (PM) with a diameter of 10 microns or less (PM_{10}) and PM with a diameter of 2.5 microns or less ($PM_{2.5}$).[1] To implement these standards, each state is required to submit for EPA approval a state implementation plan. *See id.* § 7407(a). Each plan must include a New Source Review (NSR) preconstruction permitting scheme to control emissions from new or modified sources of air pollutants. *See id.* § 7410(a)(2)(C).

The FCAA's and EPA's applicable regulations provide extensive requirements for the construction and modification of "major" sources of air pollution under NSR permitting programs. *See Luminant Generation Co., L.L.C. v. E.P.A.*, 675 F.3d 917, 922 (5th Cir. 2012). The present case, however, involves regulation of a "minor" source of air pollution that does not meet the major-source thresholds for total annual emissions. For minor sources, the FCAA simply

[1] The "criteria pollutants" are sulfur dioxide, particulate matter, carbon monoxide, ozone, oxides of nitrogen/nitrogen dioxide, and lead. 40 C.F.R. §§ 50.4-.17. The term "non-criteria pollutants" encompasses all other air pollutants.

requires each state implementation plan to include an NSR permitting program that ensures the NAAQS are attained and maintained in the state. *Id.*; 42 U.S.C. § 7410(a)(2)(C).

The TCEQ administers the requirements of the FCAA for Texas under an EPA-approved state implementation plan that includes a minor-source NSR permitting scheme. *See* 40 C.F.R. § 52.2270. Although the FCAA does not contain specific requirements for evaluating minor sources, the TCEQ has adopted a six-step procedure for conducting a "full" minor-source NAAQS analysis.

For criteria pollutants, the applicant must demonstrate that a proposed facility will not cause or contribute to an exceedance of the NAAQS. This demonstration is usually made through an air-quality analysis (AQA) supported by air-dispersion modeling. Air-dispersion modeling is a computer-based simulation of how pollutants emitted from a facility will disperse in the atmosphere.

A minor-source NAAQS analysis begins with air-dispersion modeling, which is performed to calculate the off-site ground-level concentration (GLC) of pollutants that will be emitted from a proposed facility. Modeling consists of a mathematical simulation of how pollutants from emission sources will disperse in the atmosphere and what the off-site GLCs of those pollutants will be at different distances and directions. This modeling is then used in an AQA, which is used to compare the anticipated maximum ground-level concentrations (GLC_{max}) of pollutants to the NAAQS for the criteria pollutant being evaluated.

While the EPA does not require the use of a preliminary impact analysis in minor-source NSR permits, TCEQ uses this analysis for both major- and minor-source permits. Initially, the GLC_{max} of each pollutant is compared to its Significant Impact Level (SIL). The SILs are minimum thresholds set by the EPA. When the GLC_{max} of a criteria pollutant is below its SIL level, the EPA expects that emissions of the pollutant will be de minimis and not degrade air quality. Phrased differently, a criteria pollutant for which the GLC_{max} is below its SIL is deemed by the EPA to be of such minimal impact that it could not cause or contribute to a violation of its NAAQS. Thus, when an applicant shows that the GLC_{max} for a criteria pollutant is below the applicable SIL, the NAAQS demonstration is usually complete for that pollutant, such that the remaining steps of the full minor-source NAAQS analysis need not be conducted. If, however, the GLC_{max} for a criteria pollutant exceeds its SIL, the applicant must conduct the additional steps of a full NAAQS analysis.

A full minor-source NAAQS analysis requires modeling the maximum allowable emissions from all on-property facilities and nearby off-property sources to determine the GLC_{max}. The applicant must then add a representative background concentration of pollutants to the GLC_{max} to account for emissions from facilities and other sources that are not explicitly modeled. This calculation produces a total maximum off-site GLC, which is then compared to the applicable NAAQS. To obtain authorization under an NSR permit, the applicant's full minor-source NAAQS analysis must demonstrate that the total maximum off-site GLC for each pollutant is less than the applicable NAAQS.

The process is similar for non-criteria pollutants, i.e., contaminants for which the EPA has not established NAAQS and therefore for which there is no SIL. The TCEQ Toxicology Division has developed Effects Screening Levels (ESLs) for numerous non-criteria pollutants. ESLs are not standards but rather are guidelines established to provide a high degree of certainty of protectiveness of the public health and welfare. TCEQ uses a set of guidelines called the "MERA guidance," discussed below, to determine whether a health-effects analysis is necessary for a non-criteria pollutant. If TCEQ determines that such an analysis is necessary, it may require air-dispersion modeling for that pollutant and a comparison of the resulting GLC_{max} against the applicable ESL. Among the non-criteria pollutants for which the TCEQ has developed an ESL is crystalline silica, the contaminant at issue in this case.[2]

When the predicted GLC_{max} of a non-criteria pollutant is below the applicable ESL level, the expected emissions are deemed safe and the demonstration is usually complete for that pollutant. If the GLC_{max} for a non-criteria pollutant exceeds the ESL, however, the applicant must conduct a health-effects analysis in which the applicant's modeling results are compared to the ESL for that pollutant.

The TCEQ does not require a health-effects review for emissions of crystalline silica from rock crushers. The agency has learned from experience and data from throughout the United States that limestone rock-crushing facilities typically emit insignificant amounts of crystalline silica in the 10 micron or smaller range. Accordingly, modeling emissions of PM_{10} and $PM_{2.5}$ and comparing them to the NAAQS is considered by the TCEQ a sufficient level of review.

The Texas Clean Air Act (TCAA) requires that a permit be obtained by anyone planning to construct a facility that may emit air contaminants:

> (a) Before work is begun on the construction of a new facility or a modification of an existing facility that may emit air contaminants, the person planning the construction or modification must obtain a permit or permit amendment from the commission.

Tex. Health & Safety Code § 382.0518(a). The Act provides that a permit will be granted if two requirements are met:

> (b) The commission shall grant within a reasonable time a permit or permit amendment to construct or modify a facility if, from the information available

[2] Although it is a form of PM, which can be a criteria pollutant, crystalline silica itself is a non-criteria pollutant because the EPA has not established an NAAQS specifically for crystalline silica. Nor is crystalline silica included on the EPA's list of 187 hazardous air pollutants.

to the commission, including information presented at any hearing held under Section 382.056(k), the commission finds:

(1) the proposed facility for which a permit, permit amendment, or a special permit is sought will use at least the best available control technology [BACT], considering the technical practicability and economic reasonableness of reducing or eliminating the emissions resulting from the facility; and

(2) no indication that the emissions from the facility will contravene the intent of this chapter, including protection of the public's health and physical property.

Id. § 382.0518(b). The statutory requirements are general, leaving much discretion to the TCEQ. The agency's relevant administrative rules likewise contain few detailed requirements:

(a) In order to be granted a permit, amendment, or special permit amendment, the application must include:

. . . .

(2) information which demonstrates that emissions from the facility . . . meet all of the following.

(A) Protection of public health and welfare.

(i) The emissions from the proposed facility will comply with all rules and regulations of the commission and with the intent of the Texas Clean Air Act (TCAA), including protection of the health and property of the public.

30 Tex. Admin. Code § 116.111(a)(2)(A)(i) (2020) (Tex. Comm'n on Env'l Quality, Gen. Application).

Vulcan applied for a permit to construct a rock-crushing plant at a limestone quarry in Comal County.[3] The application was opposed by numerous groups and individuals, including Friends, Reeh, and others. The TCEQ granted the hearing requests filed by the Protestants and forwarded 19 issues to the State Office of Administrative Hearings (SOAH) for resolution in a contested case hearing. Issue "O" was "Whether emissions of silica from the proposed plant will

[3] A rock crusher breaks larger rocks down into cobblestones, gravel, or other smaller pieces that may be commercially useful.

negatively impact human health and welfare."[4] After the hearing, the administrative law judges (ALJs) submitted to the Commissioners a proposal for decision recommending that the permit be granted. The Commissioners accepted this recommendation, granted the permit, and adopted the findings of fact and conclusions of law set forth in the PFD.

The Commissioners' order granting the application determined in Conclusions of Law 11 and 12 that Vulcan had satisfied the two requirements from Texas Health and Safety Code sections 382.0518(b)(1) and (b)(2) quoted above:

> 11. Consistent with Texas Health and Safety Code § 382.0518 and 30 Texas Administrative Code § 116.111(a)(2)(C), the Plant will use BACT, with consideration given to the technical practicability and economic reasonableness of reducing or eliminating emissions from the facilities.
>
> 12. Consistent with Texas Health and Safety Code § 382.0518 and 30 Texas Administrative Code § 116.111(a)(2)(A), there is no indication that emissions from the Plant will contravene the intent of the TCAA, including the protection of the public's health and physical property.

In Conclusion of Law 14, the Commissioners determined that Vulcan had satisfied the requirements of 30 Texas Administrative Code section 116.111:

> 14. Vulcan has made all demonstrations required under applicable statutes and regulations, including 30 Texas Administrative Code § 116.111 regarding air permit applications, to be issued an air quality permit with conditions as set out in the Draft Permit.

During the course of the SOAH proceeding, a discovery dispute arose regarding Vulcan's health-effects analysis of crystalline silica. The three cores Vulcan used for its sample of aggregate material in its analysis were part of 41 borings taken in an unrelated 2016 subsurface

[4] Silica, also called silicon dioxide, can appear in three different forms: crystalline silica, cryptocrystalline silica, and amorphous silica. All three have the same chemical makeup, but crystalline silica has a different molecular structure. Although Issue O refers generally to "silica," all parties focus their arguments on crystalline silica.

investigation of the proposed site. Vulcan presented evidence that it conducted the earlier investigation to determine whether to purchase the property and how much to pay for it. The investigation provided information on the quantity and quality of limestone available for processing at the site. Friends served written discovery on Vulcan requesting documents relating to the 2016 investigation and any evaluation of aggregate materials to be processed at the Plant. Vulcan objected to producing documents from its earlier investigation, asserting a trade-secret privilege. Friends filed motions to compel and for continuance, both of which were denied by the presiding ALJ. The presiding ALJ also ruled that the Protestants could not cross-examine Vulcan's experts on the subject.

Following issuance of the Commissioners' order, Friends and Reeh submitted motions for rehearing to the agency, which were overruled. They subsequently filed separate suits for judicial review in Travis County District Court, which were later consolidated. In its Final Judgment, the trial court reversed most of the Commissioners' order and remanded the case to the agency. Specifically, the court reversed Conclusions of Law 12 and 14 on several grounds, ruled that the presiding ALJ abused her discretion in allowing Vulcan to withhold information from its 2016 subsurface investigation, and ruled that the Protestants were denied due process by (1) allowing Vulcan to withhold information about the 2016 investigation, (2) denying discovery and cross-examination as to the information, and (3) failing to require Vulcan to input emissions from quarries and roads into its health-effects analysis.[5]

---

[5] The trial court's Final Judgment did, however, expressly affirm the Commissioners' Conclusion of Law 11 regarding the proposed Plant's use of Best Available Control Technology:

> TCEQ's Best Available Control Technology ("BACT") reviews for Vulcan's Application met the standards of Texas Health and Safety Code § 382.0518 and 30

The TCEQ and Vulcan perfected this appeal.

Standard of Review

The statutory standard for judicial review of a Commission order is whether its decision was "invalid, arbitrary, or unreasonable." Tex. Health & Safety Code § 382.032(e). This Court has held that "[t]he 'invalid, arbitrary, or unreasonable' standard incorporates the entire scope of review allowed by the 'substantial evidence' standard codified in the Administrative Procedure Act." *TJFA, L.P. v. Texas Comm'n on Envtl. Quality*, 632 S.W.3d 660, 666 (Tex. App.—Austin 2021, pet. pending).

The scope of judicial review of agency decisions under the substantial-evidence rule is set forth in the Administrative Procedure Act (APA) as follows:

> If the law authorizes review of a decision in a contested case under the substantial evidence rule or if the law does not define the scope of judicial review, a court may not substitute its judgment for the judgment of the state agency on the weight of the evidence on questions committed to agency discretion but:
> (1) may affirm the agency decision in whole or in part; and
> (2) shall reverse or remand the case for further proceedings if substantial rights of the appellant have been prejudiced because the administrative findings, inferences, conclusions, or decisions are:
> (A) in violation of a constitutional or statutory provision;
> (B) in excess of the agency's statutory authority;
> (C) made through unlawful procedure;

> Texas Administrative Code § 116.111(a)(2)(C), were properly conducted, supported by substantial evidence, and not arbitrary, capricious, or unlawful.

TCEQ rules define "Best Available Control Technology" as follows:

> Best available control technology (BACT)—An air pollution control method for a new or modified facility that through experience and research, has proven to be operational, obtainable, and capable of reducing or eliminating emissions from the facility, and is considered technically practical and economically reasonable for the facility.

30 Tex. Admin. Code § 116.10(1) (2020) (Tex. Comm'n on Env'l Quality, Gen. Definitions).

(D) affected by other error of law;
(E) not reasonably supported by substantial evidence considering the reliable and probative evidence in the record as a whole; or
(F) arbitrary or capricious or characterized by abuse of discretion or clearly unwarranted exercise of discretion.

Tex. Gov't Code § 2001.174. The standards for a substantial-evidence review are well established:

> Under the substantial evidence rule we review the evidence as a whole to determine if it is such that reasonable minds could have reached the same conclusion as the agency in the disputed action. We may not substitute our judgment for that of the agency and may only consider the record on which the agency based its decision. The issue before us is not whether the agency reached the correct conclusion but whether there is some basis in the record for its action. Although substantial evidence is more than a mere scintilla, the evidence in the record may actually preponderate against the agency's decision and nonetheless amount to substantial evidence. We presume that the agency's findings, inferences, conclusions, and decisions are supported by substantial evidence, and the burden to prove otherwise is on the appellant. Finally, the agency's decision should be reversed only if the party challenging the decision demonstrates that the absence of substantial evidence has prejudiced the party's substantial rights.

Citizens Against Landfill Location v. Texas Comm'n on Envtl. Quality, 169 S.W.3d 258, 264 (Tex. App.—Austin 2005, pet. denied) (citations omitted); *see also North E. Indep. Sch. Dist. v. Riou*, 598 S.W.3d 243, 251 (Tex. 2020) ("Review under the substantial-evidence rule is highly deferential—the issue is not whether the agency's decision is correct, but whether the record demonstrates a reasonable basis for it."). "The question whether an agency's determination meets [the substantial-evidence] standard is one of law." *Texas Comm'n on Envtl. Quality v. Maverick Cnty.*, 642 S.W.3d 537, 547 (Tex. 2022) (quoting *Montgomery Indep. Sch. Dist. v. Davis*, 34 S.W.3d 559, 566 (Tex. 2000)).

Although an administrative decision that is supported by substantial evidence "is generally not arbitrary and capricious," *State Bd. for Educator Certification v. Tran*, No. 03-18-00855-CV, 2020 WL 6834219, at *8 (Tex. App.—Austin Nov. 20, 2020, pet. denied) (mem. op.) (quoting *Hinkley v. Texas State Bd. of Med. Exam'rs*, 140 S.W.3d 737, 743 (Tex. App.—

Austin 2004, pet. denied)), nonetheless "[i]nstances may arise . . . in which the agency's action is supported by substantial evidence but is nonetheless arbitrary and capricious." *Heritage on San Gabriel Homeowners Ass'n v. Texas Comm'n on Envtl. Quality*, 393 S.W.3d 417, 423 (Tex. App.—Austin 2012, pet. denied); *see also* Tex. Gov't Code § 001.174(2)(F); *Texas Health Facilities Comm'n v. Charter Med., Inc.*, 665 S.W.2d 446, 454 (Tex. 1984) ("In enacting the APTRA, it is clear that the legislature intended to distinguish between agency action that is not supported by substantial evidence and agency action that is arbitrary and capricious.").

Only in narrow circumstances, however, will an agency decision be reversed as "arbitrary and capricious" when it is supported by substantial evidence. *See Charter Medical*, 665 S.W.2d at 454 ("The arbitrary and capricious standard of review historically has been construed narrowly, and we do not think that the legislature intended it to be interpreted as a broad, all-encompassing standard for reviewing the rationale of agency actions."). This Court has addressed the potential scope of such circumstances:

> We have previously identified six circumstances under which we have found agency orders to be arbitrary or capricious: "(1) the order not being supported by substantial evidence, (2) the agency denying a litigant's due process so as to prejudice its rights, (3) the agency improperly basing its decision on non-statutory criteria, (4) the agency basing its decision on legally irrelevant factors or not considering legally relevant factors, (5) the agency considering only relevant statutory factors but reaching a completely unreasonable result, and (6) the agency's failure to follow the clear, unambiguous language of its own regulations."

Tran, 2020 WL 6834219, at *8 (quoting *Westlake Ethylene Pipeline Corp. v. Railroad Comm'n,* 506 S.W.3d 676, 687 (Tex. App. —Austin 2016, pet. denied));[6] *see also Harris Cty. Appraisal*

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[6] Emphasizing the narrowness of the circumstances necessary for an agency's act to be found arbitrary and capricious even though supported by substantial evidence, this Court has opined that the finding must be "based on a violation of due process or some other unfair or unreasonable conduct that shocks the conscience." *Santulli v. Texas Bd. of L. Exam'rs*, No. 03-06-00392-CV, 2009 WL 961568, at *4 n.5 (Tex. App.—Austin, Apr. 10, 2009, pet. denied)

Dist. v. Tex. Workforce Comm'n, 519 S.W.3d 113, 119 (Tex. 2017) ("If an agency does not follow the clear, unambiguous language of its own regulation in making a decision, the agency's action is arbitrary and capricious and will be reversed."); *Public Util. Comm'n of Texas v. Texas Indus. Energy Consumers*, 620 S.W.3d 418, 427 (Tex. 2021) ("A Commission decision is arbitrary if it: '(1) failed to consider a factor the legislature directs it to consider; (2) considers an irrelevant factor; or (3) weighs only relevant factors that the legislature directs it to consider but still reaches a completely unreasonable result.'") (quoting *City of El Paso v. Public Util. Comm'n of Texas*, 883 S.W.2d 179, 184 (Tex. 1994)). Stated generally, "we must remand for arbitrariness if we conclude that the agency "'has not actually taken a hard look at the salient problems and has not genuinely engaged in reasoned decision-making.'" *Texas Health & Hum. Servs. Comm'n v. Lukefahr*, No. 03-15-00325-CV, 2016 WL 5874871, at *2 (Tex. App.—Austin Oct. 6, 2016, no pet.) (mem. op.) (quoting *City of Waco v. Texas Comm'n on Envtl. Quality*, 346 S.W.3d 781, 819–20 (Tex. App.—Austin 2011), *rev'd on other grounds*, 413 S.W.3d 409 (Tex. 2013)).

Discussion

I. *Whether the trial court erred in reversing Conclusion of Law 12.*

As stated above, the Commissioners' Conclusion of Law 12 recited that "there is no indication that emissions from the Plant will contravene the intent of the TCAA, including the protection of the public's health and physical property." To support this conclusion, the Commissioners' order included several findings of fact regarding the potential emission of crystalline silica:

(mem. op.) (quoting *Texas State Bd. of Dental Exam'rs v. Silagi*, 766 S.W.2d 280, 285 (Tex. App.—El Paso 1989, writ denied)).

> 44. The maximum offsite concentrations of crystalline silica from Vulcan's modeling are well below the crystalline silica Effects Screening Level.
>
> 45. The Plant's crystalline silica emissions will not negatively impact human health and welfare, or contravene the intent of the Texas Clean Air Act (TCAA).
>
> 46. The Plant's crystalline silica emissions would not negatively impact human health and welfare, or contravene the intent of the TCAA, even if the crystalline silica percentage used to calculate the Plant's crystalline silica emissions was 135 times higher.

In reversing Conclusion of Law 12, the trial court found in Paragraph 1 of its Final Judgment that the following errors existed in that conclusion of law:

> (i) TCEQ's determination that the Plant's crystalline silica emissions will not negatively affect human health or welfare is not supported by substantial evidence; (ii) Vulcan's silica emissions calculations are not based on representative site conditions, and TCEQ's determination that Vulcan's silica emissions calculations are representative of those to be expected from the site is not supported by substantial evidence; and (iii) TCEQ's rejection of Reeh Plaintiffs' assertions regarding ways the Permit allegedly is not sufficiently protective of public health or property is arbitrary and capricious and not supported by substantial evidence.

We will review these grounds in the order recited in the Final Judgment.

(i) Whether the TCEQ's determination that the Plant's crystalline silica emissions will not negatively affect human health or welfare is supported by substantial evidence.

Regarding Subparagraph 1(i) of the trial court's Final Judgment, as quoted above, the TCEQ and Vulcan argue that the Commissioners' finding on crystalline silica emissions is adequately supported by (1) the "MERA guidance" and, independently, (2) Vulcan's voluntary health-effects analysis.

(a) MERA guidance.

MERA is an acronym for Modeling and Effects Review Applicability. The MERA guidance is a document created by the TCEQ's Air Permits Division to assist its staff in evaluating applications for projects that are subject to air-quality-impacts analyses. It states in part: "This document provides permit reviewers and air dispersion modeling staff with a process to evaluate and determine air quality impacts analysis requirements for case-by-case permit reviews for new and/or modified facilities." In reviewing an AQA, TCEQ staff members use the MERA guidance to assist in determining the appropriate analysis necessary to demonstrate compliance with the applicable ESLs. TCEQ staff use the MERA guidance, in part, to assess preliminary impact determinations as to certain types of pollutants. If a preliminary analysis shows that the likely impact falls below the applicable ESL and if a more extensive analysis is not found to be appropriate for other reasons, the MERA guidance indicates that no further analysis by the applicant or TCEQ staff is needed for that contaminant.

In the present case, Vulcan's preliminary impact analysis showed that the likely impact of crystalline silica from Vulcan's proposed plant would be far below the TCEQ's ESL level for that pollutant. Under the MERA guidance, therefore, the TCEQ staff did not require Vulcan to conduct any further health-effects analysis as to crystalline silica. This policy was based in part on the TCEQ's prior experience with rock-crushing facilities, which had shown that such facilities produce negligible emissions of crystalline silica.

As a threshold matter, Friends contends that the MERA guidance document constitutes an administrative "rule," asserting that it is an agency statement of general applicability that implements, interprets, or prescribes law or policy or describes the procedure or practice requirements of a state agency. Friends argues that because the MERA guidance is a rule, and because it was not adopted through formal notice-and-comment rulemaking procedures, it is invalid. The Protestants are correct that "[w]hen an agency promulgates a rule without complying with the proper rule-making procedures, the rule is invalid." *El Paso Hosp. Dist. v. Texas Health & Hum. Servs. Comm'n*, 247 S.W.3d 709, 715 (Tex. 2008); *accord Texas State Bd. of Pharmacy* *v. Witcher*, 447 S.W.3d 520, 527 (Tex. App.—Austin 2014, pet. denied); *see also* Tex. Gov't Code § 2001.035(a) ("A rule is voidable unless a state agency adopts it in substantial compliance with Sections 2001.0225 through 2001.034.").[7] The issue here is whether the MERA guidance constitutes an administrative rule.

Under the APA, the term "rule" is defined as follows:

> "Rule":
> (A) means a state agency statement of general applicability that:
> (i) implements, interprets, or prescribes law or policy; or
> (ii) describes the procedure or practice requirements of a state agency;
> (B) includes the amendment or repeal of a prior rule; and
> (C) does not include a statement regarding only the internal management or organization of a state agency and not affecting private rights or procedures.

Tex. Gov't Code § 2001.003(6).

Under the APA's definition, an agency statement does not have to be formally designated a "rule" in order to meet the statutory definition and thus trigger the necessity for adoption by notice-and-comment rulemaking procedures. *See, e.g.*, *Teladoc, Inc. v. Texas Med. Bd.*, 453 S.W.3d 606, 614–15 (Tex. App.—Austin 2014, pet. denied). On the other hand, not every statement by an administrative agency constitutes a rule under the statutory definition. *See Texas Educ. Agency v. Leeper*, 893 S.W.2d 432, 443 (Tex. 1994); *Combs v. City of Webster*, 311 S.W.3d 85, 100 (Tex. App.—Austin 2009, pet. denied). Administrative agencies often issue letters, guidance, and reports that contain statements that may appear to implement, interpret, or prescribe agency policy and practice but are not rules that must be formally promulgated. *See Brinkley v. Texas Lottery Comm'n*, 986 S.W.2d 764, 769 (Tex. App.—Austin 1999, no pet.); *see also Trinity*

[7] In response to Friends' invalid-rule argument, the TCEQ argues that Friends did not preserve this alleged error, either in its motion for rehearing before the Commission or in its petition in district court. Because this issue does not affect our ultimate decision, we will assume without deciding that Friends preserved the alleged error.

Settlement Servs., LLC v. Texas State Secs. Bd., 417 S.W.3d 494, 502 (Tex. App.—Austin 2013, pet. denied). The APA "defines 'rule' in a way that will exclude a considerable range of unofficial, individually directed, tentative or other non-proscriptive agency or staff issuances concerning law or policy." *Teladoc*, 453 S.W.3d at 621–22.

In analyzing whether a particular agency statement constitutes a rule, "we consider the intent of the agency, the prescriptive nature of the guidelines, and the context in which the agency statement was made." *Combs v. Entertainment Publ'ns, Inc.*, 292 S.W.3d 712, 722 (Tex. App.—Austin 2009, no pet.). Of particular significance in *Leeper*, for example, was that "[t]he [agency's] guidelines were only recommended, not prescriptive." *Leeper*, 893 S.W.2d at 443. This Court, too, has recognized that statements that are not prescriptive fall outside the APA's definition of "rule." *See Slay v. Texas Comm'n on Envtl. Quality*, 351 S.W.3d 532, 546 (Tex. App.—Austin 2011, pet. denied) ("[T]he core concept is that the agency statement must in itself have a binding effect on private parties."). Applying the reasoning from *Slay*, this Court has stated that "a distinction exists between nonbinding evaluative guidelines that take into consideration case-specific circumstances—which have been held not to be a rule—and policies that dictate specified results without regard to individual circumstances, which have been held to be a rule." *Witcher*, 447 S.W.3d at 529.

This Court's opinion in *Slay* is particularly helpful in analyzing the present case. There, the legislature had directed the TCEQ to consider a variety of factors in determining what penalties to assess after finding hazardous-waste violations. The TCEQ's enforcement division had created a document, styled "Penalty Policy of the TCEQ," that set forth a methodology explaining how TCEQ staff were to evaluate violations for the purpose of recommending administrative penalties to the Commission. The Penalty Policy stated:

> This policy includes a description of how violations are evaluated in terms of harm and severity and how any proposed penalties are determined. It includes a discussion of what adjustments may be made to the base penalty amount after the review of case-specific information and information concerning the respondent.

Slay, 351 S.W.3d at 538. Although the administrative record in *Slay* contained evidence that TCEQ *staff* were required to follow the Penalty Policy's methodology in determining penalty recommendations, we held it significant that the record also contained evidence that use of the methodology was not mandatory for members of the Commission: "[W]hat ultimately matters is that the district court also had evidence to the effect that the TCEQ commissioners were not *bound* to follow the Penalty Policy's methodology when exercising their legislatively conferred discretion to impose penalties." *Id.* at 546 (emphasis in original).

The discretionary nature of the Penalty Policy in *Slay* was emphasized in a related TCEQ rule:

> The executive director may use enforcement guidelines that are neither rules nor precedents, but rather announce the manner in which the agency expects to exercise its discretion in future proceedings. These guidelines do not establish rules which the public is required to obey or with which it is to avoid conflict.

Id. at 547. Because the Penalty Policy lacked the required prescriptive element, we held that it did not constitute a "rule" within the meaning of the APA. *Id.* at 548; *see Witcher*, 447 S.W.3d at 533 ("Although the guidelines considered in *Slay* were intended to achieve a level of consistency when similar circumstances were present, they did not require a specific result in all cases."); *cf. Entertainment Publ'ns*, 292 S.W.3d at 721 (agency statement held to be rule where "letters [sent by the Comptroller] communicated the Comptroller's intention to apply section 151.024 in *all cases* involving brochure fundraising firms . . . ." (emphasis added)).

In the present case, the relevant MERA guidance document, like the Penalty Policy in *Slay*, states explicitly that its recommended procedures are not mandatory:

> While this document provides a general process and defines minimum criteria for agency staff's consideration of air quality impacts analysis requirements, this document is not regulatory and does not limit the permit reviewer's ability to require the applicant to provide additional information. . . . Permit reviewers and air dispersion modeling staff may deviate from this guidance with approval from their supervisors or from the Air Permits Division (APD) director.

Thus, similar to the *Slay* Penalty Policy, a fair reading of the MERA guidance is that it announces the manner in which the TCEQ expects, but is not required, to exercise its discretion in future proceedings.

Simply calling an agency statement a "guideline" or "guidance" does not, of course, automatically prevent it from falling within the APA's definition of a rule. *See, e.g.*, *John Gannon, Inc. v. Texas Dep't of Transp.*, No. 03-18-00696-CV, 2020 WL 6018646, at *7 (Tex. App.—Austin Oct. 9, 2020, pet. denied) (mem. op.). By its own terms, however, the MERA guidance document here does not have the necessary "binding effect" on the TCEQ, its staff, or the public. The TCEQ retains discretion to deviate from the MERA guidance procedures when deemed appropriate.[8] Accordingly, we conclude that the MERA guidance does not constitute a "rule" that would be invalid unless adopted through the statutory notice-and-comment rulemaking process.

Thus, the MERA guidance, which obviated the need for Vulcan to conduct a full health-effects analysis regarding the expected emission of crystalline silica from the proposed Plant, itself provides substantial evidence in support of the relevant findings of fact that supported the Commissioners' Conclusion of Law 12. In addition, however, as discussed below, Vulcan voluntarily conducted its own full-scale health-effects analysis of expected crystalline silica emissions from the site, which further supports Conclusion of Law 12.

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[8] The existence of this discretion distinguishes the present case from *Sierra Club v. EPA,* 705 F.3d 458, 463–64 (D.C. Cir. 2013), in which the D.C. Circuit disapproved the use of an SIL when the agency lacked such discretion.

(b) Substantial evidence independent of the MERA guidance.

Separate and apart from the MERA guidance, Vulcan voluntarily conducted its own health-effects analysis of crystalline silica emissions from the proposed Plant. In that analysis, Vulcan used accepted "computerized air dispersion modeling" techniques to establish an estimate of crystalline silica emissions. An expert toxicologist retained by Vulcan, Lucy Fraiser, testified about the methodology and results of this analysis:

> [Vulcan's] Health and Welfare Effects Analysis for crystalline silica involved: 1) maximum crystalline silica emissions rates estimated as a component of the modeled project-related hourly and annual PM_{10} emissions using analytical results indicating that 0.2% of project-related PM_{10} emissions is crystalline silica . . . ; 2) modeled road emissions; and 3) comparing the modeled GLC_{max} of crystalline silica to the hourly and annual TCEQ ESLs for crystalline silica.

The results of Vulcan's health-effects analysis predicted concentrations of crystalline silica far below the applicable short-term and long-term ESLs. As reflected by Finding of Fact 46, the Commission found that the predicted concentration of crystalline silica would have been below the ESL for that pollutant even if the concentrations had been 135 times higher than that shown by Vulcan's AQA.

Based on both the MERA guidance and Vulcan's voluntary health-effects analysis, we conclude that the Commissioners' determination in Finding of Fact 45—that "[t]he Plant's crystalline silica emissions will not negatively impact human health and welfare, or contravene the intent of the Texas Clean Air Act"—is supported by substantial evidence. Accordingly, the trial court erred in reversing Conclusion of Law 12 on that basis.

(ii) Whether Vulcan's crystalline silica emissions calculations are based on representative site conditions, and whether substantial evidence supports the TCEQ's determination that Vulcan's silica emissions calculations are representative of those to be expected from the site.

The trial court also reversed Conclusion of Law 12 on the ground that Vulcan's analysis and calculations of crystalline silica concentrations were not based on "representative site conditions." As explained above, Vulcan had drilled and taken 41 core samples in 2016 but used only three of those in its application to the TCEQ. The Protestants argued, and the trial court agreed, that the three samples Vulcan used in its application did not provide "reliable and accurate data" in determining expected emissions from the facility. We disagree.

Vulcan's expert geologist, Dr. Lori Eversull, testified that the company had, in deciding whether to buy the property, earlier obtained the 41 cores to determine the quantity and quality of the aggregate material at different depths and locations at the site and to ensure the aggregate material would meet the required specifications for construction aggregate. The three cores used in the TCEQ application, from among the 41 cores drilled in 2016, were chosen from the north, central, and southern parts of the property. Dr. Eversull testified that in her opinion the three cores were "representative of the Edwards [Formation] that we will mine as a whole" and that the samples were "collected in a manner that caused it to be a representative sample of the aggregate material that will be processed in the proposed plant."

Doubting the accuracy and representativeness of Vulcan's three core samples, the Protestants obtained their own core sample near—but outside—the western boundary of the Vulcan property. Their analysis of that sample showed the crystalline silica content to be at a level of 1.0% of PM_{10} emissions, in contrast to 0.2% as shown by the analysis of Vulcan's samples. From this they argue that Vulcan's numbers are inaccurate, that a determination of the impact on human health and welfare of silica emissions from the proposed plant can be made only if all information is known and accurate, and that "[t]here is no way to confirm the accuracy of Vulcan's emissions calculations or their impacts to human health or property without the withheld data."

We have little doubt that the data from Vulcan's 38 unused core samples would be of interest to the Protestants. Indeed, it is not impossible that they could have shown a higher crystalline silica content than the three core samples Vulcan used in its application. But this is not directly relevant to the question of whether Vulcan's silica emissions calculations are "based on representative site conditions." More importantly, the possibility that data from the other core samples from Vulcan's 2016 investigation could show higher silica content levels is only speculation. All that is known for sure from the administrative record is that (1) the crystalline silica content of the core samples obtained by the Protestants, though higher than that of Vulcan's three samples, was still far below the ESL for crystalline silica, and (2) there is direct evidence that the three samples used by Vulcan were "representative" of the Plant site. The chances that knowing the content of the 38 unused core samples would elevate the overall crystalline silica content to a level higher than the ESL for that pollutant appear to be remote. We conclude, therefore, that the Commissioners' ruling that the three core samples used by Vulcan were based on representative site conditions is supported by substantial evidence. Accordingly, the trial court erred in reversing Conclusion of Law 12 on that basis.

(iii) Whether TCEQ's rejection of Reeh Plaintiffs' assertions regarding ways the Permit allegedly is not protective of public health or property is arbitrary and capricious and not supported by substantial evidence.

Finally, the trial court reversed Conclusion of Law 12 on the ground that the Commission erred in rejecting "Reeh Plaintiffs' assertions regarding ways the Permit allegedly is not sufficiently protective of public health or property." Because the court's Final Judgment does not specify the "assertions" to which it refers, it is difficult to know precisely how to evaluate this finding of error. In his Appellee's Brief in this Court, Reeh argues that the following should have been considered: (1) enclosure of crushing and screening equipment, use of a fabric filter baghouse, and enclosures for stockpiles; (2) fence-line monitoring of air emissions along Vulcan's property line; and (3) excessive hours of operation. We assume these are the assertions to which the trial court's Final Judgment refers.

Our conclusions discussed above—that substantial evidence supports the Commissioners' determination that the proposed plant's crystalline silica emissions will not negatively affect human health or welfare and that the administrative record contains substantial evidence that Vulcan's crystalline silica emissions calculations were based on representative site conditions—largely render the issues in this section of the trial court's Final Judgment academic. Indeed, the essence of Reeh's argument in this regard, as stated in his Appellee's Brief, is that "additional permit controls would . . . make the Permit *more protective* of air quality, human health and property." (Emphasis added.) But whether additional permit controls might have created an even higher level of protection of human health and property was not a material issue. Rather, the central issue for the Commission was whether the public's health and property would be sufficiently protected to meet the requirements of the FCAA and the TCAA. Nonetheless, we will briefly discuss these issues raised in the Reeh Appellee's Brief.

(a) Enclosure of crushing and screening equipment, use of a fabric filter baghouse, and enclosures for stockpiles.

In his Appellee's Brief, Reeh complains that additional controls such as enclosure of crushing and screening equipment, use of a fabric filter baghouse, and enclosures for stockpiles could have given a higher level of protection from crystalline silica emissions. These matters, however, fall within the category of "best available control technology." As noted above, the trial court's Final Judgment ruled that Vulcan had used and conducted proper BACT reviews, and Protestants did not challenge or appeal that portion of the judgment. Accordingly, they may not complain about the ruling. *See* Tex. R. App. P. 25.1(c) ("A party who seeks to alter the trial court's judgment or other appealable order must file a notice of appeal.").

(b) Fence-line air emissions monitoring along Vulcan's property line.

Reeh's Appellee's Brief also mentions that fence-line monitoring would "provide additional important protections." The administrative record, however, contains contrary evidence. One of Vulcan's engineers testified that not only is there no requirement in the TCAA or TCEQ rules that a permit applicant conduct ambient fence-line monitoring for PM_{10} and $PM_{2.5}$, but also there is no suggestion in any written TCEQ guidance that such fence-line monitoring should be required. Nor was he aware of any precedent for fence-line monitoring. Because of the distance of the proposed Plant from the boundary of the Vulcan property, and because Vulcan's AQA demonstrated that crystalline silica emissions from the proposed Plant would not adversely affect public health, welfare, and property, the engineer testified that "I see no need for the Draft Permit to require that Vulcan conduct ambient fenceline monitoring for PM_{10} and $PM_{2.5}$."

(c) Excessive hours of operation.

Finally, Reeh's Appellee's Brief argues that the proposed plant's operating hours "provide a substantial amount of time that Vulcan's facility will be impacting surrounding landowners, schools, livestock, and businesses." One of Vulcan's expert witnesses testified, however, that the proposed Plant would not adversely affect human health or welfare "even if it was to operate 24 hours a day and 365 days a year." Indeed, Vulcan's AQA was based on an assumption that the plant would operate continuously.

Based on the foregoing, we conclude that the trial court erred in ruling that "TCEQ's rejection of Reeh Plaintiffs' assertions regarding ways the Permit allegedly is not sufficiently protective of public health or property is arbitrary and capricious and not supported by substantial evidence."

Accordingly, the trial court erred in reversing Conclusion of Law 12 for the reasons stated in Paragraph 1 of the Final Judgment.

II. *Whether the trial court erred in reversing Conclusion of Law 14.*

As stated above, the Commissioners' Conclusion of Law 14 recited that "Vulcan has made all demonstrations required under applicable statutes and regulations, including 30 Texas Administrative Code § 116.111 regarding air permit applications, to be issued an air quality permit with conditions as set out in the Draft Permit."[9] To support this conclusion, the Commissioners' order included several findings of fact:

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[9] Rule 116.111 provides as follows in pertinent part:

(a) In order to be granted a permit, amendment, or special permit amendment, the application must include:

. . . .

(2) information which demonstrates that emissions from the facility, including any associated dockside vessel emissions, meet all of the following.

(A) Protection of public health and welfare.

(i) The emissions from the proposed facility will comply with all rules and regulations of the commission and with the intent of the Texas Clean Air Act (TCAA), including protection of the health and property of the public.

. . . .

(C) Best available control technology (BACT) must be evaluated for and applied to all facilities subject to the TCAA. . . .

. . . .

(J) Air dispersion modeling. Computerized air dispersion modeling may be required by the executive director to determine air quality impacts from a proposed new facility or source modification. . . .

Issue A: Whether the proposed plant will negatively affect human health, including sensitive subgroups, and physical property

22. The maximum offsite concentrations from AQA are all below applicable National Ambient Air Quality Standards (NAAQS) and Commission Effects Screening Levels (ESLs).

23. Vulcan's AQA demonstrates that the maximum allowable emissions from the Plant will not negatively affect human health or welfare, including sensitive subgroups, or physical property.

Issue C: Whether cumulative impacts of existing sources were properly considered

25. Each of Vulcan's full Minor NAAQS analyses analyzed any cumulative impacts of the emissions from nearby emissions sources by inputting the emissions from the Martin Marietta Materials rock crusher into the modeling, and other off-site emissions sources by adding a representative background concentration of the criteria pollutant to its modeled maximum off-site ground level concentration (GLC_{max}).

26. Vulcan's AQA properly considered any cumulative impacts of emissions from nearby operations, plus other offsite emissions sources.

Issue Q: Whether the permit application, and associated air dispersion modeling, included and properly evaluated all applicable emissions

. . . .

49. Vulcan's AQA and modeling properly evaluated the identified emissions sources and types of emissions associated with the Plant.

Issue L: Whether the background concentrations used in the air dispersion modeling are representative of the proposed location of the plant

40. Vulcan identified ambient air monitors in counties with higher total emissions and higher populations than Comal County, and for each pollutant for which more than one monitor was identified, Vulcan chose as the background concentration the highest concentration from any of those monitors.

41. The background concentrations used in Vulcan's AQA are conservatively representative of ambient concentrations of pollutants at the Plant location.

Issue R: Whether site specific monitoring data should have been used in the air dispersion modeling conducted for this application

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30 Tex. Admin. Code § 116.111(a).

> 50. The use of site-specific monitoring data was not required in Vulcan's AQA because no site-specific ambient air monitoring data was available.

In reversing the Commissioners' order, the trial court ruled in Paragraph 2 of its Final Judgment that the following errors existed in Conclusion of Law 14:

> i) TCEQ's determination that Vulcan's air dispersion modeling adequately accounts for or addresses cumulative impacts; ii) TCEQ's determination that quarry and road emissions were adequately considered; and iii) TCEQ's determination that Vulcan's choice of the relevant background concentrations used in its voluntary Full Minor National Ambient Air Quality Standard ("NAAQS") Analyses were appropriate, is arbitrary and capricious, and not supported by substantial evidence.

The Protestants' witnesses offered evidence that called into question Vulcan's methods, analysis, and conclusions. They raised valid concerns that the ALJs were obliged to hear and consider in preparing their PFD. As discussed below, however, Vulcan presented testimony from numerous witnesses that was directly refutative of the Protestants' evidence, thus rendering that evidence insufficient to overcome the substantial-evidence presumption.

(i) Whether substantial evidence supports the Commissioners' determination that Vulcan's air-dispersion modeling adequately accounted for cumulative impacts.

In Paragraph 2 of the Final Judgment, the trial court first reversed Conclusion of Law 14 on the ground that Vulcan's air-dispersion modeling did not adequately account for the "cumulative impacts" of other pollutant sources. As discussed above, however, based on the MERA guidance, the GLC_{max} for crystalline silica was below the ESL for that pollutant. Again, the ESL of air contaminant concentration is that level below which the TCEQ does not anticipate air quality will be degraded due to emissions. As stated earlier, the TCEQ's experience, as well as nationwide data, show that rock crushers do not add more than a de minimis amount of crystalline silica to the ambient environment. Thus, based on the TCEQ's experience, whatever pollutant levels existed before the Vulcan Plant's operation began would not be increased to any meaningful degree by crystalline silica emissions from the operation of the facility. Therefore, it was not necessary for Vulcan to take a specific measurement of emissions from other sources. Any shortcomings in Vulcan's air-dispersion modeling thus could not have prejudiced the Protestants' substantial rights.

Nonetheless, a review of Vulcan's full minor-source NAAQS analysis, from which it was determined that crystalline silica levels from all off-site sources were well below the ESL for that pollutant, also reveals substantial evidence to support its conclusion. Vulcan's and the TCEQ's expert witnesses testified in detail about Vulcan's analysis, including specific testimony about how they accounted for the cumulative impacts of emissions from other sources.

Vulcan first obtained from TCEQ a list of facilities permitted for air emissions within a 10-kilometer radial distance from the center of its proposed Plant. Only a Martin Marietta rock-crushing plant satisfied those criteria. The expert witness who conducted the analysis for Vulcan, David Knollhoff, testified that he "input the maximum allowable emissions of each of those emissions sources located within 10-kilometer radial distance from the center of the proposed plant." He went on to testify that Vulcan's analysis

> constituted a cumulative impacts analysis because it considered the cumulative impacts of the emissions of nearby operations, other offsite emissions sources, and the emissions of the proposed plant. More specifically, each full Minor NAAQS Analysis considered the emissions of nearby operations and the emissions of the proposed plant by inputting into the modeling the maximum allowable emissions of each pollutant and averaging time from the nearby operations and the proposed plant to determine the predicted GLC_{max} for that criteria pollutant and averaging time. And, each full Minor NAAQS Analysis considered the emissions of that pollutant and averaging time from other off-site emissions sources by adding to the GLC_{max} for that criteria pollutant and averaging time a background concentration for that criteria pollutant and averaging time that is at least representative.

He testified that emissions from "quarry row," an area in which several large quarries are located and about which one of the Protestants' witnesses expressed concern, emanated more than 10 kilometers from the Vulcan Plant site and would have "no cumulative impact with the PM_{10} and $PM_{2.5}$ emissions from other emissions sources located more than 10 km from the proposed plant."

In addition, TCEQ expert witness Rachel Melton testified that

> [a] minor NSR full NAAQS analysis requires an evaluation of all on-property facilities, nearby off-property facilities, and representative monitored background concentrations, which are added to the modeled concentration to account for sources not explicitly modeled. . . . .
> The full NAAQS analysis [conducted by Vulcan] demonstrated that the proposed emissions are not expected to cause or contribute to an exceedance of the NAAQS.

She concluded by testifying that in her opinion the air-dispersion modeling conducted by Vulcan adequately considered the cumulative impacts of nearby sources.

Another TCEQ expert witness, Dr. Jong-Song Lee, testified that ESLs, which are set to protect against acute and chronic adverse health effects to humans, animals, vegetation, and nuisance conditions, take into account the cumulative effects in areas in which there are multiple facilities of a similar type: "[T]he method for deriving the ESLs addresses both cumulative and aggregate exposures." There is, he explained, "a lot of conservatism in the ESL and layers of conservative assumptions are made in the worst-case modeling analysis itself."

Still other Vulcan and TCEQ witnesses specifically disputed concerns expressed by the Protestants' expert witnesses in their pre-filed testimony.

We conclude that substantial evidence supports the Commissioners' determination that Vulcan's air-dispersion modeling adequately accounted for cumulative impacts of pollutants from other sources. The trial court erred in reversing Conclusion of Law 14 on that basis.

(ii) Whether substantial evidence supports the Commissioners' determination that quarry and road emissions were adequately considered.

Paragraph 2 of the trial court's Final Judgment also reversed Conclusion of Law 14 on the ground that "TCEQ's determination that quarry and road emissions were adequately considered" was not supported by substantial evidence. It is true that Vulcan's full minor-source NAAQS analysis did not explicitly include potential emissions from all on- and off-site roads and quarries. This alone, however, does not invalidate Conclusion of Law 14.

First, we note again that because the modeling in Vulcan's preliminary-impact analysis showed that crystalline silica levels were below the applicable ESL, it was not necessary for Vulcan to conduct a full minor-source NAAQS analysis or health-effects analysis at all, much less one that took a measurement of other specific sources of emissions. Any shortcomings in Vulcan's full air-dispersion modeling and AQA therefore could not have prejudiced the Protestants' substantial rights.

Second, as stated above, under the TCAA and TCEQ rules an entity is only required to apply for and obtain an air permit for new or modified emissions sources that constitute "facilities." *See* Tex. Health & Safety Code § 382.0518(a). Moreover, the statute commands that the Commission "shall" grant the requested permit if it finds no indication that emissions "from the facility" will contravene the goal of protecting the public's health and physical property. *Id.* The definition of "facility" in the TCAA and TCEQ rules, however, expressly excludes roads and quarries. *See id.* § 382.003(6) ("A mine, quarry, well test, or road is not considered to be a facility."); 30 Tex. Admin. Code § 116.10(4) ("A mine, quarry, well test, or road is not a facility.").

Additionally, the permit that the Commission granted to Vulcan contained a number of special conditions, the purpose of which was to minimize emissions from the quarrying operations and roads on the Vulcan property.

Finally, any emissions from roads and quarries were accounted for through the measurement, using TCEQ stationary monitors, of the cumulative effects of off-site sources and representative background concentrations. As TCEQ witness Melton testified, "A representative background concentration accounts for any sources not explicitly modeled such as roads, natural sources, or other off-property sources." Vulcan's full minor-source NAAQS analysis utilized data from two of the TCEQ's representative monitors. Accordingly, its analysis did include and consider, albeit indirectly, road and quarry emissions. So long as the TCEQ gives reasonable consideration to such matters, as the record shows it did here, courts must leave the question of what constitutes "adequate" consideration to the agency's informed discretion.

We conclude that the TCEQ's determination that quarry and road emissions were adequately considered is supported by substantial evidence. The trial court erred in reversing Conclusion of Law 14 on that basis.

(iii) Whether substantial evidence supports the Commissioners' determination that Vulcan's choice of the relevant background concentrations used in Vulcan's "full minor NAAQS analyses" were appropriate.

Paragraph 2 of the trial court's Final Judgment also reversed Conclusion of Law 14 on the ground that "TCEQ's determination that Vulcan's choice of the relevant background concentrations used in its voluntary Full Minor National Ambient Air Quality Standard ('NAAQS') Analyses were appropriate was not supported by substantial evidence." The phrase "choice of the relevant background concentrations" in the Final Judgment refers to Vulcan's selection of the TCEQ stationary monitors that it used to determine the background concentrations of particulate matter in the area of the proposed Plant. Friends and Reeh argue, and the trial court agreed, that Vulcan selected monitors that were not representative of air quality at the Plant site.

As Vulcan witness Knollhoff explained, "The background concentration of a pollutant is caused by emissions of that pollutant from existing emissions sources in the area, including industrial emissions sources (such as existing rock crushing plants), mobile emissions sources (such as on-road and off-road vehicles), and natural emissions sources." TCEQ witness

Melton explained that stationary monitors are used to account for emission sources that are not explicitly modeled. When cost and logistical constraints prohibit the establishment of site-specific monitors, which is usually the case, "representative monitors" may be used. The TCEQ maintains a network of stationary monitors for this purpose. Ms. Melton testified that

> [t]he existing air monitoring network is the result of a strategic balance of matching federal monitoring requirements with state and local needs. Consistent with federal air monitoring requirements, the TCEQ evaluates the placement of air quality monitors within the air monitoring network using trends in population, reported emissions inventory data, and existing air monitoring data for a given area.

Ms. Melton also testified that an applicant must demonstrate that the monitors it has chosen to use are representative of the site of the proposed facility:

> [I]f there are no existing monitoring data for the county or adjacent county where the project is located, justifying the representativeness of a monitor may include, among other things, comparing county emissions, county population, categories of source emissions for each county, and a quantitative assessment of emissions surrounding the location of the monitor compared to the project site.

In the present case, there were no TCEQ stationary monitors in Comal County. As a result, Vulcan was required to select representative monitors from outside that county to try to estimate the background concentrations of particulate matter at its proposed Plant site. For the measurement of PM_{10} and $PM_{2.5}$, it chose two monitors located in Bexar County, one referred to as the "Selma Monitor," which was used to measure PM_{10}, and the other referred to as the "Heritage Middle School Monitor," which was used to measure $PM_{2.5}$.

Mr. Knollhoff testified that for each pollutant he "evaluated the monitors for that pollutant that are located in other counties to determine which of those monitors might have produced representative background concentration data for that pollutant." He stated that he conducted his evaluation of the monitors "in a manner that was consistent with the guidance in Appendix D of TCEQ's Air Quality Modeling Guidelines" and that in his opinion "the background concentrations that I used in the full Minor NAAQS Analyses I conducted for the pollutants and averaging times that will be emitted from the proposed plant are at least representative of the location of the proposed plant."

In Vulcan's AQA report, Mr. Knollhoff further explained:

> [The] 24-hr PM_{10} monitored background concentration [at the Selma Monitor] is expected to be conservatively higher than is representative of the 24-hr PM_{10} background concentration expected for the area around the proposed crushing plant because there are much more PM_{10} emissions in the area around this monitor than there are in the area around the proposed crushing plant.
>
> . . . .
>
> [The] monitored background concentrations [at the Heritage Middle School Monitor] are expected to be conservatively higher than what are representative of the background concentrations for 24-hr $PM_{2.5}$ and annual $PM_{2.5}$ for the area around the proposed crushing plant because there are much more $PM_{2.5}$ emissions in the area around this monitor than in the area around the proposed crushing plant.

The AQA report also stated that "as an extra measure of conservatism, the highest concentration measured at any of the monitors for each pollutant and NAAQS averaging time . . . was used in the Minor NAAQS Analysis for that pollutant and NAAQS averaging time."

Ms. Melton also testified regarding Vulcan's justifications for selecting these two monitors for measurement of PM background concentrations:

> Vulcan provided a county-wide emissions comparison, a county-wide population comparison, a land use comparison, and a quantitative assessment of emissions surrounding the location of the monitors selected compared to the project site. This assessment included pointing out industry types that were nearby the monitors, which included coal fired power plants, cement plants, and steel plants. It also included consideration of the major roads near the selected monitors.

She testified that based on her review, "the monitors selected by Vulcan [were] representative of the area where the proposed plant will be located."

We conclude that the TCEQ's determination that Vulcan's choice of relevant background concentrations used in its voluntary full minor-source NAAQS analyses were appropriate is supported by substantial evidence. The trial court erred in reversing Conclusion of Law 14 on that basis.

The three bases on which the trial court reversed Conclusion of Law 14, discussed above, present instances of conflicting testimony. But it is the province of the agency, like that of a jury, to decide between conflicting evidence:

> The trial court may not set aside an administrative order merely because testimony was conflicting or disputed or because it did not compel the result reached by the agency. Resolution of factual conflicts and ambiguities is the province of the administrative body and it is the aim of the substantial evidence rule to protect that function. The reviewing court is concerned only with the reasonableness of the administrative order, not its correctness.

Firemen's & Policemen's Civ. Serv. Comm'n v. Brinkmeyer, 662 S.W.2d 953, 956 (Tex. 1984); *accord Scally v. Texas State Bd. of Med. Exam'rs*, 351 S.W.3d 434, 452 (Tex. App.—Austin 2011, pet. denied) ("Resolving factual conflicts and ambiguities is the agency's function, and the purpose of substantial-evidence review is to protect that function.").

In the present case, the ALJs—and the Commission—chose to credit certain relevant evidence presented by Vulcan and the TCEQ above that presented by the Protestants. That was the agency's province, and neither we nor the trial court may second-guess its decision. We hold that the findings of fact that underlie Conclusion of Law 14 were supported by substantial evidence. Nor do we see anything about this aspect of the Commissioners' decision that falls within the narrow circumstances, outlined above, in which an agency order may be found to be arbitrary and capricious even though it is supported by substantial evidence. The trial court erred in reversing Conclusion of Law 14 on these bases.

III. ***Whether the presiding ALJ abused her discretion by ruling that Vulcan could maintain documents from its 2016 subsurface investigation on the Plant site confidential under the trade-secret privilege.***

As explained above, the three core samples Vulcan used as representative samples in analyzing the potential crystalline silica emission from the proposed Plant came from a larger group of cores that it had taken in its 2016 investigation in determining whether to purchase the property and how much to pay for it. The Protestants' discovery request—and subsequent cross-examination attempts—to obtain documents and information about the other cores that Vulcan had not used in its application were denied on the basis of Vulcan's asserted trade-secret privilege.

In Paragraph 4 of its Final Judgment, the trial court ruled that the ALJ "abused her discretion by ruling that Vulcan could maintain information from its 2016 subsurface investigation at the property where the Plant will be located as confidential under the trade secret privilege."[10] In this appeal, the TCEQ and Vulcan argue that the ALJ's trade-secret ruling was within her discretion and, in any event, did not prejudice the Protestants' substantial rights.

The test for identifying an abuse of discretion is "whether the court acted without reference to any guiding rules and principles." *Industrial Specialists, LLC v. Blanchard Ref. Co.*, 652 S.W.3d 11, 16 (Tex. 2022) (quoting *Downer v. Aquamarine Operators, Inc.*, 701 S.W.2d 238, 241–42 (Tex. 1985)). The same standard applies to rulings of an ALJ. *Cotropia v. Texas Med. Bd.*, No. 03-18-00232-CV, 2018 WL 4087408, at *4 (Tex. App.—Austin Aug. 28, 2018, pet. denied) (mem. op.).

In addition, this Court has held that "[i]n order to show harm and obtain a reversal on the grounds that the Commission wrongly excluded evidence requires a showing that the

[10] Paragraph 3 of the Final Judgment affirmed the Commissioners' BACT determination.

evidence is controlling on a material issue, not merely cumulative." *Office of Pub. Util. Couns. v. Public Util. Comm'n*, 185 S.W.3d 555, 576 (Tex. App.—Austin 2006, pet. denied).

In general, a trade secret is "any formula, pattern, device or compilation of information which is used in one's business and presents an opportunity to obtain an advantage over competitors who do not know or use it." *In re Bass*, 113 S.W.3d 735, 739 (Tex. 2003) (orig. proceeding) (quoting *Computer Assocs. Int'l v. Altai*, 918 S.W.2d 453, 455 (Tex. 1996)). The Texas Rules of Evidence provide that "[a] person has a privilege to refuse to disclose and to prevent other persons from disclosing a trade secret owned by the person, unless the court finds that nondisclosure will tend to conceal fraud or otherwise work injustice." Tex. R. Evid. 507(a).

The Texas Supreme Court has established a specific process for evaluating an asserted trade-secret privilege: "[W]hen trade secret privilege is asserted as the basis for resisting production, the trial court must determine [(1)] whether the requested production constitutes a trade secret; [(2)] if so, the court must require the party seeking production to show reasonable necessity for the requested materials." *In re Union Pac. R.R.*, 294 S.W.3d 589, 592 (Tex. 2009) (orig. proceeding) (quoting *In re Bass*, 113 S.W.3d at 738).

The first question in the supreme court's test is whether a trade secret exists. That determination requires weighing six factors:

> To determine whether a trade secret exists, we weigh the six factors set forth in the Restatement of Torts in the context of the surrounding circumstances: (1) the extent to which the information is known outside of the business; (2) the extent to which it is known by employees and others involved in the business; (3) the extent of measures taken to guard the secrecy of the information; (4) the value of the information to the business and to its competitors; (5) the amount of effort or money expended in developing the information; (6) the ease or difficulty with which the information could be properly acquired or duplicated by others.

Id.

In the present case, Vulcan bore the burden of demonstrating that the requested information constituted a trade secret. In response to the Protestants' motion to compel, Vulcan submitted an affidavit from the Environmental Manager for Vulcan's Southwest Division in which the affiant tracked and discussed each of the six factors listed above. In a well-reasoned order, the presiding ALJ applied the supreme court's test and concluded that Vulcan had established that the requested information constituted a trade secret: "Vulcan treats its subsurface data as a protected trade secret, and expended a significant amount of money to develop it." We conclude that this part of the ALJ's ruling applied appropriate "guiding rules and principles" and therefore was not an abuse of discretion.

The second part of the supreme court's test involves determining whether the requesting party has shown a "reasonable necessity" for the requested materials. This burden rests on the requesting party:

> Once trade secret status has been established, the burden shifts to [the requesting party] to establish that the information is "necessary or essential to the fair adjudication of the case, weighing the requesting party's need for the information against the potential of harm to the resisting party from disclosure." [*In re*] *Bridgestone/Firestone*, [*Inc.*], 106 S.W.3d at 732. We have not "state[d] conclusively what would or would not be considered necessary for a fair adjudication, indicating instead that the application of the test would depend on the circumstances presented." *Id.* "[T]he degree to which information is necessary in a case depends on the nature of the information and the context of the case." *Id.* But, "the test cannot be satisfied merely by general assertions of unfairness;" instead, "a party ... must demonstrate with specificity exactly how the lack of the information will impair the presentation of the case on the merits to the point that an unjust result is a real, rather than a merely possible, threat." *Id.* at 732–33.

Id.

In the portion of her order addressing this question, the presiding ALJ concluded from the parties' prefiled testimony that the Protestants could adequately cast doubt on Vulcan's crystalline silica analysis and calculations without the necessity of the trade-secret information.

Accordingly, she ruled that nondisclosure would not work an injustice under the circumstances of this case.

The Protestants desired the requested documents to see if they could use them to attack the accuracy of the conclusions from Vulcan's air-dispersion modeling. As set forth above, however, the MERA guidance itself provides substantial evidence in support of the relevant findings of fact that supported the Commissioners' conclusion that "there is no indication that emissions from the Plant will contravene the intent of the TCAA, including the protection of the public's health and physical property." Moreover, again as stated earlier, the possibility that the requested trade-secret documents might show crystalline silica emissions from the plant to be higher than the ESL for that contaminant is speculative and appears to be extremely remote. Finally, the Protestants' witnesses did a creditable job casting doubt on Vulcan's calculations even without the requested trade-secret information. As a result, we agree with the presiding ALJ that the Protestants could adequately challenge Vulcan's methodology and calculations without the requested information. We conclude that the Protestants have failed to establish that the requested information was "necessary or essential to the fair adjudication of the case" and have failed to demonstrate "exactly how the lack of the information will impair the presentation of the case on the merits to the point that an unjust result is a real, rather than a merely possible, threat." *Id.*

We therefore hold that the presiding ALJ's ruling denying disclosure of the requested trade-secret documents was not an abuse of discretion and did not prejudice the Protestants' substantial rights; the trial court erred in ruling to the contrary.

IV. *Whether various rulings by the presiding ALJ denied the Protestants' due process rights.*

The discovery dispute regarding the core samples Vulcan took in 2016 has been outlined above. In Paragraph 5 of its Final Judgment, the trial court ruled that the Protestants' due process rights were infringed by the presiding ALJ's denial of Protestants' motion to compel production of the requested information, as well as other rulings:

> Plaintiffs were denied due process such that their substantial rights were prejudiced by: (1) the Administrative Law Judge's ruling that Vulcan could maintain information from its 2016 subsurface investigation at the property where the Plant will be located as confidential under the trade secret privilege; (2) the Administrative Law Judge's denial of Plaintiffs' discovery and cross-examination of the "privileged" information; and (3) TCEQ's not requiring Vulcan to input emissions from quarries and roads into its modeling for the AQAs for 24-hour PM_{10}, 24-hour $PM_{2.5}$, and Annual $PM_{2.5}$.

Due process protections extend to proceedings conducted before an administrative agency. *See City of Corpus Christi v. Public Util. Comm'n of Tex.*, 51 S.W.3d 231, 262 (Tex. 2001) ("This Court has held that in administrative proceedings, due process requires that parties be accorded a full and fair hearing on disputed fact issues. At a minimum, it requires that the 'rudiments of fair play' be observed." (citations omitted)); *see also Cadena Comercial USA Corp. v. Texas Alcoholic Beverage Comm'n*, 518 S.W.3d 318, 334 (Tex. 2017) ("In administrative proceedings, the 'rudiments of fair play' must be observed."). However, "due process does not require that administrative proceedings have the full procedural framework of a civil trial." *City of Corpus Christi*, 51 S.W.3d at 262.

(i) Whether allowing Vulcan to maintain its trade-secret information confidential denied the Protestants' due process rights.

The trial court ruled that allowing Vulcan to maintain the confidentiality of its trade-secret documents and information constituted a denial of the Protestants' due process rights. Having concluded above that the presiding ALJ's denial of the Protestants' motion to compel production of the requested trade-secret information was not an abuse of discretion, it follows that that ruling did not constitute a denial of due process. *See Nath v. Texas Children's Hosp.*, 446 S.W.3d 355, 361 (Tex. 2014) ("A sanctions award that fails to comply with due process constitutes an abuse of discretion because a trial court has no discretion in determining what the law is or applying the law to the facts."); *Nucor Steel-Texas v. Public Util. Comm'n*, 363 S.W.3d 871, 889 (Tex. App.—Austin 2012, no pet.) ("Having found no abuse of discretion in any of the rulings that Nucor argued were erroneous, we cannot conclude that the Commission's evidentiary rulings deprived Nucor of the right to a fair hearing or violated Nucor's constitutional rights to due process and equal protection.").

We hold that the rudiments of fair play were observed in the SOAH proceeding.

(ii) Whether denial of attempted cross-examination by the Protestants regarding Vulcan's trade-secret information denied the Protestants' due process rights.

The trial court ruled that prohibiting the Protestants from cross-examining witnesses about Vulcan's trade-secret information also denied the Protestants their due process rights. Having held that the information requested by the Protestants constituted Vulcan's trade secret and that the Protestants failed to establish that such information was "necessary or essential to the fair adjudication of the case," it follows that the presiding ALJ's denial of cross-examination relating to that same information did not deny the Protestants their due process rights. In this regard, again, the rudiments of fair play were observed in the SOAH proceeding.

(iii) Whether the TCEQ's failure to require Vulcan to input emissions from quarries and roads into its AQA modeling denied Protestants' due process rights.

The trial court ruled that the TCEQ's failure to require Vulcan to input emissions from quarries and roads into its AQA modeling constituted a denial of the Protestants' due process rights. As discussed above, any potential emissions from quarries and roads were rendered irrelevant by the MERA guidance and, in any event, were adequately accounted for by the measurement of PM_{10} and $PM_{2.5}$ taken by stationary representative monitors. The TCEQ's failure to require Vulcan to specifically include emissions from quarries and roads into its AQA modeling therefore did not prevent the Protestants from receiving a full and fair hearing.

Because the rudiments of fair play were observed in the three matters set forth in Paragraph 5 of the Final Judgment, the trial court erred in ruling that the Protestants were denied due process.

Conclusion

Having concluded that the trial court erred in reversing the Commissioners' November 21, 2019 order granting Vulcan's permit application, we reverse the trial court's judgment and affirm the Commissioners' order.

____

J. Woodfin Jones, Justice

Before Chief Justice Byrne, Justices Kelly and Jones*

Reversed and Rendered

Filed: March 31, 2023

*Before J. Woodfin Jones, Chief Justice (Retired), Third Court of Appeals, sitting by assignment. *See* Tex. Gov't Code § 74.003(b).

APPENDIX C

TEXAS COURT OF APPEALS, THIRD DISTRICT, AT AUSTIN

JUDGMENT RENDERED MARCH 31, 2023

NO. 03-21-00204-CV

Texas Commission on Environmental Quality
and Vulcan Construction Materials LLC, Appellants

v.

Friends of Dry Comal Creek, Stop 3009 Vulcan Quarry, Jeffrey Reeh,
Terry Olson, Mike Olson, and Comal Independent School District, Appellees

APPEAL FROM THE 353RD DISTRICT COURT OF TRAVIS COUNTY
BEFORE CHIEF JUSTICE BYRNE, JUSTICES KELLY AND JONES
REVERSED AND RENDERED -- OPINION BY JUSTICE JONES

This is an appeal from the judgment signed by the trial court on April 1, 2021. The Court's opinion and judgment dated September 29, 2022, are withdrawn. Having reviewed the record and the parties' arguments, the Court holds that there was reversible error in the court's judgment. Therefore, this Court reverses the trial court's judgment and renders judgment affirming the Commissioners' order of November 21, 2019. The appellee shall pay all costs relating to this appeal, both in this Court and in the court below.

APPENDIX D

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

AN ORDER GRANTING THE APPLICATION BY VULCAN CONSTRUCTION MATERIALS, LLC FOR PERMIT NO. 147392L001; TCEQ DOCKET NO. 2018-1303-AIR; SOAH DOCKET NO. 582-19-1955

On November 20, 2019, the Texas Commission on Environmental Quality (TCEQ or Commission) considered the application of Vulcan Construction Materials, LLC for an air quality permit for a new rock crushing plant to be located in Bulverde, Comal County, Texas. A Proposal for Decision (PFD) was issued by Victor John Simonds and Rebecca S. Smith, Administrative Law Judges (ALJs) with the State Office of Administrative Hearings, and considered by the Commission.

After considering the PFD, the Commission makes the following findings of fact and conclusions of law.

I. FINDINGS OF FACT

Background

1. On June 26, 2017, Vulcan Construction Materials, LLC (Vulcan or Applicant) filed an application for an air quality permit to authorize the construction and operation of a new rock crushing plant (Plant). The application, the Air Quality Analysis (AQA) submitted on November 7, 2017, and the revisions submitted on November 17, 2017, will be collectively referred to as the Application.

2. Vulcan proposes to construct the Plant on property whose northeast corner is the southwest corner of the intersection of Highway 46 and Farm-to-Market Road 3009, Bulverde, Comal County, Texas.

3. TCEQ's Executive Director (ED) declared the Application administratively complete on July 5, 2017.

4. The ED determined the Application was technically complete on January 19, 2018, and issued a draft permit for the Application (Draft Permit).

Notice and Jurisdiction

5. On July 28, 2017, Vulcan published a Notice of Receipt and Intent to Obtain an Air Quality Permit in Spanish in *La Prensa Communidad del Valle*, and on July 31, 2017, published it in English in the *San Antonio Express-News*.

6. On January 12, 2018, the ED provided written notification of the Draft Permit to the state senator and state representative who represent the area where the Plant will be located.

7. On January 26, 2018, Vulcan published a Combined Notice of Public Meeting and Notice of Application and Preliminary Decision in English in the *San Antonio Express-News* and in Spanish in *La Prensa Communidad del Valle*.

8. Vulcan posted required signs, including alternative language signs.

9. Notice of the Application was made to all persons and entities to which notification was required.

10. The TCEQ held a public meeting in New Braunfels on February 27, 2018.

11. The public comment period ended on February 27, 2018.

12. On September 6, 2018, the ED filed a Response to Public Comments and stated that no changes were made in response to public comment for the final Draft Permit.

13. On December 13, 2018, the Commission issued an interim order granting certain hearing requests, denying certain hearing requests and requests for reconsideration, and referring the Application to the State Office of Administrative Hearings (SOAH) for a contested evidentiary hearing on the following nineteen issues:

    A. Whether the proposed plant will negatively affect human health, included sensitive subgroups, and physical property;

    B. Whether the conditions in the proposed permit will adequately protect against dust emissions from the proposed plant, including during periods of high winds;

    C. Whether cumulative impacts of existing sources were properly considered;

D. Whether the controls in the proposed permit constitute Best Available Control Technology (BACT);

E. Whether the proposed facility will adversely affect wildlife, vegetation, flora and fauna;

F. Whether the proposed operating hours of the rock crusher ensure that there will be no adverse impacts to human health, welfare, and the environment;

G. Whether the air quality modeling conducted as part of this application adequately incorporated the local prevailing winds;

H. Whether the Applicant complied with TCEQ's public notice requirements related to sign-posting and newspaper notice;

I. Whether the proposed permit contains adequate monitoring and recordkeeping requirements to ensure compliance with all applicable rules and requirements;

J. Whether emissions from on-site diesel engines are adequately calculated and adequately controlled;

K. Whether an adequate site review was conducted for this application;

L. Whether the background concentrations used in the air dispersion modeling are representative of the proposed location of the plant;

M. Whether emissions from maintenance, start-up, and shutdown activities are adequately addressed in the proposed permit;

N. Whether chemical dust suppressant is safe to use as a control for emissions from the proposed plant;

O. Whether emissions of silica from the proposed plant will negatively impact human health and welfare;

P. Whether the proposed permit conditions, including emissions limitations, are enforceable;

Q. Whether the permit application, and associated air dispersion modeling, included and properly evaluated all applicable emissions;

R. Whether site specific monitoring data should have been used in the air dispersion modeling conducted for this application; and

S. Whether the Applicant's compliance history precludes issuance of the draft permit or necessitates additional special conditions in the draft permit.

Proceedings at SOAH

14. On January 29, 2019, the Chief Clerk mailed the Notices of Public Hearing for the preliminary hearing to persons entitled to receive notice under TCEQ rules or who requested notice. Notice of the preliminary hearing was published February 1-2, 2019.

15. On February 4, 2019, the Chief Clerk filed with SOAH the Application; the Draft Permit; the preliminary decisions issued by the ED; and other supporting documentation in the administrative record of the Application, which are collectively referred to as the Prima Facie Demonstration.

16. On March 6, 2019, ALJ Rebecca S. Smith held a preliminary hearing at the Comal County Courthouse in New Braunfels, Texas. Jurisdiction was established, and the Administrative Record was admitted into evidence.

17. At the preliminary hearing, the ALJ admitted the following as parties to this proceeding: Vulcan, the ED, the Office of Public Interest Counsel (OPIC), Friends of Dry Comal Creek, Stop 3009 Vulcan Quarry, Comal Independent School District, Doug Harrison, Michael L. Maurer, Ora Lee Frisch, Nathan & Kira Olson, Jack Olivier, Jim & Joyce Doyle, Bob & Jeanne Nebergall, Bruce & Grace Murphy, John P. Mooney, Stephan & Jane Johnson, Sheryl Lynn Mays, Keith & Susan Randolph, Ted Martin, James & Linda Martin, Chris Lupo, Claire H. Loomis, James & Gladys Kuhn, Chuech Kuentz, Judy Krup, William & Linda Mohr, Lara Stonesifer, Mike Zimmerman, Michael Wilkinson, Ronald J. Walton, Michael & Terry Olson, Jack & Trudy Striegel, Peggy Pueppke, Mike Stemig, James Shipley, Gerald & Tracy Schulke, Esther Scanlon, Josh & Jakki Saul, Gaspar & Anna Rivera, Jeff Reeh, Chris M. Hoppman, Mary Ann Trujillo, Renee Wilson, Richard C. Keady, Robert Carrillo, Windell Cannon, William K. Byerley, Ron & Elaine Bigbee, Michael & Deborah Bell, Yvonne R. Arreaga, Thomas & Kathleen Chaney, Mark & Betty Abolafia-Rosenzweig, Lorraine DelaRiva, Pamela Seay, Craig Johnson, Kenneth & Diane Higby, Milann & Pru Guckian, Liz James, Becky Cox, Ruby Hartmann, Katheryn Acklen, Stephen & Mary Lee Freeman, Richard & Sally Harvey, Alan M. Hammack, Kleo Halm, David & Debbie Granato, Carol Glover, Robert & Maureen Cartledge, Karl & Linda Fuchs, Brigitte & Gail Dean Deyle, David N. Fletcher, Jana Fichtner, Kyra Faught, Deborah Farrar, Larry Ewald, Don & Linda Everingham, Stephanie Elizondo, James K. & Michele Drake, Joyleen Dodson, Charles Gerdes, Greater Edwards Aquifer Alliance, Donna H. Gibson Dell, Trustee of the Robert P. and Shirley D. Gibson Living Trust, Smithson Valley Heritage Oaks Property Owners Association, and Zuercher-Froboese Family Ranch. Doug Harrison, Ron & Elaine Bigby, Mike & Terry Olson, Jeffrey Reeh, and Comal Independent School District were aligned and will be referred to as Harrison Protestants. The remaining protesting individuals and groups were aligned with Friends of Dry Comal Creek and Stop 3009 Vulcan Quarry. They will be collectively referred to as Friends Protestants.

18. ALJs Rebecca S. Smith and Victor John Simonds conducted a prehearing conference on June 6, 2019. All parties participated in the prehearing conference through their designated representatives.

19. The hearing on the merits was held from June 10-11, 2019 before ALJs Smith and Simonds at the SOAH offices, William P. Clements State Office Building, 300 West 15th Street, Fourth Floor, Austin, Texas. The hearing record closed on July 10, 2019, after replies to written closing arguments were filed.

The Application

20. The Application includes a complete Form PI-1 General Application signed by Vulcan's authorized representative.

21. The Applications were administratively and technically complete and included all necessary supporting information and appropriate TCEQ forms.

Issue A: Whether the proposed plant will negatively affect human health, including sensitive subgroups, and physical property

22. The maximum offsite concentrations from AQA are all below applicable National Ambient Air Quality Standards (NAAQS) and Commission Effects Screening Levels (ESLs).

23. Vulcan's AQA demonstrates that the maximum allowable emissions from the Plant will not negatively affect human health or welfare, including sensitive subgroups, or physical property.

Issue B: Whether the conditions in the proposed permit will adequately protect against dust emissions from the proposed plant, including during periods of high winds

24. The conditions in the Draft Permit will adequately protect against dust emissions from the Plant, including during periods of high winds.

Issue C: Whether cumulative impacts of existing sources were properly considered

25. Each of Vulcan's full Minor NAAQS analyses analyzed any cumulative impacts of the emissions from nearby emissions sources by inputting the emissions from the Martin Marietta Materials rock crusher into the modeling, and other off-site emissions sources by adding a representative background concentration of the criteria pollutant to its modeled maximum off-site ground level concentration (GLC_{max}).

26. Vulcan's AQA properly considered any cumulative impacts of emissions from nearby operations, plus other offsite emissions sources.

Issue D: Whether the controls in the proposed permit constitute Best Available Control Technology (BACT)

27. The BACT evaluations for the Plant were conducted using Tier I of the Commission's three-tiered BACT process.

28. In Tier I, controls accepted as BACT in recent permit reviews for the same type of facility are BACT if no new technical developments have occurred that would justify additional controls as economically or technically reasonable.

29. No new technical development has occurred that shows a new emissions control is technically practical and economically reasonable for any of the facilities that comprise the Plant.

30. The emissions controls required by the Draft Permit meet BACT.

31. A BACT review is not required for emissions from quarrying operations and roads.

Issue E: Whether the proposed facility will adversely affect wildlife, vegetation, flora, and fauna

32. Based on Findings of Fact Nos. 22 and 23, the maximum allowable emissions from the Plant will not adversely affect wildlife, vegetation, flora and fauna, or contravene the intent of the Texas Clean Air Act.

Issue F: Whether the proposed operating hours of the rock crusher ensure that there will be no adverse impacts to human health, welfare, and the environment

33. Based on Findings of Fact Nos. 22 and 23, the proposed operating hours of the Plant ensure there will be no adverse impacts to human health, welfare, and the environment.

Issue G: Whether the air quality modeling conducted as part of this application adequately incorporated the local prevailing winds

34. Vulcan's AQA modeling adequately incorporated local prevailing winds.

Issue H: Whether the Applicant complied with TCEQ's public notice requirements related to sign-posting and newspaper notice

35. Based on Findings of Fact Nos. 5 through 9, Vulcan complied with the Commission's public notice requirements related to sign-posting and newspaper notice.

Issue I: Whether the proposed permit contains adequate monitoring and recordkeeping requirements to ensure compliance with all applicable rules and requirements

36. The Draft Permit's monitoring and recordkeeping requirements are adequate to ensure compliance with the permit conditions and all applicable rules.

37. Ambient fenceline monitoring is not required or necessary.

Issue J: Whether emissions from on-site diesel engines are adequately calculated and adequately controlled

38. Emissions from on-site diesel engines were adequately calculated and will be adequately controlled to meet BACT.

Issue K: Whether an adequate site review was conducted for this application

39. The ED conducted an adequate site review for the Application.

Issue L: Whether the background concentrations used in the air dispersion modeling are representative of the proposed location of the plant

40. Vulcan identified ambient air monitors in counties with higher total emissions and higher populations than Comal County, and for each pollutant for which more than one monitor was identified, Vulcan chose as the background concentration the highest concentration from any of those monitors.

41. The background concentrations used in Vulcan's AQA are conservatively representative of ambient concentrations of pollutants at the Plant location.

Issue M: Whether emissions from maintenance, start-up, and shutdown activities are adequately addressed in the proposed permit

42. Based on the prima facie demonstration, the Draft Permit adequately addresses emissions from maintenance, start-up, and shutdown activities.

Issue N: Whether chemical dust suppressant is safe to use as a control for emissions from the proposed plant

43. Based on the prima facie demonstration, the chemical dust suppressant used to control emissions from the Plant will be safe.

Issue O: Whether emissions of silica from the proposed plant will negatively impact human health and welfare

44. The maximum offsite concentrations of crystalline silica from Vulcan's modeling are well below the crystalline silica Effects Screening Level.

45. The Plant's crystalline silica emissions will not negatively impact human health and welfare, or contravene the intent of the Texas Clean Air Act (TCAA).

46. The Plant's crystalline silica emissions would not negatively impact human health and welfare, or contravene the intent of the TCAA, even if the crystalline silica percentage used to calculate the Plant's crystalline silica emissions was 135 times higher.

Issue P: Whether the proposed permit conditions, including emissions limitations, are enforceable

47. The Draft Permit conditions, including emission limitations, are enforceable.

Issue Q: Whether the permit application, and associated air dispersion modeling, included and properly evaluated all applicable emissions

48. The Application properly identified all sources of air emissions that are subject to permitting under the TCAA and Commission rules and the types of emissions associated with the Plant.

49. Vulcan's AQA and modeling properly evaluated the identified emissions sources and types of emissions associated with the Plant.

Issue R: Whether site specific monitoring data should have been used in the air dispersion modeling conducted for this application

50. The use of site-specific monitoring data was not required in Vulcan's AQA because no site-specific ambient air monitoring data was available.

Issue S: Whether the Applicant's compliance history precludes issuance of the draft permit or necessitates additional special conditions in the draft permit

51. Based on the prima facie demonstration, Vulcan's compliance history does not preclude issuance of the Draft Permit or necessitate any additional or revised conditions in the Draft Permit.

Transcript Costs

52. The total cost for recording and transcribing the preliminary hearing, prehearing conference, and the hearing on the merits was $6,084.00.

53. The transcript was required by SOAH's rules, with neither party requesting it.

54. Vulcan, Protestants, the ED, and OPIC all participated in the contested case hearing and benefitted from having a transcript for use in preparing written closing arguments and responses.

55. Transcript costs cannot be assessed against the ED and OPIC because they are statutory parties who are precluded from appealing the decision of the Commission.

56. Vulcan and Protestants were each represented by private attorneys in connection with the contested case hearing.

57. Vulcan and Protestants participated fully in the hearing.

58. Vulcan and Protestants presented testimony and exhibits.

59. Vulcan will benefit from the issuance of the permit and its resources are greater than Protestants.

60. Protestants agreed to pay 50% of the surcharge for an expedited transcript of the hearing on the merits. This amount is $782.60.

61. Protestants should pay $782.60 of the transcript costs, and Vulcan should pay the remaining $5,301.40.

II. CONCLUSIONS OF LAW

1. The Commission has jurisdiction over the emission of air contaminants and the authority to issue a permit under Texas Health and Safety Code §§ 382.011 and .0518 and Texas Water Code § 5.013.

2. The Application was referred to SOAH under Texas Water Code § 5.556.

3. SOAH has jurisdiction to conduct a hearing and to prepare a PFD in contested cases referred by the Commission under Texas Government Code § 2003.047.

4. Notice was provided in accordance with Texas Water Code § 5.5553; Texas Health and Safety Code §§ 382.0516, .0517, and.056; Texas Government Code §§ 2001.051 and .052; and 30 Texas Administrative Code chapter 39.

5. Vulcan properly submitted the Application pursuant to Texas Health and Safety Code §§ 382.0515 and .0518, and 30 Texas Administrative Code §§ 116.110, .111, and .140.

6. The Application is subject to the requirements of Texas Government Code § 2003.047(i-1)-(i-3).

7. The filing of the Application, the Draft Permit, the preliminary decisions issued by the ED, and other supporting documentation in the administrative record of the Application established a prima facie case that: (i) the Draft Permit meets all state and federal legal and technical requirements; and (ii) the permit, if issued consistent with the Draft Permit, would protect human health and safety, the environment, and physical property. Tex. Gov't Code § 2003.047(i-1).

8. A party may rebut the prima facie demonstration by presenting evidence that: (1) relates to an issue directly referred; and (2) demonstrates that one or more provisions in the Draft Permit violates a specifically applicable state or federal requirement. Tex. Gov't Code § 2003.047(i-2); 30 Tex. Admin. Code §§ 80.17(c)(2), .117(c)(3).

9. Applicant retains the burden of proof on the issues regarding the sufficiency of the Application and compliance with the necessary statutory and regulatory requirements. 30 Tex. Admin. Code § 80.17(a).

10. The Commission is to issue a permit for a facility that may emit air contaminants upon finding that: (1) the proposed facility will use at least BACT, considering the technical practicability and economic reasonableness of reducing or eliminating the emissions resulting from the facility; and (2) there is no indication that the emissions from the facility will contravene the intent of the TCAA, including protection of the public's health and physical property. Tex. Health & Safety Code § 382.0518(b).

11. Consistent with Texas Health and Safety Code § 382.0518 and 30 Texas Administrative Code § 116.111(a)(2)(C), the Plant will use BACT, with consideration given to the technical practicability and economic reasonableness of reducing or eliminating emissions from the facilities.

12. Consistent with Texas Health and Safety Code § 382.0518 and 30 Texas Administrative Code § 116.111(a)(2)(A), there is no indication that emissions from the Plant will contravene the intent of the TCAA, including the protection of the public's health and physical property.

13. The special conditions in the Draft Permit are appropriately imposed under 30 Texas Administrative Code § 116.115(c)(1) and are consistent with the TCAA.

14. Vulcan has made all demonstrations required under applicable statutes and regulations, including 30 Texas Administrative Code § 116.111 regarding air permit applications, to be issued an air quality permit with conditions as set out in the Draft Permit.

15. In accordance with Texas Health and Safety Code § 382.0518(b), the Application for Air Quality Permit No. 147392L001 should be granted, under the terms contained in the Draft Permit.

16. No transcript costs may be assessed against the ED or OPIC because the TCEQ's rules prohibit the assessment of any cost to a statutory party who is precluded by law from appealing any ruling, decision, or other act of the Commission. 30 Tex. Admin. Code § 80.23(d)(2).

17. Factors to be considered in assessing transcript costs include: the party who requested the transcript; the financial ability of the party to pay the costs; the extent to which the party participated in the hearing; the relative benefits to the various parties of having a transcript; and any other factor which is relevant to a just and reasonable assessment of the costs. 30 Tex. Admin. Code § 80.23(d)(1).

18. Considering the factors in 30 Texas Administrative Code § 80.23(d)(1), a reasonable assessment of hearing transcript costs against parties to the contested case proceeding is that Protestants should pay $782.60 of the transcript costs, and Vulcan should pay the remaining $5,301.40.

III. EXPLANATION OF CHANGES

The Commission incorporated the correction to Finding of Fact No. 2 recommended by the Applicant and the Executive Director in their exceptions dated September 23, 2019, regarding the address of Vulcan's property on which the plant is to be located. By letter dated October 10, 2019, the ALJs agreed that the recommended correction suggested by the Applicant and the ED should be incorporated into the Proposed Order. Therefore, the Commission adopted that correction to Finding of Fact No. 2, as recommended by the ALJs.

NOW, THEREFORE, BE IT ORDERED BY THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY, IN ACCORDANCE WITH THESE FINDINGS OF FACT AND CONCLUSIONS OF LAW, THAT:

1. The application by Vulcan for Air Quality Permit No. 147392L001 is approved and the attached permit is issued.

2. Protestants shall pay $782.60 of the transcription cost, and Vulcan shall pay the remaining $5,301.40.

3. The Commission adopts the Executive Director's Response to Public Comment in accordance with 30 Texas Administrative Code § 50.117. If there is any conflict between the Commission's Order and the Executive Director's Responses to Public Comments, the Commission's Order prevails.

4. All other motions, requests for entry of specific Findings of Fact or Conclusions of Law, and any other requests for general or specific relief, if not expressly granted herein, are hereby denied.

5. The effective date of this Order is the date the Order is final, as provided by Texas Government Code § 2001.144 and 30 Texas Administrative Code § 80.273.

6. TCEQ's Chief Clerk shall forward a copy of this Order to all parties.

7. If any provision, sentence, clause, or phrase of this Order is for any reason held to be invalid, the invalidity of any provision shall not affect the validity of the remaining portions of this Order.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

[signature]

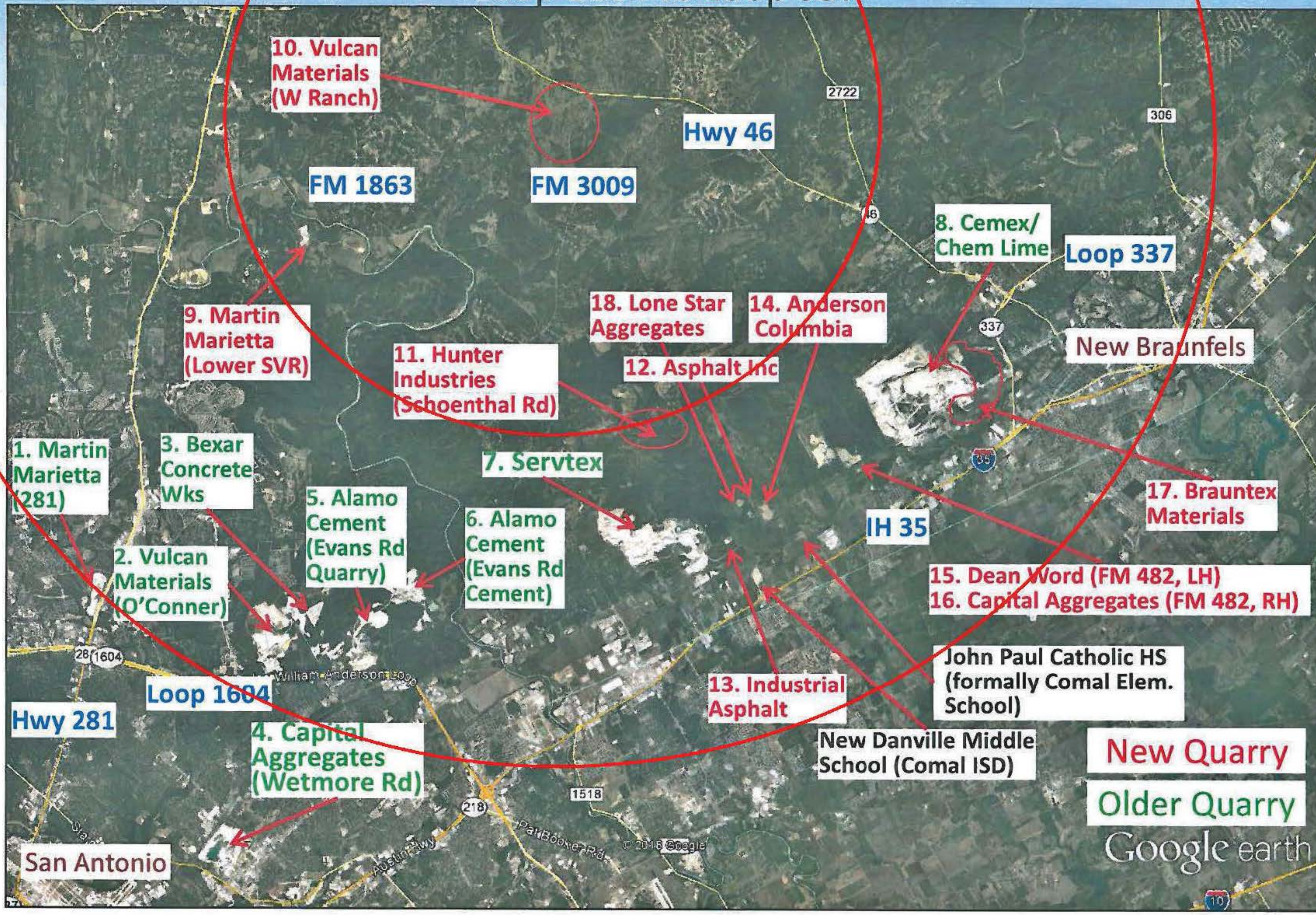
Jon Niermann, Chairman

11-21-19

Date Signed

APPENDIX E

Quarry Row Open-Pit Mines
Loop 1604 to Loop 337

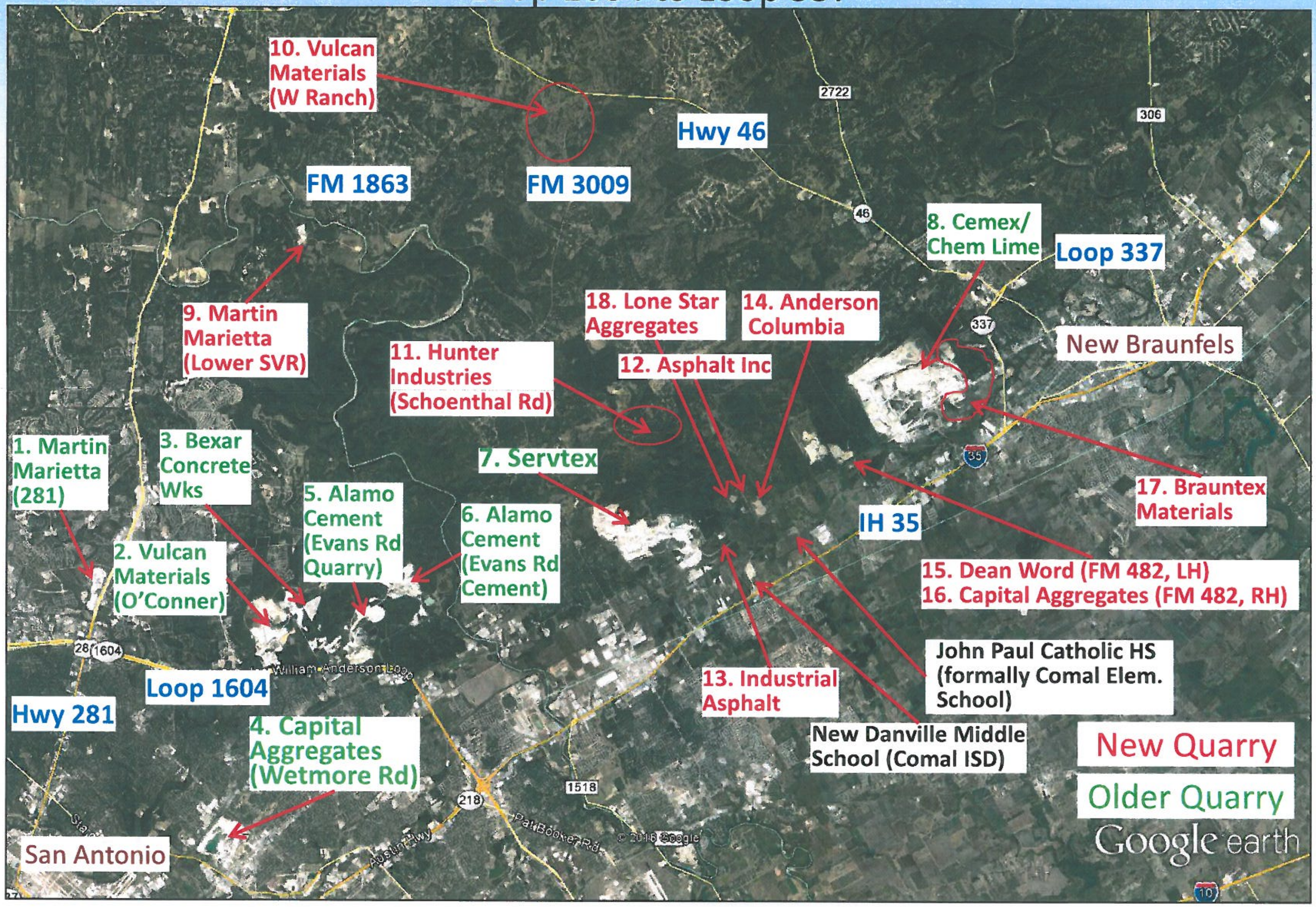


Major Concerns with Rock Quarries and Asphalt Plants 2018 rev 33.pptx

02/12/2019

Exhibit A: Exh. Friends-102 with 10km and 20km radii around Vulcan Site

Quarry Row Open-Pit Mines
Loop 1604 to Loop 337



Major Concerns with Rock Quarries and Asphalt Plants 2018 rev 33.pptx

02/12/2019

Exh. Friends-102

APPENDIX F

Air Quality Modeling Guidelines

APDG 6232

Air Permits Division

Texas Commission on Environmental Quality

April 2015

Table of Contents

Summary of Changes

April 2015:

- Minor updates to text in various sections in relation to comments provided on the Draft Guidelines during the comment period.
- Added in Appendix A – Justifying the Use of the Significant Impact Levels, guidance for justifying the $PM_{2.5}$ SILs for the Increment Analysis.
- Removed Appendix Q – Conducting an Ambient Ozone Impacts Analysis. This appendix is under further review.

Glossary of Acronyms and Symbols

$Actual_{BD}$.	Actual emissions at the applicable minor source baseline date
$Actual_{MD}$.	Actual emissions as of the date of the modeling demonstration
ADMT.	Air Dispersion Modeling Team
AOI.	Area of Impact
APD.	Air Permits Division
AQA.	Air Quality Analysis
AQRV.	Air Quality Related Value
AQS.	Air Quality System
CAMS.	Continuous Ambient Monitor Station
CAS.	Chemical Abstract Service
CFR.	Code of Federal Regulations
EPA.	Environmental Protection Agency
EPN.	Emission Point Number
ESL.	Effects Screening Level
FCAA.	Federal Clean Air Act
FLM.	Federal Land Manager
GAQM.	EPA's Guideline on Air Quality Models
GEP.	Good Engineering Practice
GLC.	Ground-Level Concentration
H.	Structure Height
HGEP.	GEP Stack Height
IRD.	Information Resources Division
L.	Lesser of the structure height or maximum projected width
LULC.	Land-Use/Land-Cover
MSDS.	Material Safety Data Sheet
NAAQS.	National Ambient Air Quality Standard(s)
NSR.	New Source Review
PBR.	Permit By Rule

Glossary of Acronyms and Symbols *(continued)*

PPB	Parts Per Billion
PSD.	Prevention of Significant Deterioration
SIL.	Significant Impact Level
SIP.	State Implementation Plan
SMC.	Significant Monitoring Concentration
SPLD	Single Property Line Designation
TAC.	Texas Administrative Code
TCAA.	Texas Clean Air Act
TCEQ.	Texas Commission on Environmental Quality
TD.	Toxicology Division
THSC.	Texas Health and Safety Code
TPY.	Tons Per Year
USGS.	United States Geological Survey
UTM.	Universal Transverse Mercator

Definitions

The following explanations of terms are included solely for the reader's convenience; they do not take the place of any definition in state or federal laws, rules, or regulations. All section references are to Title 30 of the Texas Administrative Code (TAC) unless specified otherwise.

Air contaminant. Particulate matter, radioactive materials, dust, fumes, gas, mist, smoke, vapor, or odor, including any combination of those items, produced by processes other than natural (Texas Health and Safety Code [THSC] Section 382.003). May also be referred to by staff as *constituent, chemical, compound,* or *pollutant.*

Air dispersion model. A simplification of the physical laws governing the dispersion and transport of contaminants in the atmosphere. The simplification is represented as a set of mathematical equations that require information describing a physical situation before the equations can be solved.

Air pollution. One or more air contaminants in such concentration and of such duration that they could cause injury; adversely affect human health or welfare, animal life, vegetation, or property; or interfere with the normal use and enjoyment of animal life, vegetation, or property (THSC 382.003).

Air Quality Related Value (AQRV). A term used by federal land managers that include visibility, odor, flora, fauna; geological resources; archeological, historical, and other cultural resources; and soil and water resources.

Ambient air. That portion of the atmosphere, external to buildings, to which the general public has access (30 TAC 101.1).

Area of Impact (AOI). All locations where the significant increase in the potential emissions of a pollutant from a new source, or significant net emissions increase from a modification, will cause a de minimis impact (i.e., equal or exceed the applicable de minimis impact level, as shown in 30 TAC 101.1). The highest modeled pollutant concentration for each averaging time is used to determine whether the source will have a de minimis impact for that pollutant.

Attainment area. Any area that meets the national primary or secondary ambient air quality standard for an applicable criteria pollutant.

Background. Air contaminant concentrations present in the ambient air that are not attributed to the source or site being evaluated.

Class I area. An area defined by Congress that is afforded the greatest degree of air quality protection. Class I areas are deemed to have special natural, scenic, or historic value. The Prevention of Significant Deterioration (PSD) regulations provide special protection for Class I areas. Little deterioration of air quality is allowed.

Class II area. An area defined by Congress where a moderate degree of emissions growth is allowed.

Criteria pollutant. A pollutant for which a National Ambient Air Quality Standard (NAAQS) has been defined.

De minimis impact. A change in ground level concentration of an air contaminant as a result of the operation of any new major stationary source or of the operation of any existing source that has undergone a major modification that does not exceed the significance levels as specified in 40 Code of Federal Regulations (CFR) §51.165(b)(2). [30 TAC 101.1].

Effects Screening Level (ESL). Guideline concentrations derived by the Texas Commission on Environmental Quality (TCEQ) and used to evaluate ambient air concentrations of constituents. Based on a constituent's potential to cause adverse health effects, odor nuisances, vegetation effects, or materials damage. Health-based screening levels are set at levels lower than those reported to produce adverse health effects, and are set to protect the general public, including sensitive subgroups such as children, the elderly, or people with existing respiratory conditions. If an air concentration of a constituent is below the screening level, adverse effects are not expected. If an air concentration of a constituent is above the screening level, it is not indicative that an adverse effect will occur, but rather that further evaluation is warranted.

Emission point. Point of constituent emissions release into the air.

Facility. A discrete or identifiable structure, device, item, equipment, or enclosure that constitutes or contains a stationary source, including appurtenances other than emission control equipment. A mine, quarry, well test, or road is not considered to be a facility (30 TAC 116.10). For the purpose of emissions inventory, the term does not refer to the entire site but to individual process units at the site.

Fugitive emission. Any gaseous or particulate contaminant entering the atmosphere that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening designed to direct or control its flow. (30 TAC 101.1).

Greenfield site. An area of agricultural or forest land, or some other undeveloped site earmarked for commercial development or industrial projects.

Ground-Level Concentration (GLC). The concentration, commonly provided in micrograms per cubic meter ($\mu g/m^3$), as predicted by modeling. May also be observed by ambient air monitoring.

Hazardous Air Pollutant (HAP). Any pollutant subject to a standard promulgated under the Federal Clean Air Act (FCAA) section 112 (relating to hazardous air pollutants).

Major. The term *major* may refer to the total emissions at a stationary source or to a specific facility. For PSD review, once a site or project is major for one pollutant, all other pollutant's emissions are compared to significance levels in (30 TAC 116.12(17) and (18)).

- A named major stationary source is any source belonging to a list of 28 source categories in 40 CFR 52.21(b)(1) which emits or has the potential to emit 100 tons per year (tpy) or more of any pollutant regulated by the FCAA.
- A major stationary source is any source not belonging to the 28 named source categories which emits or has the potential to emit such pollutants in amounts of 250 tpy or more.
- A major source is any source that emits 10 tpy or more of any single HAP or 25 tpy or more of any combination of HAPs under FCAA section 112(b).

Major modified stationary source or facility. Used in the context of a PSD or Nonattainment permit application, the phrase *major modified stationary source or facility* refers to a change in operation that results in a significant net increase of emissions for any pollutant for which a NAAQS has been defined. New sources at an existing major stationary source are treated as modifications to the major stationary source. Also, see the definitions of *source* and *facility.*

Major New Source Review (NSR) Program. The major NSR program contained in parts C and D of title I of the FCCA is a preconstruction review and permitting program applicable to new major sources and major modifications at such sources. In areas meeting the NAAQS (*attainment* areas) or for which there is insufficient information to determine whether they meet the NAAQS (*unclassifiable* areas), the NSR requirements under part C of title I of the FCAA apply. The Environmental Protection Agency (EPA) calls this portion of the major NSR program the *Prevention of Significant Deterioration* or PSD program. In areas not meeting the NAAQS, the major NSR program is implemented under the requirements of part D of title I of the FCCA. The EPA calls this program the "nonattainment" major NSR program. The EPA has promulgated rules in 40 CFR 52.21 to implement PSD in portions of the country that do not have approved state or tribal PSD programs.

Major source baseline date. This is the date after which actual emissions associated with physical changes or changes in the method of operation at a major stationary source affect the available increment. Changes in actual emissions occurring at any stationary source after this date contribute to the baseline concentration until the minor source baseline date is established.

Minor. The term *minor* may refer to the total emissions at a stationary source or to a specific facility. To be minor for PSD review, the emissions must be less than 250 tpy. To be minor for Nonattainment review, the emissions must be less than the major source emission thresholds in 30 TAC 116. To be minor for HAPs review, the emissions must be less than 10 tpy for a single HAP or 25 tpy for multiple HAPs (30 TAC 116).

Minor source baseline date. This is the earliest date after the PSD increment *trigger date* on which a PSD application for a new major source or a major modification to an existing source is considered complete. The minor source baseline date is pollutant - and geographically-specific.

Modified stationary source or facility.

- When used in the context of modeling, the phrase *modified stationary source or facility* refers to a change in the location or stack parameters of an emission point, including emission rate.
- When used in the context of a permit application, the phrase *modified stationary source or facility* refers to a physical change in, or change in method of operation, that results in an increase of emissions.

National Ambient Air Quality Standards (NAAQS). Levels of air quality to protect the public health and welfare (40 CFR 50.2). Primary standards are set to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly from the effects of "criteria air pollutants" and certain non-criteria pollutants. Secondary standards are set to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

New facility. A facility for which construction started after August 30, 1971, and no contract for construction was executed on or before August 30, 1971, and that contract specified a beginning construction date on or before February 29, 1972 (30 TAC 116.10).

New source. Any stationary source, the construction or modification of which is started after March 5, 1972 (30 TAC 116.10).

- When used in the context of modeling, the phrase *new source* refers to a proposed emission point.
- When used in the context of a permit application, the term *new source* refers to a stationary source that was constructed or modified after March 5, 1972 (30 TAC 116.10).
- When used in the context of a PSD or Nonattainment permit application, the term *new source* refers to the total proposed emissions for a greenfield site when the increase in emissions will be major. Or, *new source* refers to emissions at a minor stationary source when the increase in emissions will be major.

Nonattainment area. Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for a criteria pollutant.

Project. An operational and/or physical change that may affect air emission rates at a site.

Property. All land under common control or ownership coupled with all improvements on such land, and all fixed or movable objects on such land, or any vessel on the waters of this state (30 TAC 101.1).

PSD Increment. The maximum allowable increase of an air pollutant that is allowed to occur above the applicable baseline concentration for that pollutant.

Receptor. A location where the public could be exposed to an air contaminant in the ambient air. For the health effects evaluation process, receptors are classified as industrial or non-industrial.

- Industrial. A receptor relating to the manufacturing of products or handling of raw materials or finished products without any associated retail product sales on property.
- Non-industrial. A receptor type such as residential, recreational, commercial, business, agricultural, or a school, hospital, day-care center, or church. Other types include rights-of-way, waterways, or the like. In addition, receptors in unzoned or undeveloped areas may be treated as non-industrial.

Refined model. An analytical technique that provides a detailed treatment of physical and chemical atmospheric processes and requires detailed and precise input data. Specialized estimates are calculated that are useful for evaluating source impact relative to air quality standards and allowable increments. The estimates are more representative than those obtained from conservative screening techniques.

Screening technique. A relatively simple analysis technique to determine whether a given source is likely to pose a threat to air quality. Concentration estimates from screening techniques are conservative.

Significant Monitoring Concentration (SMC). A de minimis level of impact that the EPA has concluded does not justify collecting pre-construction monitoring data for purposes of an air quality analysis.

Site. The area that encompasses all emission sources of constituents. Includes all facilities and other emission sources associated with the regulatory entity number (30 TAC 122.10).

Site-wide modeling. Modeling (refined or screening) of *all* emission points on a contiguous property or associated with the regulatory entity number. Emissions from all authorization types except de minimis are included: permit by rule, standard permit and new source review permit.

Source.

- A point of origin of air contaminants, whether privately or publicly owned or operated (30 TAC 116.10). Upon request of a source owner, the executive director shall determine whether multiple processes emitting air contaminants from a single point of emission will be treated as a single source or as multiple sources (30 TAC 101.1).
- For PSD and Nonattainment permit applications, *source* may refer to all emission points on a site or to a facility.
- When used in the context of modeling, the term *source* refers to the release point, volume, or area of emissions.

Stationary source.

- When used in the context of modeling, the term *stationary source* refers to emission points that are fixed and not mobile. For example, exhaust from a stack or baghouse is from a fixed point, and exhaust from a car is from a mobile source because the exhaust moves as the car does.
- When used in the context of PSD and Nonattainment permit applications, the term *stationary source* refers to any building, structure, facility, or installation that emits or may emit any air pollutant subject to regulation under the FCAA (30 TAC 116.12).
- Also see *modified stationary source or facility* and *major modified stationary source or facility.*

Trigger date. This is the date after which the PSD increment minor source baseline date may be established.

Unclassifiable area. Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

Universal Transverse Mercator projection (UTM). UTM is a widely used map projection that employs a series of identical projections around the world in the mid-latitude areas, each spanning six degrees of longitude and oriented to a meridian. This projection preserves angular relationships and scale plus it easily allows a rectangular grid to be superimposed on it. Many worldwide topographic and planimetric maps at scales ranging between 1:24,000 and 1:250,000 use this projection.

Section I – Introduction

The Texas Commission on Environmental Quality (TCEQ or commission) manages air quality in the state of Texas by regulating the release of air contaminants through the Texas Clean Air Act (TCAA), located in Chapter 382 of the Texas Health and Safety Code

(THSC), develops rules, including those in Title 30 of the Texas Administrative Code (TAC), and implements provisions of the Federal Clean Air Act (FCAA) and Code of Federal Regulations (CFR).

Applications for projects subject to air quality impacts analyses are those with new and/or modified facilities or sources of emissions of air contaminants. The applicant must fully document the basis for air quality impact analysis determinations as it is the applicant's responsibility to demonstrate that the permit should be issued.

This document provides permit reviewers and air dispersion modeling staff with a process to evaluate and determine air quality impacts analysis requirements for case-by-case permit reviews for new and/or modified facilities. While the focus of the document is on the technical review process, it is available to the regulated community and the public to provide an understanding of air quality impacts analysis requirements and processes that affect air permit applications.

During the course of the technical review of an air permit application, the permit reviewer and air dispersion modeling staff evaluate air quality impacts analysis requirements and confirm that the applicant has conducted an appropriate air quality impacts analysis and properly determined off-property impacts for the project facilities and associated sources. The applicant's air quality impacts analysis, along with the permit reviewer and air dispersion modeling staff's evaluation and final recommendation, provide a record that demonstrates that the operation of a proposed facility will not cause or contribute to a condition of air pollution and will comply with all applicable federal and state rules and regulations, as well as with the intent of the TCAA.

While this document provides a general process and defines minimum criteria for agency staff's consideration of air quality impacts analysis requirements, this document is not regulatory and does not limit the permit reviewer's ability to require the applicant to provide additional information. This additional information could be related to comments received during the public notice or meeting process, coordination with U.S. Environmental Protection Agency (EPA) or TCEQ staff on known areas of interest, or issues related to off-property impacts (protection of public health). Permit reviewers and air dispersion modeling staff may deviate from this guidance with approval from their supervisors or from the Air Permits Division (APD) director.

Be aware that there are often differences in term usage and term definitions between the state and federal regulatory agencies. Please refer to "Glossary of Acronyms and Symbols" and "Definitions" for additional clarification.

This document replaces Air Dispersion Modeling Guidelines, RG-25, February 1999.

Section II – Authority for Requesting Air Quality Impacts Analyses

The policy of the state of Texas and the purpose of the TCAA is "to safeguard the state's air resources from pollution by controlling or abating air pollution and emissions of air contaminants, consistent with the protection of public health, general welfare, and physical property, including the esthetic enjoyment of air resources by the public and the maintenance of adequate visibility" (THSC 382.002(A)).

The TCEQ receives its authority for an air quality impacts analysis review through the TCAA and the FCAA. The TCAA requires air permit authorizations for new and/or modified facilities, including a demonstration that the operation of a proposed facility will not cause or contribute to a condition of air pollution and comply with federal requirements under the FCAA.

Under 30 TAC 116.111, all construction permits and amendments for facilities require an air quality impacts analysis. In addition, each proposed new major source or major modification in an attainment or unclassifiable area shall comply with 30 TAC 116.160.

The EPA has approved the Texas State Implementation Plan (SIP), making the TCEQ the permitting authority for regulation of air emissions generated in the state of Texas. The Texas SIP, which is federally enforceable, includes Texas' New Source Review (NSR) permitting programs for both major and minor sources, and these programs implement both the FCAA and the TCAA. The required permits are commonly referred to as "construction," "case-by-case," or "NSR" permits and must be issued prior to construction. Facilities must, at a minimum, comply with TCAA requirements. Additional requirements apply if a facility is subject to the permitting programs established in the FCAA.

Facilities must meet all applicable state rules and federal regulations to receive any state or federal air authorization. The applicant must address each of the air quality rules and regulations for applicability and explain the basis for expected compliance. If any particular rule or regulation is not applicable, the applicant must provide the basis for non-applicability.

Section III – Air Quality Analysis

An applicant must demonstrate that the proposed operation, as represented in the air permit application, would not cause or contribute to a National Ambient Air Quality Standard (NAAQS) or Prevention of Significant Deterioration (PSD) Increment violation and would be protective of public health, general welfare, and physical property. This demonstration is commonly referred to as a protectiveness or impacts review or evaluation. An air quality analysis (AQA) is the means for the applicant to make the demonstration. The AQA is an evaluation of the potential impact on the environment associated with increased emissions from a new and/or modified facility and can contain a combination of air dispersion modeling and ambient air monitoring data. Additional analyses required by federal rule would also be included in the AQA.

The AQA is a stand-alone report. Results from the report should be sufficient for staff to evaluate the impact of the proposed operation without input from other reports. Staff should not refer to other documents or reports for data required to be in the report. In addition, applicants should not exclude items normally required without coordination with the Air Dispersion Modeling Team (ADMT), unless the items are clearly not applicable to the project.

Air Dispersion Modeling

As stated above, an AQA may include air dispersion modeling (30 TAC 116.111(J)). Air dispersion models are tools to approximate concentrations from one or more facilities or sources of air contaminants. When an air contaminant is emitted into the atmosphere, it is transported and dispersed by various atmospheric processes. Algorithms and equations have been developed to approximate (model) these atmospheric processes and have been incorporated into various computer codes (computer models). Agency staff use the results from these computer models in their review of air permit applications. A modeled prediction alone does not mean that there will be a condition of air pollution, but it is one of many indicators that agency staff considers in the air permit application review process. However, a modeled prediction exceeding a standard or guideline value may be used as the basis to modify proposed/existing allowable emission rates, stack parameters, or operating conditions in order to demonstrate that the predicted impact from the operation is acceptable.

Ambient Air Monitoring

Occasionally, modeled predictions may not clearly indicate whether emissions from a site or individual facility could cause or contribute to a condition of air pollution. In those cases, the use of ambient air monitoring data in the technical review process may be an option to supplement modeled predictions. With few exceptions, the monitoring demonstration must be conducted before a permit is issued to ensure that permit conditions and allowable emissions are protective.

An ambient air monitor captures a sample of air from the atmosphere. The sample is then analyzed to determine the amount (concentration) of air contaminants contained in the sample. The sample can be automatically analyzed at the monitor location (continuous ambient monitor station or CAMS) or taken to a laboratory to be analyzed (canister or filter sample).

The air contaminants contained in a sample from an ambient air monitor come from air contaminant sources that are upwind of the monitor location, both manmade and natural. Some air contaminant sources may be immediately upwind, such as a combustion engine exhaust stack, or thousands of miles away, such as the Sahara Desert. The farther the upwind distance from the monitor, the longer the transport time from the source to the monitor, and the more the contaminants are dispersed before reaching the monitor.

Ambient air monitoring is used to give an idea of what the air quality is at a specific location during a specific time period. Many samples over an extended period of time from many locations in proximity to each other can provide a reasonable estimate of the air quality over a region.

Air Quality Analysis Process

The AQA process may involve a number of agency staff, depending on the complexity of the application and the potential impact of the proposed facilities or sources on air quality. The permit reviewer determines the scope of the AQA to be performed by the applicant and involvement of other agency staff. Therefore, the applicant should contact the permit reviewer for guidance before involving other agency staff in the AQA process.

For all minor NSR AQAs, management recommends that a modeling protocol be submitted or a guidance meeting be held detailing the proposed approach to demonstrate compliance with all applicable requirements. For all federal AQAs, a modeling protocol is required, and a copy of the modeling protocol must be sent to EPA Region 6. A modeling protocol or guidance meeting should include as many details, specifics, and support documents as applicable. Ideally, the AQA modeling protocol or guidance meeting minutes would be identical to the final AQA report without any modeling results. When setting up a guidance meeting, the applicant should provide as much detail to agency staff before the meeting to allow sufficient time for staff to prepare for the meeting.

Next, the applicant prepares and submits an AQA to the agency as part of an air permit application. Frequently, the permit reviewer requests that the ADMT conduct a technical review, or audit, of an AQA. The purpose of the review is to evaluate the technical quality of the AQA to ensure the information and results can be used by agency staff in the technical review process. A key part of the review is ADMT's assessment that the predicted concentrations represent potential impacts and demonstrate compliance with federal and state regulations.

If the ADMT staff finds errors and/or discrepancies during the review, they evaluate the errors and/or discrepancies to determine whether they would cause a significant change in the magnitude or location of predicted concentrations. That is, whether the predicted concentrations would still be representative and usable by agency staff to determine whether the permit should be issued. The ADMT should work closely with the permit reviewer and the applicant's modeler to resolve omissions, unclear documentation, or other deficiencies.

If the ADMT cannot resolve a modeling-related deficiency, then the modeling submittal is not accepted, and the ADMT forwards recommended corrective actions to the permit reviewer. Then, the permit reviewer contacts the applicant to provide the deficiencies and schedule to resolve them.

Section IV – Conducting the Air Quality Analysis

The AQA is an evaluation of the impact on the environment associated with increased emissions from a new and/or modified facility and is usually based on the predicted concentrations obtained through modeling. There are two levels of modeling used in the AQA process: screening and refined. Modeling results from either level, as appropriate, may be used to demonstrate compliance with standards or guidelines.

Screening Modeling

The first level of modeling involves the use of screening procedures or models. Screening models use simple algorithms and conservative techniques to indicate whether more detailed modeling is necessary.

Screening models are usually designed to evaluate a single source. Multiple sources can be modeled individually. The maximum predicted concentration from each source is then summed for an overall estimate of the maximum predicted concentration. This technique is conservative since the predicted concentrations from each source are added without regard to time and space.

Refined Modeling

The second level of modeling, refined modeling, requires more detailed and precise input data and more complex models in order to provide refined concentration estimates.

The permit reviewer may determine that refined modeling is necessary if the screening analysis indicates that the predicted concentrations from the evaluated sources could exceed a standard, a guideline (such as an effects screening level), a de minimis level, or an agency staff-identified percentage of a standard or guideline.

Modeling Emissions Inventory

The modeling emissions inventory consists of the emissions from facilities to be permitted, as well as other applicable on- and off-property emissions. These emissions are identified by emission point numbers (EPNs) but are usually referred to as sources in air dispersion modeling guidance documents.

Preliminary Impact Determination

It is important to understand that individual facilities may be subject to different requirements depending on the contaminants and proposed emission rates of each facility. There are two general categories of permits: major NSR and minor NSR. The major NSR permit is often referred to as a federal or PSD permit. A PSD permit can be issued for criteria pollutants (those with NAAQS and PSD increments) and selected non-criteria pollutants (those with significant emission rates but no NAAQS).

Technically, all TCEQ permits are federal in that the state must implement a minor NSR permitting program to ensure the NAAQS and increments are attained. The AQAs for major NSR and minor NSR permits begin with a preliminary impact determination. The purpose of a preliminary impact determination is to determine whether a new and/or modified facility, or a combination of the two, could cause a significant off-property impact. Either screening or refined modeling can be used as appropriate. Below are general steps for identifying emissions to include in the preliminary impact determination.

Step 1: Identify All Sources of Emissions. Include emissions from all new and/or modified facilities associated with the project.

Step 2: Determine Whether There Is a Net Emissions Increase. Determination of the project emissions may vary depending on the type of permit (minor NSR or major NSR). The determination of the level of federal applicability is the first step in the technical review process and is performed by the permit reviewer. The federal applicability process determines whether a project is minor or major. While the steps of the modeling process are consistent, requirements vary based on the type of permit and contaminant.

Note that the discussion below in terms of actual emissions refers to emissions used in modeling (the two years before the modeling demonstration) and may not be the same as that used in the federal applicability process.

Minor NSR: The permit reviewer evaluates proposed allowable emissions from new facilities and allowable emissions increases and decreases from existing facilities directly associated with the permit application or project.

Major NSR: The permit reviewer evaluates proposed allowable emissions from new facilities and emissions increases and decreases at any facility site-wide over a contemporaneous period (minimum five-year period).

Step 3: Evaluate Modifications to Existing Sources at the Site. Carry out this step even if there is no net increase in emissions. For both minor and major NSR modeling, include these sources in the preliminary impact determination if there is a change in operating hours or stack parameters, and previous modeling demonstrations were limited to those operating hours or stack parameters. That is, the permit was based on those limits.

Step 4: Develop the Emission Inventory for the Site. In general, the statements below are valid; however, the applicant should consult with the permit reviewer to verify that the appropriate emission rates were developed.

New Facility:

> Minor NSR: The emission rate is the proposed allowable emission rate.
>
> Major NSR: The emission rate is the proposed allowable emission rate.

Modified Facility:

Minor NSR: The emission rate is the difference between the proposed allowable emission rate and the current allowable emission rate.

For modified facilities that have not had a change in location or source parameters, this emission rate is the difference between the proposed allowable emission rate and the current allowable emission rate. For modified facilities that have a proposed change in location or source parameters, model the current allowable emission rates as a negative value with the current location and source parameters and the proposed allowable emission rates with the proposed location and source parameters. Include facilities that will be shut down permanently, not operating, or operating at a reduced rate as represented in the air permit application. These representations will be incorporated as enforceable permit limits.

Major NSR: The emission rate is the difference between the proposed allowable emission rate and the actual emission rate.

For modified facilities that have not had a change in location or source parameters, this emission rate is the difference between the proposed allowable emission rate and the actual emission rate. For modified facilities that have a proposed change in location or source parameters, model the actual emission rates as a negative value with the current location and source parameters and the proposed allowable emission rates with the proposed location and source parameters. Include facilities that will be shut down permanently, not operating, or operating at a reduced rate as represented in the air permit application. These representations will be incorporated as enforceable permit limits.

If the applicant has data on actual short-term emission rates, then these data can be used to determine representative short-term emission rates over the appropriate averaging time period. If these data are not available, the short-term emission rates can be derived from the actual annual emission rates. Using the derived short-term emission rates may result in larger emission rates to model, which is a reasonable approach.

Carry out the preliminary impact determination modeling as indicated for the applicable modeling analysis discussed below.

Minor NSR

When a project does not trigger major NSR review or emits an air contaminant not subject to major NSR review, the minor NSR air quality analysis consists of the following elements and modeling as applicable:

- NAAQS analysis;
- State Property Line Standard analysis; and
- Health Effects analysis. Also known as effects screening level (ESL) analysis and includes consideration of welfare effects.

Minor NAAQS Analysis

The purpose of the Minor NAAQS analysis is to demonstrate that proposed emissions of criteria pollutants from a new facility or from a modification of an existing facility that does not trigger PSD review will not cause or contribute to an exceedance of the NAAQS. The demonstration may consist of both air dispersion modeling predictions and ambient air monitoring data. The person conducting the modeling should follow the basic procedure described in the following paragraphs.

Minor NAAQS Step 1: Conduct a preliminary impact determination to predict whether the proposed source(s) could make a significant impact on existing air quality. That is, the model predicts concentrations at one or more receptors in the modeling grid greater than or equal to a NAAQS de minimis level (note for this document, the term de minimis and the phrase significant impact level (SIL) are synonymous). It should be noted that the U.S. Court of Appeals vacated and remanded 40 CFR 51.166(k)(2) and 52.21(k)(2) based on EPA's lack of authority to exempt sources from the requirements of the FCAA when it established SILs for $PM_{2.5}$. Because of the court decision, an analysis will need to be conducted in order to justify the use of the SILs. Refer to Appendix A for additional guidance on justifying the use of the SILs.

- Model all new and/or modified sources. Compare the predicted high concentration at or beyond the property line for each criteria pollutant and each averaging time to the appropriate NAAQS de minimis level in Appendix B. The predicted high concentration may be related to the form of the NAAQS (exceedance- or statistically-based) and the number of years of meteorological data used.
- If the sources do not make a significant impact for a pollutant of concern, the demonstration is complete. If there is a significant impact, then the significant receptors define an area of impact (AOI), and a full NAAQS analysis is required. Go to Step 2.

Minor NAAQS Step 2: Determine the AOI for each criteria pollutant and averaging period subject to the NAAQS analysis.

- The AOI is the set of receptors that have predicted concentrations at or greater than the de minimis level for each applicable averaging time and criteria pollutant.
- The full NAAQS analysis is carried out for each criteria pollutant and averaging time separately and need only include the AOI for the associated criteria pollutant and averaging time combination.

Minor NAAQS Step 3: Off-property sources will need to be evaluated. One method is to obtain a listing of applicable sources and associated parameters from the TCEQ to evaluate in the AQA. The Information Resources Division (IRD) should be contacted to request this listing. It is the responsibility of the person conducting the modeling to obtain these data and ensure their accuracy. Any changes made to the data must be documented and justified. In addition, if the person conducting the modeling is aware of source data not provided by the IRD, such as recently issued permitted facilities or applicable facilities in other states within the distance limits of the model, the data should be included as applicable. Refer to Appendix C for additional guidance for requesting data from the IRD.

Minor NAAQS Step 4: Determine predicted concentrations over the AOI from all obtained sources and sources to be permitted using the same meteorological data set used in the preliminary impact determination modeling. Model allowable emission rates for all sources that emit the criteria pollutant. Use a certified limit for PBR authorizations. For PBRs without a certified limit, use an estimate of allowable emissions based on actual emissions. Use allowable emissions for standard permit authorizations.

Minor NAAQS Step 5: Determine a representative monitored background concentration. As defined by the EPA, background air quality includes pollutant concentrations due to natural sources, nearby sources other than the one(s) under consideration, and unidentified sources. Refer to Appendix D for additional guidance on determining a representative monitored background concentration.

Minor NAAQS Step 6: Compare the predicted concentration plus representative monitored background concentration for each criteria pollutant and averaging time to the appropriate NAAQS (Appendix B). If the maximum concentrations are at or below the NAAQS, the demonstration is complete. If not, review the demonstration for conservatism and determine if any refinements can be made, or demonstrate that the project's impact will not be significant.

Refer to Appendix E for additional guidance on conducting the Minor NAAQS analysis.

State Property Line Standard Analysis

The purpose of the state property line standard analysis is to demonstrate compliance with state standards for net ground-level concentrations. This analysis must demonstrate that resulting air concentrations from all on-property facilities and sources that emit the regulated pollutant will not exceed the applicable standard.

Although all on-property facilities should be evaluated, in many cases the proposed emissions or changes in emissions may not be substantial when compared to the total emissions from the site. The person conducting the modeling should follow the basic procedure described in the following paragraphs.

State Property Line Step 1: Conduct a preliminary impact determination by modeling the allowable emission rates for all new and/or modified facilities that emit the applicable contaminant.

- For new sources with no other sources on site. If the predicted high concentration is equal to or less than the standard, the demonstration is complete.
- For new and modified or only modified sources at the site. If the predicted high concentration is less than two percent of the standard, technical justification for demonstrating compliance may require additional information such as project emissions increases, total site emissions, results from previous site-wide modeling, or ambient air monitoring data. Refer to Appendix F for further discussion to determine if site-wide modeling is needed.
- If the predicted high concentration is equal to or greater than two percent of the standard, coordinate with the permit reviewer to determine if site-wide modeling is needed. Staff will consider factors such as project emissions increases, total site emissions, results from previous site-wide modeling, or ambient air monitoring data. Refer to Appendix F for further discussion to determine if site-wide modeling is needed. If site-wide modeling is required, go to Step 2.

State Property Line Step 2: Model the allowable emission rates for all sources on the property that emit the contaminant. Use a certified limit for PBR authorizations. For PBRs without a certified limit, use an estimate of allowable emissions based on actual emissions. Use allowable emissions for standard permit authorizations. Compare the predicted high concentration to the applicable state standard (see Appendix B).

- If the predicted high concentration is less than or equal to the standard, the demonstration is complete.
- If the predicted high concentration is greater than the standard, review the demonstration for conservatism and determine if any refinements can be made.

Refer to Appendix F for additional guidance on conducting the State Property Line Standard analysis.

Health Effects Analysis

The purpose of the Health Effects analysis is to demonstrate that emissions of non-criteria pollutants from a new facility or from a modification of an existing facility will be protective of the public's health and welfare.

Agency toxicologists use the results from the Health Effects analysis to evaluate the effects of emissions on a contaminant-by-contaminant basis. The objectives of the analysis are to:

- establish off-property ground-level concentrations (GLCs) of contaminants resulting from proposed and/or existing emissions, and
- evaluate these GLCs for their potential to cause adverse health or welfare effects.

Toxicology Division (TD) staff compare the GLC to an effects screening level (ESL). An ESL is a guideline, and not a standard. This format provides the flexibility required to easily revise the value to incorporate the newest toxicity data. Consult with the TD to ensure that the most recent ESL list is used, to obtain additional information concerning the basis for ESLs, or to obtain ESLs for contaminants not on the published list. For contaminants not on the published list, provide the chemical abstract service (CAS) registry number and a material safety data sheet (MSDS) to the TD staff so that they can positively identify the contaminant and derive an ESL.

Refer to Appendix G for additional guidance on conducting the Health Effects analysis.

PSD Air Quality Analysis

The PSD program applies when a major source, that is located in an area that is designated as attainment or unclassifiable for any criteria pollutant, is constructed and/or undergoes a major modification. The PSD program also applies to select non-criteria pollutants. The air quality analysis consists of the following elements:

- PSD NAAQS analysis;
- PSD pre-application analysis;
- PSD increment analysis;
- Additional impacts analysis; and
- Class I area analysis.

PSD NAAQS Analysis

The purpose of the PSD NAAQS analysis is to demonstrate that emissions of criteria pollutants from a new major source or major modification of an existing source will not cause or contribute to an exceedance of the NAAQS. The demonstration may consist of both air dispersion modeling predictions and ambient air monitoring data. The person conducting the modeling should follow the basic procedure described in the following paragraphs.

PSD NAAQS Step 1: Conduct a preliminary impact determination to predict whether the proposed source(s) could make a significant impact on existing air quality. That is, the model predicts concentrations at one or more receptors in the modeling grid greater than or equal to a NAAQS de minimis level (note for this document, the term de minimis and the phrase SIL are synonymous). It should be noted that the U.S. Court of Appeals vacated and remanded 40 CFR 51.166(k)(2) and 52.21(k)(2) based on EPA's lack of authority to exempt sources from the requirements of the FCAA when it established SILs for $PM_{2.5}$. Because of the court decision, an analysis will need to be conducted in order to justify the use of the SILs. Refer to Appendix A for additional guidance on justifying the use of the SILs.

- Model all new and/or modified sources. Compare the predicted high concentration at or beyond the fence line for each criteria pollutant and each averaging time to the appropriate NAAQS de minimis level in Appendix B. The predicted high concentration may be related to the form of the NAAQS (exceedance - or statistically-based) and the number of years of meteorological data used.

- If the sources do not make a significant impact for a criteria pollutant of concern, the demonstration is complete. If there is a significant impact, then an AOI is defined, and a full NAAQS analysis is required. Go to Step 2.

PSD NAAQS Step 2: Determine the AOI for each criteria pollutant and averaging period subject to the NAAQS analysis.

- The AOI is the set of receptors that have predicted concentrations at or greater than the de minimis level for each applicable averaging time and criteria pollutant.
- The full NAAQS analysis is carried out for each criteria pollutant and averaging time separately and need only include the AOI for the associated criteria pollutant and averaging time combination.

PSD NAAQS Step 3: Off-property sources will need to be evaluated. One method is to obtain a listing of applicable sources and associated parameters from the TCEQ to evaluate in the AQA. The IRD should be contacted to request this listing. It is the responsibility of the person conducting the modeling to obtain these data and ensure their accuracy. Any changes made to the data must be documented and justified. In addition, if the person conducting the modeling is aware of source data not provided by the IRD, such as recently issued permitted facilities or applicable facilities in other states within the distance limits of the model, the data should be included as applicable. Refer to Appendix C for additional guidance for requesting data from the IRD.

PSD NAAQS Step 4: Determine predicted concentrations over the AOI from all obtained sources and sources to be permitted using the same meteorological data set used in the preliminary impact determination modeling. Model allowable emission rates for all sources that emit the regulated criteria pollutant. Use a certified limit for PBR authorizations. For PBRs without a certified limit, use an estimate of allowable emissions based on actual emissions. Use allowable emissions for standard permit authorizations.

PSD NAAQS Step 5: Determine a representative monitored background concentration. As defined by the EPA, background air quality includes pollutant concentrations due to natural sources, nearby sources other than the one(s) under consideration, and unidentified sources. Refer to Appendix D for additional guidance on determining a representative monitored background concentration.

PSD NAAQS Step 6: Compare the predicted concentration plus representative monitored background concentration for each criteria pollutant and averaging time to the appropriate NAAQS (Appendix B). If the maximum concentrations are at or below the NAAQS, the demonstration is complete. If not, review the demonstration for conservatism and determine if any refinements can be made, or demonstrate that the project's impact will not be significant.

Refer to Appendix E for additional guidance on conducting the PSD NAAQS analysis.

PSD Pre-application Analysis

The purpose of the PSD pre-application analysis is to provide an analysis of the existing ambient air quality in the area that the major source or major modification would affect. The analysis must be based on continuous air quality monitoring data. The person conducting the analysis should follow the basic procedure described in the following paragraphs. Note that pre-construction and/or post-construction monitoring could be required by the TCEQ.

PSD Pre-application Step 1: Compare the predicted high concentration obtained from the applicable preliminary impact determination to the significant monitoring concentration (SMC) in Appendix B.

- For criteria pollutants, compare the predicted high concentrations obtained from the NAAQS preliminary impact determination modeling demonstration to the SMC for the pollutant of interest. If the maximum concentration is less than the SMC, the demonstration is complete. If the maximum concentration equals or exceeds the SMC, go to Step 2.
- For non-criteria pollutants, use the preliminary impact determination results from the appropriate minor NSR modeling demonstration. If the maximum concentration is less than the SMC, the demonstration is complete. If the maximum concentration equals or exceeds the SMC, go to Step 2.

PSD Pre-application Step 2: Provide an analysis of the ambient air quality in the area that the project emissions would affect for all applicable averaging periods.

- For criteria pollutants, collect representative monitoring background concentrations to establish the existing air quality for the area that the project emissions would affect. Refer to Appendix D for additional guidance on determining representative monitoring background concentrations.
- For non-criteria pollutants, site-wide modeling from the minor NSR modeling demonstration may be sufficient for the pre-application analysis.

  If existing monitoring data are not available, or are judged not to be representative or conservative, go to Step 3.

PSD Pre-application Step 3: Establish a site-specific monitoring network. The applicant should coordinate with the permit reviewer for determining the scope of monitoring and for assistance in the preparation of a monitoring quality assurance plan.

Refer to Appendix H for additional guidance on conducting the PSD Pre-application analysis.

PSD Increment Analysis

The purpose of the PSD increment analysis is to demonstrate that emissions of applicable criteria pollutants from a new major source or major modification of an existing source will not cause or contribute to an exceedance of an increment. The PSD increment is the maximum allowable increase in concentration that is allowed to occur above a baseline concentration for a pollutant. The person conducting the modeling should follow the basic procedure described in the following paragraphs. The following discussion introduces and explains several terms that are specific to PSD increment analyses followed by the basic procedure for conducting the analysis.

Baseline and Trigger Dates. There are several dates that are used in the increment analysis:

- *Major source baseline date.* This is the date after which actual emissions associated with physical changes or changes in the method of operation at a major stationary source affect the available increment. Changes in actual emissions occurring at any stationary source after this date contribute to the baseline concentration until the minor source baseline date is established. After the minor source baseline date, new and modified major and minor stationary sources in the baseline area consume increment.
- *Trigger date.* This is the date after which the minor source baseline date may be established.
- *Minor source baseline date.* This is the earliest date after the trigger date on which a PSD application for a new major source or a major modification to an existing source is considered complete. The minor source baseline date is pollutant and geographically specific.

Baseline area. The baseline area is established for each applicable pollutant's minor source baseline date by the submission of a complete PSD application and subsequent source impact analysis. The extent of a baseline area is limited to intrastate areas and includes all portions of the attainment or unclassifiable area in which the PSD applicant would propose to locate, as well as any attainment or unclassifiable area in which the proposed emissions would have a significant ambient impact for the annual averaging period.

Baseline concentration. The ambient concentration level that existed in the baseline area at the time of the applicable minor source baseline date. The baseline concentration is the reference point for determining air quality deterioration in an area. The baseline concentration level is not based on ambient monitoring because ambient measurements reflect emissions from all sources, including those that should be excluded from the measurements.

Increment calculation. The baseline concentration does not need to be obtained to determine the amount of PSD increment consumed or the amount of increment available. Instead, the amount of PSD increment that has been consumed in an attainment or unclassified area is determined from the emissions increases and decreases that have occurred from stationary sources in operation since the applicable minor source baseline date. Modeled increment consumption calculations reflect the change in ambient pollutant concentration attributable to increment-affecting emissions. Increment consumption (or expansion) calculations are determined by evaluating the difference between the actual emissions at the applicable minor source baseline date ($Actual_{BD}$) and actual emissions as of the date of the modeling demonstration ($Actual_{MD}$).

- *$Actual_{BD}$*. This is the representative 2-year average for long-term emission rates, or the maximum short-term emission rate in the same 2-year period immediately before the applicable minor source baseline date. For major sources permitted at or after the applicable major source baseline date but not in operation as of the applicable minor source baseline date or for minor sources not in operation as of the applicable minor source baseline date, $Actual_{BD}$ would be the permit allowable emission rate.
- *$Actual_{MD}$*. This is the most recent, representative 2-year average for long-term emissions rates, or the maximum short-term emission rate in the same 2-year period immediately before the modeling demonstration. If little or no operating data are available, as in the case of permitted sources not yet in operation at the time of the increment analysis, $Actual_{MD}$ would be the permit allowable emission rate.

A tiered approach is suggested for this analysis to limit the amount of research needed to determine actual emission rates. The person conducting the modeling should follow the basic procedure described in the following paragraphs.

PSD Increment Step 1: Determine whether the predicted high concentration (excluding background concentration) obtained in the PSD full NAAQS analysis is equal to or less than the applicable increment. If yes, the demonstration is complete because all sources were modeled at allowable emission rates. If not, go to Step 2. Step 1 does not apply for criteria pollutants with NAAQS that are statistically-based (i.e., multi-year average).

PSD Increment Step 2: Determine the AOI for each criteria pollutant and averaging period subject to the PSD increment analysis. The AOI will be the same one used in the PSD NAAQS analysis, except for those criteria pollutants with NAAQS that are statistically-based. For criteria pollutants with NAAQS that are statistically-based, determine the AOI following the convention of exceedance-based NAAQS (i.e., maximum predicted concentration). It should be noted that the U.S. Court of Appeals vacated and remanded 40 CFR 51.166(k)(2) and 52.21(k)(2) based on EPA's lack of authority to exempt sources from the requirements of the FCAA when it established SILs for $PM_{2.5}$. Because of the court decision, an analysis will need to be conducted in order to justify the use of the SILs. Refer to Appendix A for additional guidance on justifying the use of the SILs.

PSD Increment Step 3: Obtain a listing of applicable increment-affecting sources and associated parameters from the TCEQ to evaluate in the AQA. The IRD should be contacted to request this listing. It is the responsibility of the person conducting the modeling to obtain these data and ensure their accuracy. Any changes made to the data must be documented and justified. In addition, if the person conducting the modeling is aware of source data not provided by the IRD, such as recently issued permitted facilities or applicable facilities in other states within the distance limits of the model, the data should be included as applicable. Refer to Appendix C for additional guidance.

PSD Increment Step 4: Adjust the emission inventory.

- Omit any source from the inventory that has a negative emission rate unless the source existed and was in operation at the applicable minor source baseline date. A source must have existed and been in operation on or before the applicable minor source baseline date to be considered for increment expansion.
- Omit any source permitted after the applicable minor source baseline date that has shut down or any source as part of the current project that will be shut down. A source that did not exist or was not operating on or before the applicable minor source baseline date would not have contributed to the air quality at that time, and there would be no need to model the source with an emission rate of zero.

PSD Increment Step 5: Conduct the modeling demonstration using the same meteorological data set used in the determination of the AOI using the following tiered approach, as applicable.

Increment Modeling Tier I. Model all sources using their allowable emission rates. This approach is conservative since the increment consumed is based on the entire allowable emission rate. Compare the predicted high concentration to the appropriate increment (Appendix B). If the increment is not exceeded, the demonstration is complete. Otherwise, go to Tier II.

Increment Modeling Tier II. Model selected sources with $Actual_{MD}$ emission rates and all other sources at allowable emission rates. The selected sources are usually the applicant's, since actual emission rates may be difficult to obtain for off-property sources. This process assumes that the increment consumed for the selected sources is based on the entire actual emission rate and the entire allowable emission rate for all other sources. If the increment is not exceeded, the demonstration is complete. Otherwise, go to Tier III.

Increment Modeling Tier III. Model selected sources that existed and were in operation at the applicable minor source baseline date with the *difference* between $Actual_{MD}$ and $Actual_{BD}$.

- For major sources permitted at or after the applicable major source baseline date but not in operation as of the applicable minor source baseline date or for minor sources not in operation as of the applicable minor source baseline date, use the difference between $Actual_{MD}$ and the allowable emission rate.

- For sources that existed at the applicable minor source baseline date, where a change in actual emission rates involved a change in stack parameters, use the emission rates associated with both the applicable minor source baseline date and the current and/or proposed source configuration. That is, enter the $Actual_{BD}$ as negative numbers along with the applicable minor source baseline source parameters, and enter $Actual_{MD}$ for the same source as positive numbers along with the current and/or proposed source parameters.
- Use emission rates found in Tiers I or II for other sources, as applicable.

If the increment is not exceeded, the demonstration is complete. Otherwise, continue to refine increment emission rates or demonstrate that the project's impact will not be significant.

Refer to Appendix I for additional guidance on conducting the PSD increment analysis.

Additional Impacts Analysis

The purpose of the Additional Impacts Analysis is to show that additional impacts from a new major source or major modification of an existing source will not impair visibility, soils, and vegetation as a result of the emissions associated with the source or modification. Also, an analysis of the air quality impact projected for the area due to growth associated with the new major source or major modification of the existing source is required. The person conducting the modeling should follow the basic procedure described in the following paragraphs.

The Additional Impacts Analysis consists of the following elements:

- Growth Analysis;
- Visibility Impairment Analysis; and
- Soils and Vegetation Analysis.

Each of these analyses is described in detail below.

- **Growth Analysis**

  The analysis consists of estimating how much new growth (residential, industrial, commercial, and/or other growth) is likely to occur in the area (i.e. within the modeling domain) to support the major source or major modification under review, and then estimate the emissions which will result from that associated growth. The growth analysis shall also include an analysis of the air quality impact projected for the area as a result of general residential, industrial, commercial, and/or other growth associated with the major source or major modification under review. An in-depth growth analysis is only required if the project would result in a significant shift in population and associated activity into the area (i.e. a population increase on the order of thousands of people).

- **Visibility Impairment Analysis**

  The analysis consists of evaluating visual impairment from the project emissions within the area (i.e. within the modeling domain). This analysis is distinct and separate from the Class I area visibility analysis. The applicant can meet the requirement for the Class II visibility impairment analysis by acknowledging compliance with the visibility and opacity requirements in 30 TAC Chapter 111.

- **Soils and Vegetation Analysis**

  The analysis consists of evaluating the impact of the project emissions on soils and vegetation within the area (i.e. within the modeling domain). A good faith effort must be made to understand the area surrounding the project site and verify with other agencies (National Park Service, U.S. Forest Service, Texas Parks and Wildlife, etc.) the existence of sensitive soils and vegetation. For most types of soils and vegetation, ambient concentrations of criteria pollutants below the secondary NAAQS will not result in harmful effects. The impact on vegetation having no significant commercial or recreational value need not be addressed.

Class I Area Analysis

A Class I area is an area defined by Congress that is afforded the greatest degree of air quality protection. Class I areas are deemed to have special natural, scenic, or historic value. The PSD regulations provide special protection for Class I areas. Little deterioration of air quality is allowed. A map of all Class I areas is located at the following link:
www2.nature.nps.gov/air/maps/receptors/index.cfm

The purpose of the Class I area analysis is to demonstrate that the project emissions will not have an adverse impact on any Class I area and not exceed Class I increments. The FCAA specifically addresses the prevention of visibility impairment and protection of air quality related values (AQRVs) regarding Federal Class I areas. The AQRVs are all those values possessed by an area that may be affected by changes in air quality, and include all those assets of an area whose visibility, significance, or integrity are dependent upon the environment. Examples of AQRVs include:

- visibility, odor, flora, fauna, and other geological resources;
- archeological, historical, and other cultural resources; and
- soils and water quality resources.

A Class I area analysis is required for all applicable criteria and non-criteria pollutants from any new major source or major modification located within 10 kilometers (km) of a Class I area and would have a 24-hour average impact greater than 1 $\mu g/m^3$. In addition, any new major source or major modification located within 100 km of a Class I area is required to perform an impacts analysis for the affected Class I areas. A Class I area analysis could be required for sources located more than 100 km from a Class I area if there is concern that the project emissions could cause an adverse impact on a Class I area. The person conducting the modeling should follow the basic procedure described in the following paragraphs.

The Class I area analysis consists of the following elements:

- Class I area increment analysis; and
- Visibility and AQRV analysis.

Each of these analyses is described in detail below.

- **Class I Area Increment Analysis**

The demonstration of compliance with Class I area increment values is similar in procedure to the Class II area increment compliance demonstration with several differences:

- The Class I increment analysis considers only the impact on Class I areas.
- The preliminary impact determination is performed with respect to the Class I SILs.
- The Class I area is the center point for the development of the emissions inventory for the full Class I increment analysis.
- The modeled results are compared to the Class I increment values.
- **Visibility and AQRV Analysis**

Be sure to coordinate with the appropriate Federal Land Manager (FLM) to determine the scope of the analysis. The FLM is the federal agency or the federal official charged with direct responsibility for management of an area designated as a Class I area. Pre-application meetings between the applicant, TCEQ, and the affected FLM to discuss air quality concerns for a specific Class I area are encouraged. Given preliminary information, such as the source's location and the types and quantity of projected air emissions, the FLM can discuss specific AQRVs, including visibility, for an area and advise the applicant of the analyses needed to assess potential impacts on these resources.

Section V – Preferred Air Dispersion Models and Associated Inputs

An air dispersion model is a simplification of the physical laws governing the dispersion and transport of contaminants in the atmosphere. The simplification is represented as a set of mathematical equations that require information describing a physical situation before the equations can be solved. The required information describing the physical situation is the source data, downwash applicability, receptor design, surface characteristics of the modeling domain, and meteorological data. When the model is run, the required information is read into the set of mathematical equations and then the calculations are performed. The result would be the types of values the user desired to see, such as ambient air ground-level concentrations.

The person conducting the modeling should select the model that is appropriate for the evaluation being conducted, as well as develop/acquire the input data associated with the selected model. The basic procedure is described in the following paragraphs.

Preferred Air Dispersion Models

In general, use the models and follow the modeling procedures identified in the Guideline on Air Quality Models (GAQM). Although the GAQM was developed to address PSD and SIP modeling issues, the ADMT applies the general guidance contained in the GAQM to other modeling demonstrations in order to maintain a consistent approach for all projects.

Refer to Appendix J for additional guidance on preferred air dispersion models.

Source Data

Begin by clearly identifying and documenting all sources of emissions associated with the modeling analysis. For each identified source, evaluate and discuss how emissions are generated and emitted. This discussion will be the supporting basis for the source characterization used in the modeling analysis. Then determine and document the appropriate source parameters associated with the source characterization.

Refer to Appendix K for additional guidance on characterizing sources.

Downwash Applicability

Downwash is a term used to represent the potential effects of a building on the dispersion of emissions from a source. Downwash is considered for sources characterized as point sources. The stack height and proximity of a point source to a structure can be used to determine the applicability of downwash. Downwash does not apply to sources characterized as areas. Downwash is indirectly considered for volume sources by adjusting the initial dispersion factors.

Point sources with stack heights less than good engineering practice (GEP) stack height should consider dispersion impacts associated with building wake effects (downwash). GEP stack height is the greater of (40 CFR § 51.100(ii)):

(1) 65 meters, measured from the ground-level elevation at the base of the stack:

(2) (i) For stacks in existence on January 12, 1979, and for which the owner or operator had obtained all applicable permits or approvals required under 40 CFR parts 51 and 52.

$H_g = 2.5H$,

provided the owner or operator produces evidence that this equation was actually relied on in establishing an emission limitation:

(ii) For all other stacks,

$H_g = H + 1.5L$

where

H_g is the GEP stack height;

H is the structure height; and

L is the lesser of the structure height or maximum projected width (the width as seen from the source looking towards either the wind direction or the direction of interest) of the structure.

These formulas define the stack height above which building wake effects on the stack gas exhaust may be considered insignificant.

A structure is considered sufficiently close to a stack to cause downwash when the minimum distance between the stack and the building is less than or equal to five times the lesser of the structure height or maximum projected width of the structure (5L). This distance is commonly referred to as the structure's region of influence. If the source is located near more than one structure, assess each structure and stack configuration separately.

Once downwash applicability is determined, provide documentation to support that determination. If downwash is applicable for the modeling analysis, refer to Appendix L for additional guidance on developing downwash parameters.

Receptor Design

For modeling, receptors are locations where the model calculates a predicted concentration. Design a receptor grid with sufficient spatial coverage and density to determine the maximum predicted ground-level concentration in an off-property area or an area not controlled by the applicant. For NAAQS and PSD increment modeling, receptors should cover the entire area of de minimis impact. For example, if the model predictions at the edge of the receptor grid are greater than de minimis, extend the receptor grid until the model predictions are less than de minimis.

When designing a receptor grid, consider such factors as:

- Results of screening analyses;
- A source's release height;
- Proximity of sources to the property line;
- Location of non-industrial receptors and ambient air monitors; and
- Topography, climatology, and other relevant factors.

In addition, the location of ambient air receptors should guide the design of the receptor grid. Ambient air for minor NSR modeling starts at the applicant's property line. If a single property line designation (SPLD) exists, then ambient air for minor NSR modeling starts at the single property line boundary. Note that the SPLD does not apply to federal reviews.

For PSD modeling, ambient air starts at the applicant's fence line or other physical barrier to public access. Also, no receptors are required on the applicant's property because the air over an applicant's property is not ambient; therefore, in a regulatory sense, applicants cannot cause a condition of air pollution on their property from their own sources.

Generally, the spacing of receptors increases with distance from the facilities being evaluated. Consider the following types of receptor spacing:

- *Tight receptors.* Spaced 25 meters apart. Tight receptors could extend up to 200-300 meters from the facilities being evaluated. Consider the distance between the facility and the property or fence line.
- *Fine receptors.* Spaced 100 meters apart. Fine receptors could extend one km from each facility being modeled.
- *Medium receptors.* Spaced 500 meters apart. Medium receptors could cover the area that lies between one and five km from each facility.
- *Coarse receptors.* Spaced one km apart. This spacing could cover the area that lies beyond the medium receptors out to 50 km.

Enter receptor locations into air dispersion models in Universal Transverse Mercator (UTM) coordinates, in order to be consistent with on- and off-property source locations represented in the air permit application, and other reference material, such as United States Geological Survey (USGS) topographic maps. Provide the datum used for UTM coordinates. Applicable UTM zones in Texas are either 13 (from the west border to 102 degrees longitude), 14 (between 102 and 96 degrees longitude), or 15 (east of 96 degrees longitude to the east border). Do not use coordinate systems based on plant coordinates or other applicant-developed coordinate systems.

Refer to Appendix M for additional guidance on developing receptor grids.

Surface Characteristics of the Modeling Domain

The modeling domain is the region that will influence the dispersion of the emissions from the facilities under review. Surface characteristics for the modeling domain should be evaluated when determining representative dispersion coefficients. Air dispersion models utilize dispersion coefficients to determine the rate of dispersion for a plume. Dispersion coefficients are influenced by factors such as land-use / land-cover (LULC), terrain, averaging period, and meteorological conditions.

Evaluating the LULC within the modeling domain is an integral component to air dispersion modeling. The data obtained from a LULC analysis can be used to determine representative dispersion coefficients. The selection of representative dispersion coefficients may be as simple as selecting between rural or urban land-use types. For more complex analyses, representative dispersion coefficients can be determined by parameters that are directly related to the LULC within the modeling domain.

Dispersion coefficients are also influenced by terrain. Evaluate the geography within the modeling domain to determine how terrain elevations should be addressed.

Refer to Appendix N for additional guidance on conducting a LULC analysis and terrain.

Meteorological Data

The ADMT has prepared meteorological data sets for modeling demonstrations in order to establish consistency among modeling demonstrations across the state. These data sets are available by county for download from the ADMT Internet page.

For minor NSR permit applications, the use of one year of meteorological data may be sufficient. However, if five years of meteorological data are used, then use the same five-year meteorological data for all applicable averaging periods for consistency. For PSD demonstrations, use the most recent, readily available five years of meteorological data. Provide an ASCII version of the data with the AQA submittal.

Applicants may request to use other available meteorological data not available from the ADMT. If the request is approved, the applicant is responsible for obtaining, preparing, and processing the data. Before these data sets are used in any modeling demonstration, the applicant should submit them to the ADMT. The ADMT should review and approve the data sets and all the data used to develop the specific meteorological parameters required.

Refer to Appendix O for additional guidance on meteorological data.

Section VI Reporting Requirements

Include in the AQA a written discussion covering the project, the modeling performed, and the results. This analysis should contain at least the items in Appendix P.

The AQA is a stand-alone report. Results from the report should be sufficient to make a decision without input from other reports. Do not refer to other documents or reports for data required to be in the report. In addition, do not exclude items without coordination with the ADMT, unless the items are clearly not applicable to the project. Follow the reporting requirements to expedite the technical review of the AQA and to eliminate unnecessary modeling.

Send the AQA to the permit reviewer that requested the analysis. In addition, for PSD applications send a copy of the AQA to EPA Region 6.

Appendix A – Justifying the Use of the Significant Impact Levels

The U.S. Court of Appeals vacated and remanded 40 Code of Federal Regulations (CFR) 51.166(k)(2) and 52.21(k)(2) based on Environmental Protection Agency's (EPA's) lack of authority to exempt sources from the requirements of the Federal Clean Air Act (FCAA) when it established Significant Impact Levels (SILs) for $PM_{2.5}$. The Court also vacated 40 CFR 51.166(i)(5)(i)(c) and 52.21(i)(5)(i)(c) based on EPA's lack of authority to exempt the preconstruction monitoring requirements through the Significant Monitoring Concentration (SMC) established for $PM_{2.5}$ (Sierra Club v. U.S. EPA, Docket No. 10-1413, D.C. Circuit, January 22, 2013).

The purpose of this appendix is to provide guidance for conducting an air quality analysis (AQA) when relying on the SILs, as well as for meeting the preconstruction monitoring requirements of section 165 of the FCAA.

Conducting the Air Quality Analysis

The AQAs for Prevention of Significant Deterioration (PSD) and minor New Source Review (NSR) permits begin with a preliminary impact determination. The preliminary impact determination is an evaluation of the project emissions and the results are used to determine whether the project emissions could cause a significant ambient air impact.

Next, an analysis of the ambient air quality at the project site and in areas which may be affected by emissions from the project is conducted. For PSD permits, this analysis is required in order to meet the preconstruction monitoring requirements (165(e) of the FCAA). For both PSD and minor NSR permits, this analysis can be used to justify the use of the $PM_{2.5}$ SILs with the AQA.

Analysis of the Ambient Air Quality

The purpose is to provide an analysis of the existing ambient air quality at the project site and in areas which may be affected by emissions from the project. The analysis must be based on continuous air quality monitoring data. When conducting the analysis, follow the basic procedures described in the following paragraphs. Note that the procedures for justifying the use of the $PM_{2.5}$ SILs are different depending on whether the analysis is done for the NAAQS or PSD increment demonstrations. In addition, pre-construction and/or post-construction monitoring could be required by the Texas Commission on Environmental Quality (TCEQ).

Procedure for NAAQS

Step 1: Collect representative monitoring background concentrations to establish the existing ambient air quality for the area that the project emissions would affect.

If site-specific ambient air monitoring data are not available, using monitoring data from an existing network of regional monitors may be considered. There are a number of factors used to determine the representativeness of a particular monitor used for background concentrations: proximity of the monitor to the project site; the type and amount of emission sources around the monitor compared to the project site; comparisons between the topography and land-use for the project and monitor sites; etc. Justify why the monitoring data are representative for the existing air quality in the area of the project site.

For example, if the nearest monitor is located seven kilometers away in an urban area surrounded by many industrial sources, but the project site is located in a rural area with no surrounding sources, an argument could be made that the air quality by the nearest monitor is indicative of a pollutant "hot spot" and not of the regional air quality around the project site. The use of this monitor may be considered conservative and the type of documentation to support this claim could be aerial photography of the two locations.

The documentation to support the selected monitor in the above example is based on a qualitative assessment. Some cases may require a more quantitative assessment that could include an analysis of the sources of emissions surrounding the project and monitor locations. For example, the types of sources in the vicinity of each location; the magnitude of reported emissions and allowable emissions from sources in the vicinity of each location; etc.

If existing monitoring data are not available, or are judged not to be representative or conservative for the project site, go to Step 3.

Step 2: Determine the difference between the National Ambient Air Quality Standards (NAAQS) and the measured background concentrations.

Using the ambient air monitoring data collected in Step 1, determine the monitored design value for $PM_{2.5}$. Note that any higher monitor rank may be used as a background concentration. That is, the high, first high (H1H) monitored concentration could be used instead of the high, second high (H2H) monitored concentration, since the H1H monitored concentration would be higher and thus more conservative:

- Particulate Matter ($PM_{2.5}$)
    - 24-hour averaging time - Select the most recent 3-year average of the annual 98th percentile of the 24-hour values that encompasses three consecutive calendar years of complete data for a monitoring site.
        - A year meets data completeness criteria when at least 75 percent of the scheduled sampling days for each quarter have valid data.
    - Annual averaging time - Select the most recent 3-year average of the annual monitored concentrations that encompasses three consecutive calendar years of complete data for a monitoring site.
        - A year meets data completeness criteria when at least 75 percent of the scheduled sampling days for each quarter have valid data.

If the monitoring data do not meet the completeness criteria described above, there are procedures in Appendix N to 40 CFR Part 50 that provide methods for validating incomplete data.

If the difference between the NAAQS and the measured background concentrations is greater than or equal to the SIL, then it would be sufficient to conclude that a source with an impact less than the SIL would not cause or contribute to a violation of the NAAQS and forego a cumulative modeling analysis. If the difference between the NAAQS and the measured background concentrations is less than the SILs, go to Step 3 or conduct a full NAAQS analysis.

For additional guidance on representative background monitoring concentrations, refer to Appendix D.

Step 3: Establish a site-specific monitoring network. The applicant should coordinate with the permit reviewer for determining the scope of monitoring and for assistance in the preparation of a monitoring quality assurance plan.

Procedure for PSD Increment

Please note that this approach will not work for all applicants and is used on a case-by-case basis.

Step 1: Collect representative monitoring background concentrations to evaluate the difference in ambient background concentrations for the time period between the most recent year and the major source baseline date. This is not a reflection of how much increment has been consumed, since the monitors pick up emissions from all sources, but the exercise is used to help justify using the SILs to show that the SILs are reasonable to use when the project emissions lead to predictions that are less than the SILs.

If site-specific ambient air monitoring data are not available, using monitoring data from an existing network of regional monitors may be considered. There are a number of factors used to determine the representativeness of a particular monitor used for background concentrations: proximity of the monitor to the project site; the type and amount of increment-affecting sources around the monitor compared to the project site; comparisons between the topography and land-use for the project and monitor sites; etc.

For example, if the monitor is located nearby the project site and is impacted by similar sources as the project site, an argument could be made that the monitoring data are representative of the project site. The type of documentation to support this claim could be aerial photography of the two locations.

If existing monitoring data are not available, or are judged not to be representative for the project site, go to Step 3.

Step 2: Determine the difference between the PSD increment and the difference in ambient background concentrations for the time period between the most recent complete year and the major source baseline date.

Using the ambient air monitoring data collected in Step 1, determine the difference between the 24-hr high, second high (H2H) and annual monitored concentrations for the major source baseline date and the most recent complete year. These metrics are used to be consistent with the short and long-term PSD increments. If the difference between the PSD increment and the difference in measured background concentrations is greater than or equal to the SIL, then it would be sufficient to conclude that a source with an impact less than the SIL would not cause or contribute to a violation of the PSD increment and forego a cumulative modeling analysis. If the difference between the PSD increment and the difference in measured background concentrations is less than the SILs, then go to Step 3.

If the monitoring data do not meet the completeness criteria described above, there are procedures in Appendix N to 40 CFR Part 50 that provide methods for validating incomplete data.

Step 3: Perform a full PSD increment analysis. Refer to Appendix I for additional information.

Appendix B - Federal and State Air Quality Standards

The tables below list contaminants that are specifically regulated by federal or state rules by a limit on the concentration in ambient air. The table lists the pollutant name, applicable averaging time, the type of standard, and the threshold concentration. When performing an air quality analysis (AQA), all applicable standards are to be addressed.

The source of the information for the tables is as follows: Texas Commission on Environmental Quality (TCEQ) de minimis levels (note for this document, the term de minimis and the phrase significant impact level (SIL) are synonymous) are listed in 40 CFR 51.165(b)(2); Significant Monitoring Concentrations (SMCs) are listed in 40 CFR 52.21(i)(5)(i); Primary and Secondary National Ambient Air Quality Standards (NAAQS) values and form of the standard are listed in 40 CFR 50; Prevention of Significant Deterioration (PSD) Increment values for Class I and Class II areas are listed in 40 CFR 52.21(c); and State Property Line Standards are listed in 30 TAC 112.

Table B - 1. Criteria Pollutants

Pollutant	Averaging Time	SIL (µg/m3)	SMC (µg/m3)	Primary NAAQS (µg/m3)	Secondary NAAQS (µg/m3)	Class II Increment (µg/m3)	Class I Increment (µg/m3)
Carbon Monoxide	1-Hour	2,000	-	40,000	-	-	-
Carbon Monoxide	8-Hour	500	575	10,000	-	-	-
Lead	Rolling 3-month average	-	0.1[a]	0.15	0.15	-	-
Nitrogen Dioxide	1-Hour	7.5[b]	-	188	-	-	-
Nitrogen Dioxide	Annual	1	14	100	100	25	2.5
Ozone	8-Hour	-	-	147 (75 ppb)	147 (75 ppb)	-	-
Particulate Matter (PM_{10})	24-Hour	5	10	150	150	30	8
Particulate Matter (PM_{10})	Annual	1	-	-	-	17	4
Particulate Matter ($PM_{2.5}$)	24-Hour	1.2	-	35	35	9	2
Particulate Matter ($PM_{2.5}$)	Annual	0.3	-	12	15	4	1
Sulfur Dioxide	1-Hour	7.8[b]	-	196	-	-	-
Sulfur Dioxide	3-Hour	25	-	-	1,300	512	25

Table B - 1. Criteria Pollutants

Pollutant	Averaging Time	SIL (µg/m3)	SMC (µg/m3)	Primary NAAQS (µg/m3)	Secondary NAAQS (µg/m3)	Class II Increment (µg/m3)	Class I Increment (µg/m3)
Sulfur Dioxide	24-Hour	5	13	365[c]	-	91	5
Sulfur Dioxide	Annual	1	-	80[c]	-	20	2

a - The SMC for lead is based on a 3-month average and not a rolling 3-month average
b - Interim SIL (www.epa.gov/nsr/documents/20100629no2guidance.pdf for 1-hour NO_2 and www.epa.gov/region07/air/nsr/nsrmemos/appwso2.pdf for 1-hour SO_2)
c - EPA revoked both the existing 24-hour and annual standards; however, they will remain in effect until one year after the effective date of the 1-hour SO_2 designations

Table B - 2. Non-Criteria Pollutants with a Significant Monitoring Concentration

Pollutant	Averaging Time	SMC (µg/m3)
Fluorides[a]	24-Hour	0.25
Hydrogen Sulfide	1-Hour	0.2
Reduced Sulfur Compounds	1-Hour	10
Total Reduced Sulfur	1-Hour	10

a - Fluorides does not include hydrogen fluoride

Table B - 3. State Property Line Standards

Pollutant	Averaging Time	County	Land Use	Value (µg/m3)
Hydrogen Sulfide	30-Minute[a]	All Counties	Residential, business, or commercial purposes (in general, non-industrial areas)	108
Hydrogen Sulfide	30-Minute[a]	All Counties	All other land uses	162
Sulfur Dioxide	30-Minute[a]	Galveston and Harris	All land uses	715
Sulfur Dioxide	30-Minute[a]	Jefferson and Orange	All land uses	817
Sulfur Dioxide	30-Minute[a]	Remaining Counties	All land uses	1,021
Sulfuric Acid	1-Hour	All Counties	All land uses	50
Sulfuric Acid	24-Hour	All Counties	All land uses	15

a - The 1-hour averaging time is used given that the shortest averaging time for the preferred models typically used for regulatory demonstrations is the 1-hour averaging time.

Appendix C - Requesting Information from the Air Permits Allowable Database

If staff or applicants need emissions data for an air quality analysis (AQA), they should request this information from the Information Resources Division (IRD) by filling out and submitting an Air Permits Allowable Database (APAD) Modeling Retrieval Request Form. This form may be obtained at the following link: www.tceq.texas.gov/permitting/air/guidance/newsourcereview/nsr_mod_guidance.html.

Allow ten business days for the IRD to provide the retrieval information. Provide the following information with the request:

For National Ambient Air Quality Standard (NAAQS) and Prevention of Significant Deterioration (PSD) Increment retrievals, provide the center point, in Universal Transverse Mercator (UTM) coordinates in North American Datum of 1983 (NAD83), of the radius of impact (ROI);

- UTM easting
- UTM northing
- UTM zone

The coordinates include the UTM easting (meters), UTM northing (meters), and UTM zone. The retrieval program will automatically take care of any overlap from one zone to another. For the UTM zone, use either 13 (from the west border to 102 degrees longitude), 14 (between 102 and 96 degrees longitude), or 15 (east of 96 degrees longitude to the east border).

For the requested pollutant, this information is used by the retrieval program to locate all sources that are within 50 kilometers (km) of the specified center point. A radius of 50 km is based on transport distances over which steady-state assumptions are appropriate. Steady-state assumptions are fundamental to Gaussian air dispersion models used for regulatory purposes.

Check the type of reports desired;

- By pollutant
- By averaging time
- By review type (NAAQS or PSD Increment)
- For Particulate Matter ($PM_{2.5}$) or less, also request a retrieval for Particulate Matter (PM_{10}) or less.

The selection of pollutant depends on the review type. For NAAQS or PSD Increment, as applicable, identify the pollutant using carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), PM_{10}, $PM_{2.5}$, or lead (Pb).

Indicate the averaging time of interest. The averaging times to select from depend on the review type and pollutant combination. For example, for NO_x, the relevant averaging times for NAAQS are 1-hour and annual and for PSD Increment, annual only. If you do not specify an averaging time, the retrieval will include all relevant averaging times.

Indicate the type of request: NAAQS and/or PSD Increment.

The term NAAQS pertains to criteria pollutants and indicators, e.g. CO, SO_2, NO_x, PM_{10}, $PM_{2.5}$, and Pb. PSD Increment retrievals are available for NO_x, SO_2, PM_{10}, and $PM_{2.5}$.

For each pollutant, averaging time, and review type combination, the retrieval program generates an electronic file with data for all sources, including area sources, meeting the search criteria with the modeling parameters placed in the proper format for use with certain Environmental Protection Agency (EPA) models including AERMOD, ISC-PRIME, and ISCST3.

Submit the APAD Modeling Retrieval Request Form:

- Mail the form to:

  Information Resources Division, MC 197
  Attn: Open Records & Reporting Services
  TCEQ
  PO Box 13087
  Austin TX 78711-3087

- Submit request and form through online Open Records Request Form.
- Call 512/239-DATA (3282)

Notes about APAD data

What the requestor will receive:

- **Model-ready text file** for each pollutant, averaging time, and review type combination requested.
  - o All sources (POINT and AREA) listed in APAD within 50 km of a UTM coordinate provided in the request are included. You can request a greater search radius by providing an ROI distance.
  - o Source identifiers are the unique source identifier listed in APAD.
- **Summary Report** listing all sources included in the retrievals with their associated regulated entity number (RN), emission point number (EPN), permit number, source location, source emission rate by pollutant, and source parameters.

What data are in APAD:

Data were migrated into APAD in three phases:

- Source IDs (EPNs), source parameters (including locations), permit allowable emission rates (by pollutant), and permit number for effective permits from the point source database (PSDB);
- Source IDs and source parameters for active sources from the State of Texas Air Reporting System (STARS); and
- For active sources that reported emissions of criteria pollutants, if there was no record of an allowable emission rate, those sources were assigned an allowable emission rate of 0 pounds per hour (lb/hr) and 0 tons per year (tpy) for the reported pollutants.

Now that the data migration is complete, data in APAD are currently being supplemented through data entry of permit information listed in Maximum Allowable Emission Rate Tables (MAERTs), with priority given to permits for major sources of criteria pollutants.

What data gaps exist in APAD:

As it was not initially possible to populate APAD with all allowable emission rates for all sources, some cases of missing or inconsistent data have been encountered in the database. The issues related to the data gaps are:

- EPNs on MAERTs not matching the source identifiers listed in PSDB or STARS;
- Pollutant names on MAERTs not matching pollutant names listed in PSDB or STARS;
- EPNs with no associated permit number;
- EPNs with missing or invalid source parameters; and
- EPNs with missing or invalid coordinates.

The supplemental data entry continues to eliminate many of the data gaps, but some data are still missing. Indicators of missing data are:

- Permit numbers beginning with "D-." These indicate that a dummy permit number was assigned to the EPN.
- Allowable emission rate being 0 lb/hr or 0 tpy. These indicate that actual emissions of this pollutant were reported for the EPN, but there is no record of an allowable emission rate. It is the applicant's responsibility to research and determine the appropriate emission rate values for these sources. (See What to do about data gaps in APAD below)

Missing or invalid source parameters have been filled in the following way.

- For missing or invalid parameters for type "STACK":
  - Height = 1.0 meter

- Temperature = 0 Kelvin
  - Velocity = 0.001 meters/second
  - Diameter = 0.001 meters
- For missing or invalid parameters for type "FLARE":
  - Height = 1.0 meter
  - Average Flow Rate, Lower Heating Value, or Molecular Weight,
  - Diameter = 0.001 meters
- For missing or invalid parameters for type "FUGITIVE":
  - Height = 1.0 meter
  - Length = 1.0 meter
  - Width = 1.0 meter
  - Degree = 0
- **Missing or invalid source coordinates.** These sources have been assigned the coordinate of the site centroid or coordinate provided on the agency Core Data Form for the site.

What to do about data gaps in APAD:

As was the case with data retrievals from PSDB, it is the applicant's responsibility to correct any data in error and provide any supplementary data that may be necessary in performing their AQA. Any corrections to the data must be accompanied with documentation that Air Permits Division (APD) staff can validate. Much of the data necessary to fill in data gaps are contained in the paper files located in Central Records at the Texas Commission on Environmental Quality (TCEQ). However, there are on-line data sources applicants are encouraged to use:

- Site emission inventory data access by Regulated Entity reference number at www15.tceq.texas.gov/crpub/index.cfm?fuseaction=regent.RNSearch
- GroupWise Remote Document Server to access permit documents, like the MAERTs, at webmail.tceq.texas.gov/gw/webpub

Validated data corrections will be loaded in APAD as appropriate. As corrections are made, the data quality will improve.

Staff and applicants are not limited to using only APAD as a data source. If the applicant is aware of data not contained in APAD, such as recently issued permitted facilities, shut down facilities, or facilities in other states, the data should be included as applicable. All changes to data must be documented.

Contact the Air Dispersion Modeling Team (ADMT) at (512) 239-1250 if you have questions about how to use the retrievals for the AQA.

Appendix D – Representative Background Monitoring Concentrations

The purpose of representative background monitoring concentrations is to account for sources not explicitly modeled in an air dispersion modeling analysis. Most air dispersion modeling analyses only account for industrial stationary emission sources; therefore, additional information needs to be used to account for other emission sources such as natural sources, nearby sources other than the one(s) under consideration, and unidentified sources. Ambient air quality monitors are used to provide representative background concentrations for a project site.

Ideally, a network of monitors would be available to provide concentrations near the site of the permit application. The term "near" means within about one kilometer (km) of the area of maximum concentrations from existing sources or the area of the combined maximum impact from existing and proposed sources. However, existing monitors within 10 km of the proposed sources can also be used. Unfortunately, data from nearby monitors are rarely available; furthermore, time and cost constraints usually prohibit the establishment of site-specific networks. Applicants and staff should use the following guidance to determine an appropriate monitor to represent air quality at the project site. This procedure can be used for National Ambient Air Quality Standards (NAAQS) and pre-application analyses.

Existing Ambient Monitoring Data for the County

If site-specific ambient air monitoring data are not available and an ambient air monitor is located in the same county as the project site, use the most recent data from the nearest ambient air monitor. Justify why the monitoring data are representative for the air quality in the area of the project site.

If there are multiple monitors in the same county, justify why the monitor selected is conservative or representative of the area the project would affect. For example, if the nearest monitor is located in an urban area surrounded by many industrial sources but the project sources are located in a rural area with no surrounding sources, the argument could be made that the air quality by the nearest monitor is indicative of a pollutant "hot spot" and not of the regional air quality around the project sources. The use of this monitor may be considered conservative and the type of documentation to support this claim could be aerial photography of the two locations.

However, if the use of the nearest monitor in the example above is too conservative, a more representative monitor from the same county may be used. The type of documentation to support the use of the selected monitor could be aerial photography of the two locations.

The documentation to support the selected monitors in the above examples was based on a qualitative assessment. Some cases may require a more quantitative assessment that could include an analysis of the source of emissions surrounding the two locations (project sources and monitor). For example, the types of sources in the vicinity of each location, the magnitude of reported emissions, allowable emissions, etc. An assessment out to 10 km from each location should be sufficient. Detailed actual emissions data from the Point Source Emissions Inventory may be obtained at the following link: www.tceq.texas.gov/airquality/point-source-ei/psei.html

No Existing Ambient Monitoring Data for the County

If there are no existing monitoring data for the county where the project is located, monitoring data from an adjacent county may be used. Justify why the reported concentrations are conservative or representative of the area the project would affect.

If there are no existing monitoring data for an adjacent county, then monitoring data from another county may be used. Justify why the reported concentrations are representative of the area the project would affect. For example, the nearest ambient air monitor is located over 80 km and two counties over from the project. The project is the only major source in its county. The monitor over 80 km away is in close proximity to several major sources. The monitoring data from this monitor may be used provided the justification would be the air quality in the area near several major sources would be no higher in an area that only has one major source. The type of documentation to support this claim include comparing county emissions, county population, categories of source emissions for each county, and a quantitative assessment of emissions surrounding the location of monitor compared to the project site, etc.

Emissions data can be obtained at the following url:

www.epa.gov/air/emissions/index.htm; and

www.epa.gov/ttn/chief/eiinformation.html

Population data can be obtained at the following url:

quickfacts.census.gov/qfd/states/48000.html

Once an appropriate monitor has been selected to represent the air quality of the project site, the representative background concentration is determined. Begin by obtaining ambient monitoring data and corresponding documentation from the Environmental Protection Agency (EPA) AirData website at the following url:

www.epa.gov/airquality/airdata/

The EPA AirData is a good source to obtain representative background concentrations since it contains current monitoring data and reports both the exceedance- and statistically-based values.

Monitoring data may also be obtained from the Texas Commission on Environmental Quality's (TCEQ's) Texas Air Monitoring Information System (TAMIS) Web Interface located at the following url:

www17.tceq.texas.gov/tamis/

The monitoring data from TAMIS are the same monitoring data that are in the EPA AirData; however, the statistically-based values are not readily available.

A third option is to obtain monitoring data from the TCEQ's yearly summary reports at the following url:

www.tceq.texas.gov/cgi-bin/compliance/monops/select_year.pl

Depending on the pollutant and averaging time being evaluated, the representative background concentration may be in the form of the standard (exceedance- or statistically-based). Note that any higher monitor rank may be used as a background concentration. That is, the high, first high (H1H) monitored concentration could be used instead of the high, second high (H2H) monitored concentration, since the H1H monitored concentration would be higher and thus more conservative:

- Carbon Monoxide (CO) - Select the H2H monitored concentration from the most recent complete year for the 1-hour and 8-hour averaging times.
  - A year meets data completeness criteria if at least 75 percent of the hours in a year are reported.
- Lead (Pb) - Select the highest rolling 3-month average value that encompasses the most recent 38-month period of complete data for a monitoring site (i.e., the most recent 3-year calendar period plus two previous months).
  - The monthly average is considered complete if the monthly data capture rate is greater than or equal to 75 percent.
- Nitrogen Dioxide (NO_2)
  - 1-hour averaging time - Select the most recent 3-year average of the annual 98th percentile daily maximum 1-hour values that encompasses three consecutive calendar years of complete data for a monitoring site.
    - A year meets data completeness criteria when all four quarters are complete. A quarter is complete when at least 75 percent of the sampling days for each quarter have complete data. A sampling day has complete data if 75 percent of the hourly concentration values, including State-flagged data affected by exceptional events which have been approved for exclusion by the Administrator, are reported.
  - Annual averaging time - Select the annual monitored concentration from the most recent complete year for the annual averaging time.
    - A year meets data completeness criteria when 75 percent of the hours in a year are reported.
- Ozone (O_3) - Select the most recent 3-year average of the annual fourth-highest daily maximum 8-hour average that encompasses three consecutive calendar years of complete data for a monitoring site.
  - The completeness criteria is met for the 3-year period at a monitoring site if daily maximum 8-hour average concentrations are available for at least 90% of the days within the O_3 monitoring season, on average, for the 3-year period,

with a minimum data completeness criteria in any one year of at least 75% of the days within the O_3 monitoring season.

  - Years with concentrations greater than the level of the standard shall be included even if they have less than complete data. Thus, in computing the 3-year average fourth highest daily maximum 8-hour average concentration, calendar years with less than 75% data completeness shall be included in the computation if the 3-year average fourth-highest daily maximum 8-hour concentration is greater than the level of the standard.

- Particulate Matter (PM_{10}) - Select the H2H monitored concentration for the 24-hour averaging time that encompasses the most recent three consecutive calendar years of complete data for a monitoring site.
  - A year meets data completeness criteria if at least 75 percent of the scheduled PM_{10} samples per quarter are reported.
- Particulate Matter ($PM_{2.5}$)
  - 24-hour averaging time - Select the most recent 3-year average of the annual 98th percentile of the 24-hour values that encompasses three consecutive calendar years of complete data for a monitoring site.
    - A year meets data completeness criteria when at least 75 percent of the scheduled sampling days for each quarter have valid data.
  - Annual averaging time - Select the most recent 3-year average of the annual monitored concentrations that encompasses three consecutive calendar years of complete data for a monitoring site.
    - A year meets data completeness criteria when at least 75 percent of the scheduled sampling days for each quarter have valid data.
- Sulfur Dioxide (SO_2)
  - 1-hour averaging time - Select the most recent 3-year average of the annual 99th percentile daily maximum 1-hour values that encompasses three consecutive calendar years of complete data for a monitoring site.
    - A year meets data completeness criteria when all four quarters are complete. A quarter is complete when at least 75 percent of the sampling days for each quarter have complete data. A sampling day has complete data if 75 percent of the hourly concentration values, including State-flagged data affected by exceptional events which have been approved for exclusion by the Administrator, are reported.
  - 3-hour averaging time - Select the H2H monitored concentration for the 3-hour averaging time from the most recent complete year.
    - A year meets data completeness criteria provided that at least 75 percent of the hourly data are complete in each calendar quarter.

- 24-hour averaging time - Select the H2H monitored concentration for the 24-hour averaging time from the most recent complete year.
  - A year meets data completeness criteria provided that at least 75 percent of the hourly data are complete in each calendar quarter.
- Annual averaging time - Select the annual monitored concentration from the most recent complete year for the annual averaging time.
  - A year meets data completeness criteria provided that at least 75 percent of the hourly data are complete in each calendar quarter.

If the monitoring data do not meet the completeness criteria described above, there are procedures in the Appendices to 40 CFR Part 50 that provide methods for validating incomplete data for several pollutants and averaging times. For those pollutants and averaging times where procedures are not provided, the applicant can propose methods for using monitoring data with incomplete data.

Monitoring Background Refinement

If the monitored background concentration used in an analysis is too conservative, then it may be necessary to refine the monitored background concentration in order to remove or limit contributions from the modeled point sources. Several methods are provided below. The goal is to obtain a representative background concentration using an appropriate amount of time and effort. Therefore, the options do not need to be followed in sequence and may be combined as appropriate.

- For isolated sources located in the general area of the monitors. Isolated means there are no other point sources within the 90-degree sector, or whose emissions would interact within the 90-degree sector with the same meteorological conditions. A source could impact a monitor within a 90-degree sector downwind of the source. Determine the average background concentration at each applicable monitor for the year under review by excluding values when the source(s) in question impacts the monitor. Obtain hourly or daily concentrations and corresponding meteorological data from the TCEQ. Exclude concentrations caused by transport from the source toward the monitor within the 90-degree sector. Average the remaining concentrations for each separate averaging time to determine the average background value.
- Identify the location of the receptors with significant predicted concentrations from the project. Determine the meteorological conditions associated with these predicted concentrations. Obtain hourly or daily monitored concentrations and corresponding meteorological data from the TCEQ. Find meteorological conditions that are similar to those that caused the predicted concentrations and identify applicable monitoring data with the same meteorological conditions. Use this monitored concentration as the background concentration.
- Find a monitor that is not affected by the background point sources included in the modeling demonstration. This could be done by modeling the background point

sources to identify those that contribute to the monitored concentrations or by analyzing wind flow patterns.

- For particulates, determine if the concentration was caused by a non-prescribed fire, wind speed in excess of the monthly average, etc. If so, use the next highest concentration that would not be affected by these events.

For any method of refinement of monitoring background concentrations, all documentation and technical justification must be provided. For example, when excluding hourly data, be sure to clearly identify all excluded hourly data and discuss the rationale for excluding the data.

Appendix E - Minor and Prevention of Significant Deterioration National Ambient Air Quality Standards

The purpose of the National Ambient Air Quality Standards (NAAQS) analysis is to demonstrate that proposed emissions of criteria pollutants from a new facility or from a modification of an existing facility will not cause or contribute to an exceedance of the NAAQS. The demonstration may consist of both air dispersion modeling predictions and ambient air monitoring data. The person conducting the modeling should follow the basic procedure described in the following paragraphs.

Preliminary Impact Determination

The procedure begins with a preliminary impact determination to predict whether the proposed emissions could make a significant impact on existing air quality. That is, the model predicts concentrations at one or more receptors in the modeling grid greater than or equal to a NAAQS de minimis level (note for this document, the term de minimis and the phrase significant impact level (SIL) are synonymous). It should be noted that the U.S. Court of Appeals vacated and remanded 40 Code of Federal Regulations (CFR) 51.166(k)(2) and 52.21(k)(2) based on the Environmental Protection Agency's (EPA's) lack of authority to exempt sources from the requirements of the Federal Clean Air Act (FCAA) when it established SILs for $PM_{2.5}$. Because of the court decision, an analysis will need to be conducted in order to justify the use of the SILs. Refer to Appendix A for additional guidance on justifying the use of the SILs.

Model all new and/or modified sources using the appropriate length of meteorological data. For Minor NAAQS, one year of National Weather Service (NWS) meteorological data is sufficient. However, if five years of meteorological data are used, then use the same five year meteorological data for all applicable averaging periods for consistency. For Prevention of Significant Deterioration (PSD) NAAQS, five years of NWS meteorological data or at least one year of site-specific meteorological data are required.

The predicted high concentration for each criteria pollutant and each averaging time are then compared to the appropriate NAAQS de minimis level. For Minor NAAQS, the predicted high concentration is located at or beyond the property line. For PSD NAAQS, the predicted high concentration is located at or beyond the fence line. The predicted high concentration may be related to the form of the NAAQS (exceedance - or statistically-based) and the number of years of meteorological data used:

- Carbon Monoxide (CO) - Report the maximum high, first high (H1H) predicted concentration from all receptors across the applicable meteorological data set for the 1-hour and 8-hour averaging times.
- Lead (Pb) - A de minimis level has not been established. Proceed to the full NAAQS analysis.
- Nitrogen Dioxide (NO_2)

- 1-hour averaging time - When using one year of meteorological data, report the maximum H1H predicted concentration from all receptors. When using five years of meteorological data, report the highest 5-year average of the H1H predicted concentrations from all receptors. For additional guidance regarding the evaluation of 1-hour NO_2, see Appendix S.
- Annual averaging time - Report the maximum predicted concentration from all receptors across the applicable meteorological data set.

- Ozone (O_3) - A de minimis level has not been established. However, any net emissions increase of 100 tons per year (tpy) or more of volatile organic compounds (VOCs) or nitrogen oxides (NO_x) subject to PSD would require an ambient impact analysis. See Appendix Q for guidance on conducting an ozone ambient impact analysis.
- Particulate Matter (PM_{10}) - Report the maximum H1H predicted concentration from all receptors across the applicable meteorological data set for the 24-hour averaging time.
- Particulate Matter ($PM_{2.5}$)
  - 24-hour averaging time - When using one year of meteorological data, report the maximum H1H predicted concentration from all receptors. When using five years of meteorological data, report the highest 5-year average of the H1H predicted concentrations from all receptors.
  - Annual averaging time - When using one year of meteorological data, report the maximum predicted concentration from all receptors. When using five years of meteorological data, report the highest 5-year average of the predicted concentrations from all receptors.
- Sulfur Dioxide (SO_2) – The EPA revoked both the existing 24-hour and annual average standards with the promulgation of the 1-hour standard; however, these averaging times will remain in effect until one year after the effective date of the 1-hour SO_2 designations.
  - 1-hour averaging time - When using one year of meteorological data, report the maximum H1H predicted concentration from all receptors. When using five years of meteorological data, report the highest 5-year average of the H1H predicted concentrations from all receptors. For additional guidance regarding the evaluation of 1-hour SO_2, see Appendix S.
  - 3-hour and 24-hour averaging times - Report the maximum H1H predicted concentration from all receptors across the applicable meteorological data set.
  - Annual averaging time - Report the maximum predicted concentration from all receptors across the applicable meteorological data set.

Be aware of model limitations when using a concatenated meteorological data set with multiple averaging times in the same model run. For example, when modeling NO_2 with a concatenated 5-year meteorological data set and both the 1-hour and annual averaging times are selected, the model may compute 5-year average concentrations for both averaging times. This is not appropriate for the annual averaging time.

If the sources do not make a significant impact for a pollutant of concern, the demonstration is complete. If there is a significant impact, then an area of impact (AOI) is defined, and a full NAAQS analysis is required. The AOI is the set of receptors that have predicted concentrations at and above the de minimis level for each applicable averaging time and pollutant. Please note that when evaluating emissions of $PM_{2.5}$, secondary formation must be addressed. Refer to Appendix R for additional information regarding secondary formation of $PM_{2.5}$.

Full NAAQS Analysis

The full NAAQS analysis is carried out for each pollutant using the AOI results from the preliminary impact determination and applicable averaging time. For multiple AOIs for the same pollutant, the person conducting the modeling can use one receptor grid that combines all significant receptors from each averaging time.

The full NAAQS analysis considers all emissions at the site under review, as well as emissions from nearby sources and background concentrations. The person conducting the modeling can receive a listing of all sources and associated parameters from the Texas Commission on Environmental Quality (TCEQ) to include in the air quality analysis (AQA). The person conducting the modeling should contact the Information Resources Division (IRD) to request this listing. Refer to Appendix C for additional guidance on source retrievals. It is the responsibility of the person conducting the modeling to obtain these data and ensure their accuracy. Any changes made to the data must be documented and justified. In addition, if the person conducting the modeling is aware of source data not provided by the IRD, such as recently issued permitted facilities or applicable facilities in other states within the distance limits of the model, the data should be included as applicable.

Model allowable emission rates for all sources that emit the pollutant. Use a certified limit for PBR authorizations. For PBRs without a certified limit, use an estimate of allowable emissions based on actual emissions. Use allowable emissions for standard permit authorizations. Use the same meteorological data set used in the preliminary impact determination modeling. The predicted concentrations may be related to the form of the NAAQS (exceedance- or statistically-based) and the number of years of meteorological data used:

- CO - When using one year of meteorological data, report the maximum H1H predicted concentration from all receptors for the 1-hour and 8-hour averaging times. When using five years of meteorological data, report the maximum high, second high (H2H) predicted concentration from all receptors for the 1-hour and 8-hour averaging times.

  Pb - The NAAQS for Pb is based on a rolling 3-month average. For a conservative representation, the Air Dispersion Modeling Team (ADMT) recommends reporting the maximum H1H monthly predicted concentration from all receptors across the applicable meteorological data set. Or a post-processing tool is available from EPA (LEADPOST) that will compute the maximum predicted concentration in the form of the standard from all receptors across the applicable meteorological data set. To download LEADPOST and the corresponding documentation, refer to: www.epa.gov/ttn/scram/dispersion_prefrec.htm#aermod

- NO_2
  - 1-hour averaging time - When using one year of meteorological data, report the maximum H1H predicted concentration from all receptors. When using five years of meteorological data, report the maximum 5-year average of the 98th percentile of the annual distribution of the maximum daily 1-hour predicted concentrations (or high, eighth high (H8H) predicted concentration) determined for each receptor.
  - Annual averaging time - Report the maximum predicted concentration from all receptors across the applicable meteorological data set.
- O_3 - Any net emissions increase of 100 tpy or more of VOCs or NO_x subject to PSD would be required to perform an ambient impact analysis. Refer to Appendix Q for additional guidance on conducting an ozone ambient impact analysis.
- PM_{10} - When using one year of meteorological data, report the maximum H1H predicted concentration from all receptors for the 24-hour averaging time. When using five years of meteorological data, report the maximum high, sixth high (H6H) predicted concentration for the concatenated five-year period.
- $PM_{2.5}$
  - 24-hour averaging time - When using one year of meteorological data, report the maximum H1H predicted concentration from all receptors. When using five years of meteorological data, report the maximum 5-year average of the 98th percentile of the annual distribution of the maximum 24-hour predicted concentrations (or H8H predicted concentration) determined for each receptor. This is consistent with EPA guidance provided secondary formation of $PM_{2.5}$ is sufficiently addressed. Refer to Appendix R for additional information concerning secondary formation of $PM_{2.5}$.
  - Annual averaging time - When using one year of meteorological data, report the maximum predicted concentration from all receptors. When using five years of meteorological data, report the highest 5-year average of the predicted concentrations from all receptors.
- SO_2
  - 1-hour averaging time - When using one year of meteorological data, report the maximum H1H predicted concentration from all receptors. When using five years of meteorological data, report the maximum 5-year average of the 99th percentile of the annual distribution of the maximum daily 1-hour predicted concentrations (or high, fourth high (H4H) predicted concentration) determined for each receptor.

- 3-hour and 24-hour averaging times - When using one year of meteorological data, report the maximum H1H predicted concentration from all receptors for the 3-hour and 24-hour averaging times. When using five years of meteorological data, report the maximum H2H predicted concentration from all receptors.
- Annual averaging time - Report the maximum predicted concentration from all receptors across the applicable meteorological data set.

Note that for any demonstration a higher concentration rank may be used to compare with a standard. That is, the maximum H1H predicted concentration could be used instead of the maximum H2H predicted concentration, since the maximum H1H would be higher and thus more conservative.

Determine a representative monitored background concentration to add with the predicted concentrations. Refer to Appendix D for additional guidance on determining representative monitoring concentrations. Compare the predicted concentration plus representative monitored background concentration for each pollutant and averaging time to the appropriate NAAQS. If the maximum concentration is at or below the NAAQS, the demonstration is complete. If not, review the demonstration for conservatism and determine if any refinements can be made (operating limitations, conservative emissions estimates, etc.), or demonstrate that the project's impact will not be significant. A possible demonstration to determine if the project's impact will not be significant may consist of comparing the project's impact to the applicable NAAQS de minimis level. If the project's impact is less than the applicable NAAQS de minimis level, then the project's impact is not significant.

Appendix F - State Property Line Standard Analysis

The purpose of the state property line standard analysis is to demonstrate compliance with state standards for net ground-level concentrations for sulfur dioxide (SO_2), hydrogen sulfide (H_2S), and sulfuric acid (H_2SO_4). This analysis must demonstrate that resulting air concentrations from all on-property facilities and sources[1] that emit the regulated pollutant will not exceed the applicable state standard.

Although all on-property facilities should be evaluated, in many cases the proposed emissions or changes in emissions may not be substantial when compared to the total emissions from the site. The basic procedure is described in the following paragraphs.

Preliminary Impact Determination

The procedure begins by conducting a preliminary impact determination by modeling the proposed allowable emission rates for all new and/or modified facilities that emit the regulated pollutant. Modeling with one year of National Weather Service (NWS) meteorological data is sufficient. If conducting an analysis for both the SO_2 state property line standard and 1-hour SO_2 National Ambient Air Quality Standards (NAAQS), and the 1-hour SO_2 NAAQS analysis is based on five years of meteorological data, be aware of model limitations when using a concatenated meteorological data set. For example, when modeling SO_2 with a concatenated five-year meteorological data set in AERMOD, AERMOD will compute 5-year average concentrations. This is not appropriate for the state property line standard.

In addition, the Environmental Protection Agency (EPA) has provided modeling guidance related to the treatment of emissions from facilities that operate intermittently. The techniques described in EPA's modeling guidance are based on the form of the 1-hour SO_2 NAAQS, and they do not apply to the state property line standard analysis for SO_2.

For new sources with no other sources on site, the predicted high concentrations for each pollutant and averaging time at or beyond the property line are then compared against the applicable state standard. If the predicted high concentrations are equal to or less than the standard, the demonstration is complete. Note that the SO_2 state standard depends on the county. Galveston, Harris, Jefferson and Orange counties have a more stringent state standard. In addition, the H_2S state standard depends on the land usage of the downwind property affected. If the downwind property is used for residential, business, or commercial purposes (in general, non-industrial areas), the state standard is more stringent:

- SO_2 - The state standard for SO_2 is based on a 30-minute averaging time. Report the maximum high, first high (H1H) predicted concentration from all receptors for the 1-hour averaging time. The 1-hour averaging time is used given that the shortest averaging time for the preferred models typically used for regulatory demonstrations is the 1-hour averaging time.

[1] See the definition of facility and source in 30 TAC Chapter 116.110

- H_2S - The state standard for H_2S is based on a 30-minute averaging time. Report the maximum H1H predicted concentration from all receptors for the 1-hour averaging time. The 1-hour averaging time is used given that the shortest averaging time for the preferred models typically used for regulatory demonstrations is the 1-hour averaging time.
- H_2SO_4 - Report the maximum H1H predicted concentration from all receptors for the
  1-hour and 24-hour averaging times.

For new and modified or only modified sources at the site, the predicted high concentrations for each pollutant and averaging time at or beyond the property line are then compared against two percent of the applicable state standard. If the predicted high concentration is less than two percent of the state standard, technical justification for demonstrating compliance may require additional information such as project emissions increases, total site emissions, results from previous site-wide modeling, or ambient air monitoring data.

For example, a nearby H_2S ambient monitor (within 8-10 kilometers (km) of the site property line) has recorded a concentration just below the state standard. The site seeking an authorization has never conducted site-wide modeling for H_2S. The project emissions increase is a small percentage of the overall site emissions. Even though the project emissions increase has a model prediction less than two percent of the state standard, modeling only the project emissions increase is not sufficient to demonstrate compliance with the standard.

However, if the predicted high concentration is equal to or greater than two percent of the state standard, coordinate with the permit reviewer to determine if site-wide modeling is needed. Staff will consider factors such as project emissions increases, total site emissions, results from previous site-wide modeling, or ambient air monitoring data.

For example, an applicant models the project emissions increase of H_2S, which results in a predicted concentration equal to or greater than two percent of the state standard. Site-wide modeling for H_2S has been previously conducted using the same model and the site-wide modeling results were only a small fraction of the state standard. Even though model predictions associated with the project emissions increase is greater than two percent of the state standard, adding the predicted concentration from the project to the previous site-wide predicted concentration may be sufficient to demonstrate compliance with the state standard. Site-wide modeling including the project emissions increase may not be necessary.

Site-wide Modeling

If site-wide modeling is required, model the allowable emission rates for all sources on the property that emit the regulated pollutant using the same meteorological data set used in the preliminary impact determination modeling. Use a certified limit for Permit-By-Rule (PBR) authorizations. For PBRs without a certified limit, use an estimate of allowable emissions based on actual emissions. Use allowable emissions for standard permit authorizations. Compare the predicted high concentration to the applicable state standard. If the predicted high concentration is equal to or less than the state standard, the demonstration is complete. If the predicted high concentration is greater than the state standard, review the demonstration for conservatism and determine if any refinements can be made.

Appendix G - Health Effects Analysis

The purpose of the health effects analysis is to demonstrate that emissions of non-criteria pollutants from a new facility or from a modification of an existing facility will be protective of the public's health and welfare.

Agency toxicologists use the results from the health effects analysis to evaluate the effects of emissions on a contaminant-by-contaminant basis. The objectives of the analysis are to:

- Establish off-property ground-level concentrations (GLCs) of contaminants resulting from proposed and/or existing emissions, and
- Evaluate these GLCs for their potential to cause adverse health or welfare effects.

The Air Permits Division (APD) has developed a guidance document to assist with conducting a health effects analysis. This guidance document is titled, *Modeling and Effects Review Applicability: How to Determine the Scope of Modeling and Effects Review for Air Permits* (MERA), and can be found at the following url: www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/mera.pdf

The MERA document establishes a process to determine the scope of the modeling and health effects review. The MERA document also provides information on the toxicology health effects evaluation procedure typically performed by the Toxicology Division (TD).

The health effects evaluation procedure is based on a three-tiered approach. Tiers I, II, and III represent progressively more complex levels of review:

- Tier I - The maximum off-property short- and long-term GLCs are compared to the effects screening levels (ESLs) for the contaminants under review. An ESL is a guideline—not a standard. This format provides the flexibility required to easily revise the value to incorporate the newest toxicity data. Consult with the TD to ensure that the most recent ESL list is used, to obtain additional information concerning the basis for ESLs, or to obtain ESLs for contaminants not on the published list. For contaminants not on the published list, provide the chemical abstract service (CAS) registry number and a material safety data sheet (MSDS) to the TD staff so that they can positively identify the contaminant and derive an ESL. If the maximum off-property short- and long-term GLCs are equal to or less than the ESLs for the contaminants under review, adverse health or welfare effects would not be expected. The current ESL list can be found at the following url: www.tceq.texas.gov/toxicology/esl/ESLMain.html
- Tier II - For contaminants with GLCs predicted to exceed their applicable ESL, determine whether the locations are industrial or non-industrial (residences, recreational areas (land or water), day care centers, hospitals, schools, unzoned and/or undeveloped areas, etc.). For industrial receptors, if the maximum off-property short- and long-term GLCs are equal to or less than two times the ESLs for the contaminants under review, adverse health or welfare effects would not be expected. For non-industrial receptors, if the maximum off-property

short- and long-term GLCs are equal to or less than the ESLs for the contaminants under review, adverse health or welfare effects would not be expected.

- Tier III - While Tiers I and II are reviews based solely on predicted concentrations, Tier III incorporates additional case-specific factors that have a bearing on exposure. The factors the TD considers in a Tier III case-by-case review may include surrounding land use, magnitude of predicted concentrations, frequency of predicted exceedance, toxic effect caused by the contaminant, etc. Consideration of all these factors together provides additional information about the potential for exposure and occurrence of adverse health and welfare effects.

  For additional information on the frequency of predicted exceedance, refer to the guidance memo at the following url: www.tceq.texas.gov/assets/public/permitting/air/memos/effeval.pdf

Appendix H – Prevention of Significant Deterioration Pre-application Analysis

The purpose of the Prevention of Significant Deterioration (PSD) pre-application analysis is to provide an analysis of the existing ambient air quality in the area that the major source or major modification would affect. The analysis must be based on continuous air quality monitoring data. The basic procedure is described in the following paragraphs. Note that pre-construction and/or post-construction monitoring could be required by the Texas Commission on Environmental Quality (TCEQ).

Compare the predicted high concentration obtained from the applicable preliminary impact determination to the significant monitoring concentration (SMC):

- Carbon Monoxide (CO) - Report the maximum high, first high (H1H) predicted concentration from all receptors for the 8-hour averaging time.
- Lead (Pb) - The SMC for Pb is based on a three-month average. For a conservative representation, the ADMT recommends reporting the maximum H1H monthly predicted concentration from all receptors.
- Nitrogen Dioxide (NO_2) - Report the maximum predicted concentration from all receptors for the annual averaging time.
- Ozone (O_3) - A SMC has not been established for O_3. However, any net emissions increase of 100 tons per year (tpy) or more of volatile organic compounds (VOCs) or nitrogen oxides (NO_x) subject to PSD would be required to perform an ambient impact analysis, including the gathering of ambient air quality data.
- Particulate Matter (PM_{10}) - Report the maximum H1H predicted concentration from all receptors for the 24-hour averaging time.
- Particulate Matter ($PM_{2.5}$) - The SMC for $PM_{2.5}$ was vacated on January 22, 2013.
- Sulfur Dioxide (SO_2) - Report the maximum H1H predicted concentration from all receptors for the 24-hour averaging time.
- Fluorides - Report the maximum H1H predicted concentration from all receptors for the 24-hour averaging time.
- Hydrogen Sulfide (H_2S) - Report the maximum H1H predicted concentration from all receptors for the 1-hour averaging time.
- Reduced Sulfur Compounds - Report the maximum H1H predicted concentration from all receptors for the 1-hour averaging time.
- Sulfuric Acid Mist (H_2SO_4) - A SMC has not been established for H_2SO_4. However, site-wide modeling from the minor New Source Review (NSR) modeling demonstration may be sufficient for the pre-application analysis.
- Total Reduced Sulfur Compounds - Report the maximum H1H predicted concentration from all receptors for the 1-hour averaging time.

If the maximum concentration is less than the SMC, the demonstration is complete. If the maximum concentration equals or exceeds the SMC, provide an analysis of the ambient air quality in the area that the project emissions would affect for applicable averaging periods.

When conducting an analysis of the ambient air quality in the area that the project emissions would affect, collect representative monitoring background concentrations to establish the existing air quality in that area. Refer to Appendix D for additional guidance on determining representative monitoring background concentrations. Please note that when conducting an analysis of the ambient air quality in the area that the project emissions would affect, the pre-application analysis is required for all averaging periods for which there is a National Ambient Air Quality Standards (NAAQS); not just the averaging period associated with the SMC.

If existing monitoring data are not available, or are judged not to be representative, then the applicant should establish a site-specific monitoring network. The applicant should coordinate with the permit reviewer for determining the scope of monitoring and for assistance in the preparation of a monitoring quality assurance plan.

Appendix I - Prevention of Significant Deterioration Increment

The purpose of the Prevention of Significant Deterioration (PSD) increment analysis is to demonstrate that emissions of applicable criteria pollutants from a new major source or major modification of an existing source will not cause or contribute to an exceedance of an increment. The PSD increment is the maximum allowable increase in concentration that is allowed to occur above a baseline concentration for a pollutant. The following discussion introduces and explains several terms that are specific to PSD increment analyses followed by the basic procedure for conducting the analysis.

Terms

Baseline and Trigger Dates. There are several dates that are used in the increment analysis:

- *Major source baseline date.* This is the date after which actual emissions associated with physical changes or changes in the method of operation at a major stationary source affect the available increment. Changes in actual emissions occurring at any stationary source after this date contribute to the baseline concentration until the minor source baseline date is established. After the minor source baseline date, new and modified major and minor stationary sources in the baseline area consume increment. Applicable major source baseline dates are listed below:
  - Nitrogen Dioxide (NO_2) - February 8, 1988
  - Particulate Matter (PM_{10}) - January 6, 1975
  - Particulate Matter ($PM_{2.5}$) - October 20, 2010
  - Sulfur Dioxide (SO_2) - January 6, 1975
- *Trigger date.* This is the date after which the minor source baseline date may be established. Applicable trigger dates are listed below:
  - NO_2 - February 8, 1988
  - PM_{10} - August 7, 1977
  - $PM_{2.5}$ - October 20, 2011
  - SO_2 - August 7, 1977
- *Minor source baseline date.* This is the earliest date after the trigger date on which a PSD application for a new major source or a major modification to an existing source is considered complete. The minor source baseline date is pollutant - and geographically-specific.

  The minor source baseline dates have been established for NO_2, PM_{10}, and SO_2 for all areas of the state. For NO_2, the minor source baseline date was established as a single date for the entire state. For PM_{10} and SO_2, the minor source baseline dates were established by air quality control regions (AQCRs). The minor source baseline dates have not been established for $PM_{2.5}$ for all areas of the state. The minor source baseline dates for $PM_{2.5}$ are established by county.

[Please note that TCEQ will insert a Web reference in this document to a list of minor source baseline dates by county and pollutant.]

Baseline area. The baseline area is established for each applicable pollutant's minor source baseline date by the submission of a complete PSD application and subsequent source impact analysis. The extent of a baseline area is limited to intrastate areas and includes all portions of the attainment or unclassifiable area in which the PSD applicant would propose to locate, as well as any attainment or unclassifiable area in which the proposed emissions would have a significant ambient impact for the annual averaging period.

The following are three examples for determining the extent of the baseline area:

1. If the annual predicted concentrations associated with proposed emissions of $PM_{2.5}$ are less than 0.3 μg/m3 for all receptors, then the extent of the baseline area is limited to the county in which the PSD applicant would propose to locate.
2. If the receptors with annual predicted concentrations associated with proposed emissions of $PM_{2.5}$ equal to 0.3 μg/m3 or greater are limited to the county in which the PSD applicant would propose to locate, then the extent of the baseline area is limited to that county.
3. If the receptors with annual predicted concentrations associated with proposed emissions of $PM_{2.5}$ equal to 0.3 μg/m3 or greater extend into one or more adjacent counties, then the extent of the baseline area encompasses all of those counties.

Baseline concentration. The ambient concentration level that existed in the baseline area at the time of the applicable minor source baseline date. The baseline concentration is the reference point for determining air quality deterioration in an area. The baseline concentration level is not based on ambient monitoring because ambient measurements reflect emissions from all sources, including those that should be excluded from the measurements.

Increment calculation. An applicant does not need to obtain the baseline ambient concentration to determine the amount of PSD increment consumed or the amount of increment available. Instead, the amount of PSD increment that has been consumed in an attainment or unclassified area is determined from the emissions increases and decreases that have occurred from stationary sources in operation since the applicable minor source baseline date. Modeled increment consumption calculations reflect the change in ambient pollutant concentration attributable to increment-affecting emissions. Increment consumption (or expansion) calculations are determined by evaluating the difference between the actual emissions at the applicable minor source baseline date ($Actual_{BD}$) and actual emissions as of the date of the modeling demonstration ($Actual_{MD}$).

- $Actual_{BD}$. This is the representative 2-year average for long-term emission rates, or the maximum short-term emission rate in the same 2-year period immediately before the applicable minor source baseline date. For major sources permitted at or after the applicable major source baseline date but not in operation as of the applicable minor source baseline date or for minor sources not in operation as of the applicable minor source baseline date, $Actual_{BD}$ would be the permit allowable emission rate.

- *$Actual_{MD}$*. This is the most recent, representative 2-year average for long-term emissions rates, or the maximum short-term emission rate in the same 2-year period immediately before the modeling demonstration. If little or no operating data are available, as in the case of permitted sources not yet in operation at the time of the increment analysis, $Actual_{MD}$ would be the permit allowable emission rate.

Conducting the Analysis

The Air Dispersion Modeling Team (ADMT) suggests a tiered approach to this analysis to limit the amount of research needed to determine actual emission rates. The person conducting the modeling should follow the basic procedure described in the following paragraphs.

Determine whether the predicted high concentration (excluding background concentration) obtained in the PSD full National Ambient Air Quality Standards (NAAQS) analysis is at or below the applicable increment. This procedure does not apply for criteria pollutants with NAAQS that are statistically-based (i.e., multi-year average).

- NO_2 - Report the maximum annual average concentration at any receptor for each year modeled.
- PM_{10}
  - 24-hour averaging time - Report the maximum high, second high (H2H) concentration at any receptor from each year modeled.
  - Annual averaging time - Report the maximum annual average concentration at any receptor for each year modeled.

  If the 24-hour PM_{10} NAAQS results are based on the maximum high, sixth high (H6H) predicted concentration, then do not compare the results with the increment.

  Although there is no annual NAAQS for PM_{10}, follow the procedure to determine the area of impact (AOI) for the annual NAAQS. The AOI is the set of receptors that have predicted concentrations equal to or greater than the de minimis level. Use this AOI to conduct the annual PM_{10} increment analysis. Also, be aware of model limitations when using a concatenated meteorological data set. For example, when modeling PM_{10} with a concatenated 5-year meteorological data set for the annual averaging period, the model may compute concentrations that have been averaged over the 5-year period. This is not appropriate for the annual averaging time. Compare the highest average concentrations from each year modeled to the increment to determine compliance.

- $PM_{2.5}$
  - 24-hour averaging time - Report the maximum H2H concentration at any receptor from each year modeled.
  - Annual averaging time - Report the maximum annual average concentration at any receptor for each year modeled.

  If the 24-hour and annual $PM_{2.5}$ NAAQS results are based on a 5-year average of the maximum predicted concentrations, then do not compare the results with the increments.
- SO_2
  - 3-hour and 24-hour averaging times - Report the maximum H2H concentration at any receptor from each year modeled.
  - Annual averaging time - Report the maximum annual average concentration at any receptor for each year modeled.

If the predicted concentration (excluding background concentration) obtained in the PSD full NAAQS analysis for the pollutants listed above is at or below the applicable increment, then the demonstration is complete because all sources were modeled at allowable emission rates. If not, then an AOI is defined, and further analyses are required. It should be noted that the U.S. Court of Appeals vacated and remanded 40 Code of Federal Regulations (CFR) 51.166(k)(2) and 52.21(k)(2) based on the Environmental Protection Agency's (EPA's) lack of authority to exempt sources from the requirements of the Federal Clean Air Act (FCAA) when it established SILs for $PM_{2.5}$. Because of the court decision, an analysis will need to be conducted in order to justify the use of the SILs. Refer to Appendix A for additional guidance on justifying the use of the SILs.

The increment analysis is carried out for each criteria pollutant and averaging time separately and need only include the AOI for the associated criteria pollutant and averaging time combination. The AOI will be the same one used in the PSD NAAQS analysis, except for those criteria pollutants with NAAQS that are statistically-based. While the significant impact levels (SILs) for both NAAQS and increment are identical, the procedures to determine significance (that is, predicted concentrations to compare to the SIL) are different. This difference occurs because for those NAAQS that are statistically-based, the corresponding increments are exceedance-based. For criteria pollutants with NAAQS that are statistically-based, determine the AOI following the convention of exceedance-based NAAQS (i.e., maximum predicted concentration).

- For example, when modeling $PM_{2.5}$, use the maximum predicted concentrations from all receptors to determine the AOI for the 24-hour and annual averaging times instead of the 5-year average of the maximum predicted concentrations from the NAAQS analysis.

The increment analysis considers all increment-affecting emissions at the site under review, as well as increment-affecting emissions from nearby sources. The person conducting the modeling can receive a listing of all increment-affecting sources and associated parameters from the Texas Commission on Environmental Quality (TCEQ) to include in the air dispersion modeling. The person conducting the modeling should contact the Information Resources Division (IRD) on how to receive this listing. Refer to Appendix C for additional guidance on source retrievals. It is the responsibility of the person conducting the modeling to obtain these data and ensure their accuracy. Any changes made to the data must be documented and justified. In addition, if the person conducting the modeling is aware of source data not provided by the IRD, such as recently issued permitted facilities or applicable facilities in other states, the data should be included as applicable.

Adjust the emission inventory.

- Omit any source from the inventory that has a negative emission rate unless the source existed and was in operation at the applicable minor source baseline date. A source must have existed and been in operation on or before the applicable minor source baseline date to be considered for increment expansion.
- Omit any source permitted after the applicable minor source baseline date that has shut down or any source as part of the current project that will be shut down. A source that did not exist or was not operating on or before the applicable minor source baseline date would not have contributed to the air quality at that time, and there would be no need to model the source with an emission rate of zero.

Conduct the modeling demonstration using the same meteorological data set used in the determination of the AOI using the following tiered approach, as applicable.

Increment Modeling Tier I. Model all sources using their allowable emission rates. This approach is conservative since the *difference* in increment is based on the entire allowable emission rate.

- NO_2 - Report the maximum annual average concentration at any receptor for each year modeled.
- PM_{10}
  - 24-hour averaging time - Report the maximum H2H concentration at any receptor from each year modeled.
  - Annual averaging time - Report the maximum annual average concentration at any receptor for each year modeled.
- $PM_{2.5}$
  - 24-hour averaging time - Report the maximum H2H concentration at any receptor from each year modeled.
  - Annual averaging time - Report the maximum annual average concentration at any receptor for each year modeled.
- SO_2
  - 3-hour and 24-hour averaging times - Report the maximum H2H concentration at any receptor from each year modeled.

- Annual averaging time - Report the maximum annual average concentration at any receptor for each year modeled.

Be aware of model limitations when using a concatenated meteorological data set. For example, when modeling NO_2 with a concatenated 5-year meteorological data set for the annual averaging period, the model may compute 5-year average annual concentrations. This is not appropriate for the annual averaging time.

Compare the predicted concentration to the appropriate increment. If the increment is not exceeded, the demonstration is complete. Otherwise, go to Tier II.

Increment Modeling Tier II. Model selected sources with $Actual_{MD}$ emission rates and all other sources at allowable emission rates. The selected sources are usually the applicant's, since actual emission rates may be difficult to obtain for off-property sources. This process assumes that the *difference* in increment for the selected sources is based on the entire actual emission rate.

Report the model predictions following the same conventions listed in Tier I. Compare the predicted high concentration to the appropriate increment. If the increment is not exceeded, the demonstration is complete. Otherwise, go to Tier III.

Increment Modeling Tier III. Model selected sources that existed and were in operation at the applicable minor source baseline date with the *difference* between $Actual_{MD}$ and $Actual_{BD}$.

- For major sources permitted at or after the applicable major source baseline date but not in operation as of the applicable minor source baseline date or for minor sources not in operation as of the applicable minor source baseline date, use the difference between $Actual_{MD}$ and the allowable emission rate ($Actual_{BD}$).
- For sources that existed at the applicable minor source baseline date, where a change in actual emission rates involved a change in stack parameters, use the emission rates associated with both the applicable minor source baseline date and the current and/or proposed source configuration. That is, enter the $Actual_{BD}$ as negative numbers along with the applicable minor source baseline source parameters, and enter $Actual_{MD}$ for the same source as positive numbers along with the current and/or proposed source parameters.
- Use emission rates found in Tiers I or II for other sources, as applicable.

Report the model predictions following the same conventions listed in Tier I. Compare the predicted high concentration to the appropriate increment. If the increment is not exceeded, the demonstration is complete. Otherwise, continue to refine increment emission rates or demonstrate that the project's impact will not be significant.

Appendix J - Preferred Air Dispersion Models

The U.S. Environmental Protection Agency (EPA) has adopted the American Meteorological Society/EPA Regulatory Model (AERMOD) as the preferred air dispersion model for major New Source Review (NSR) permits. The model is used for refined modeling of criteria pollutants within approximately 50 kilometers (km) of a site. Beyond 50 km, the EPA has adopted the California Puff model (CALPUFF) as the preferred model for long-range transport.

Refined Models

An applicant can use either AERMOD or the most recent version of the Industrial Source Complex (ISC) with Plume Rise Model Enhancements (ISC-PRIME) model until a federal NSR review is required. The most recent version of the ISC model can also be used if the dispersion of air contaminants could not be affected by building downwash at a site.

Once an applicant has used AERMOD for a major NSR permit, AERMOD should be used for minor NSR permits as well. In addition, if AERMOD has been relied upon for a minor NSR permit, AERMOD should continue to be used at that site (this includes single property line designations [SPLDs]). This guidance will ensure consistency in the technical review process as modeled concentrations will be calculated under the requirements of the same modeling system. If the ISC-PRIME model or the ISC model has been used previously, engineering judgment must be used to reconcile emissions limits and controls based on predicted differences in contaminant concentrations between modeling systems until all authorizations at the site are evaluated under the same modeling system.

Screening Models

An applicant can use either AERSCREEN or the SCREEN3 model until a federal NSR review is required. AERSCREEN is a screening version of AERMOD, and SCREEN3 is a screening version of the ISC model.

Once an applicant has used AERSCREEN for a major NSR permit, AERSCREEN should be used for minor NSR permits as well. In addition, if AERSCREEN has been relied upon for a site-wide analysis for a minor NSR permit, AERSCREEN should continue to be used at that site (this includes SPLDs). This guidance will ensure consistency in the technical review process as modeled concentrations will be calculated under the requirements of the same modeling system. If the SCREEN3 model has been used previously, engineering judgment must be used to reconcile emissions limits and controls based on predicted differences in contaminant concentrations between modeling systems until all authorizations at the site are evaluated under the same modeling system.

Appendix K - Source Characterizations

It is important that the applicant, or staff developing scenarios for agency-directed modeling, completely and accurately describes the operating factors and conditions of the facilities undergoing permit review. The following is a list of the type of factors that should be considered before emissions can be characterized and model parameters developed.

Operation or Process Limitations

The applicant, or Texas Commission on Environmental Quality (TCEQ) staff as applicable, should address the following factors in the permit application and modeling protocol or checklist, if the facilities do not operate continuously:

- Operational scenarios. Provide worst-case and reasonable worst-case operational scenarios, and discuss how likely it would be for the worst-case scenario to occur. In addition, describe the operational processes in enough detail to justify all source type characterizations. For example, for a blasting operation, provide the minimum and maximum size of a blasting area and the details of how the blasting operation will be conducted. That is, describe such operational factors as whether the operation will be done manually or by machine; on a single side at a time or multiple sides; or on one level at a set height or multiple levels with a varying height.
- Hours of operation. For each facility under permit review, identify the hours of operation. If the hours of operation are less than 8760 hours per year, provide any time-of-day or seasonal restrictions, and whether the emissions are the same for each hour or if they are reduced for some hours.
- Type of emissions. Identify all facilities that could be operated simultaneously. For example, for a site with coating and blasting facilities, indoor coating and outdoor blasting could occur at the same time. If the emissions are not continuous, the applicant should identify any batch process or a process that must occur before another process can occur. In addition, the applicant should include the frequency and duration of the emissions, for example, one hour out of every three hours or one hour per day.
- Emission rates. Short-term emissions for a single specific facility often vary significantly with time because of such factors as fluctuations in process operating conditions; control device operating conditions; type of raw materials being handled or processed; and ambient conditions. Provide the basis used to determine the maximum allowable emission rate. For example, is the emission rate based on the potential for a single spike during an hour, or are the emissions uniform throughout an hour? Alternatively, are the emissions linked to wind speed, such as wind-generated emissions originating from a standing stockpile?

- Controls. Describe any best management practice that will be used in addition to controls that must be used to meet best available control technology requirements, such as shrouds, bunkers, or fixed enclosures. The use of partial or full obstructions to airflow will affect the way a fugitive emission is characterized for input into the air dispersion model. The characterization will depend on factors such as the height of release; height of the enclosure; particle size; and the duration of the operation. For example, if shrouds will be used to contain emissions from the outdoor blasting or painting of small equipment, the characterization will be different if two-sided shrouds are used compared to the use of four-sided shrouds. The height of release that will be used in the model for the two-sided shroud will be lower than the height of release for a four-sided shroud. In addition, if particle size was not considered in the development of the emission rate, the modeled emission rate might be reduced to account for lower expected emissions due to impact with all sides of the shroud and release of emissions at the top of the shroud.

Source Types

The source characterizations used in a modeling analysis will depend on the model being used. The guidance discussed in this section addresses some, but not all, possible ways to characterize certain types of point and non-point sources. Ensure that applicants are aware of any new procedures before final modeling is conducted. In addition, applicants, or staff if applicable, should include a complete description of how a source is characterized and how the applicable modeling parameters were developed in the air quality analysis (AQA). The description is important because several characterizations for the same source could be appropriate depending upon the potential impact of building and other structures and meteorological conditions. The following is a brief discussion of different source characterizations:

- Point. Use the point source characterization to simulate emissions that are emitted from a stack. For the point source characterization, such as a vent pipe, use the actual stack diameter, exit gas velocity, and exit gas temperature in the modeling demonstration. Use the actual height of release unless the height of release varies due to the operational process. In those cases, use the average height of release. For example, if a vent pipe is located on the deck of a marine vessel, the height of the top of the pipe will vary during the loading or unloading process, as the vessel rises or falls in the water. Therefore, determine an average height of release and use that height in the model.
    - Pseudo-point. This source type is a point source characterization using default stack parameters, and the emissions are treated as if they are released from a stack. Default parameters for stack diameter, exit gas velocity, and exit gas temperature are used to prevent the stack plume from having any buoyancy or momentum flux. Examples of sources that might be treated as pseudo-points are individual pipe connections; flanges; small vents and ducts (a few feet in diameter); small stockpiles; and covered, obstructed, or horizontal stacks.

Use the following default stack parameters when using SCREEN3 or ISC:

- Stack diameter: 0.001 meter
- Exit gas velocity: 0.001 meters per second
- Exit gas temperature: 0 Kelvin (the ISC model will use the ambient temperature as the exit gas temperature)
- Height of release: use the actual release height

When using AERSCREEN or AERMOD, follow the appropriate guidance contained in the AERMOD Implementation Guide for determining the default parameters: www.epa.gov/ttn/scram/7thconf/aermod/aermod_implmtn_guide_19March2009.pdf

- Volume. Use the volume source characterization to simulate emissions that initially disperse in three dimensions with little or no plume rise, such as emissions from vents on a building roof; multiple vents from a building; and fugitive emissions from pipes, stockpiles, and conveyor belts. Parameters used to characterize volume sources are location, height of release, and initial horizontal and vertical dimensions. The height of release is the center of the volume source above the ground. The initial horizontal and vertical dimensions are used to determine the applicable dispersion parameters. The length of the side of the volume source, the vertical height of the source, and whether the source is on or adjacent to a structure or building must be identified in order to determine the applicable dispersion parameters (see section 1.2.2 of the ISC Model User's Guide - Volume II for suggested procedures to be used for estimating the initial horizontal and vertical dimensions for various types of volume sources).

  For example, if the length and width of a piping structure is 10 meters and the piping extends from the surface to 20 meters, and the emissions could come from multiple locations throughout the entire piping structure, then the initial horizontal dimension would be 10 meters divided by 4.3, the initial vertical dimension would be 20 meters divided by 2.15, and the height of release would be 10 meters. However, if emissions could only come from the upper portions of the piping structure (from 10 to 20 meters), then the initial horizontal dimension would be 10 meters divided by 4.3, the initial vertical dimension would be 10 meters divided by 4.3, and the height of release would be 15 meters.

  The base of the volume source must be square. If the base is not square, model the source as a series of adjacent volume sources, each with a square base. For relatively uniform sources, determine an equivalent square by taking the square root of the area of the length and width of the volume base.

- Area. Use the area source characterization to simulate emissions that initially disperse in two dimensions with little or no plume rise, such as ground-level or low-level emissions from a storage pile, slag dump, landfill, or holding pond. Parameters used to characterize area sources are location, geometry, and release height. The geometry of an area source may be characterized as a rectangle, irregularly shaped polygon, or circle. If the source is not at ground level, then a height of release must be entered into the model.

  The emission "rate" is unique for an area source in that emissions are entered in units of mass per unit time per unit area; an emission flux rather than a rate. Use an emission rate per unit area instead of total emissions; that is, divide the total emissions in grams per second by the total area in square meters. Also, the model integrates over the portion of the area that is upwind of a receptor so receptors may be placed within the area and at the edge of the area. The model does not integrate for portions of the area that are closer than one meter upwind of a receptor.

- Open Pit. Use the open pit source characterization to simulate emissions from facilities that originate from a below-grade open pit. Parameters used are the open pit emission rate, the average release height, the initial lengths of the X and Y sides of the open pit, the volume of the open pit, and the orientation angle in degrees from 360 degrees (north). While detailed guidance is contained in section 1.2.4 of the ISC Model User's Guide - Volume II, some factors to consider follow.
  - As with the area source characterization, an emission rate per unit area is used; that is, the total emissions in grams per second divided by the total area in square meters.
  - The average release height above the base of the open pit cannot exceed the pit's effective depth, which is calculated by the model based on the pit's length, width, and volume. An average release height of zero indicates emissions that are released from the base of the pit.
  - The length-to-width aspect ratio for open pit sources should be less than 10 to 1. Unlike the area source characterization, the open pit cannot be subdivided because the assumption used to develop the algorithm is that the emissions are mixed throughout the pit before being dispersed. Characterize irregularly shaped pit areas by a rectangular shape of equal area.
  - Unlike the area source characterization, receptors cannot be placed within the boundaries of the pit.
- Flare. Flares are a special type of elevated source that may be modeled using a point source characterization or a flare source characterization. It may be difficult to obtain the necessary input parameters for air dispersion modeling based on the design and operation of a flare. A large open flame radiates a significant portion of the heat of combustion associated with a flaring gas stream. The buoyancy of the combustion gases will be related to the remaining sensible heat of the flare gas. There are two methods for modeling emissions from a flare. One method uses a traditional point source characterization with user-provided exit gas velocity, exit

gas temperature, height of release, and effective stack diameter to determine the amount of buoyancy flux. In this method, the heat release of the flared gas is used to derive an equivalent stack diameter while the exit gas temperature and exit gas velocity are fixed.

Use the following default parameters:

- Exit gas velocity: 20 meters per second
- Exit gas temperature: 1273 Kelvin
- Height of release: use the actual height of the flare tip

The effective stack diameter (D) in meters is calculated using the following equations:

$$D=\sqrt{(10\text{-}6\ q_n)}$$

and

$$q_n=q(1-0.048\sqrt{MW})$$

where

q = gross heat release in calories per second

q_n = net heat release in calories per second

MW = weighted (by volume) average molecular weight of the compound being flared

Note that enclosed vapor combustion units should not be modeled with the preceding parameters but instead with stack parameters that reflect the physical characteristics of the unit.

The second method for modeling emissions from a flare was developed for the flare source characterization. In this method, the user provides the height of release and the gross heat release from the flare. The height of release is the actual height of the flare tip. The model uses the gross heat release from the flare together with a fixed exit gas temperature and exit gas velocity to internally calculate the effective diameter.

Equivalency of Source Types

There is no direct equivalency or relationship between the types of source characterizations. Many factors must be considered to determine if a source characterization is conservative or representative. A conservative characterization is one that will result in a higher concentration than a representative characterization would in a specific area of concern. In addition, a conservative concentration would not be expected to occur based on actual operation of the permitted facility. In general, use a screening model to determine whether a characterization would be conservative and under what meteorological conditions. This information will make the processes of model result clarification or post-processing of modeled predictions easier. Factors to consider when choosing a source characterization include:

- Type of compliance demonstration. National Ambient Air Quality Standards (NAAQS), Prevention of Significant Deterioration (PSD) Increment, and state property line standard compliance demonstrations are directly related to the highest concentrations predicted in ambient air. For these demonstrations, a characterization does not have to be representative if it results in a conservative prediction. However, for a health effects review, the type of receptor and magnitude and frequency of exposure must be considered. Therefore, a source should be characterized in the most representative way to ensure that the health effects review is based on realistic data, and to prevent costly or unnecessary process changes.
- Distance from the source to the property line or area of concern. At great distance (on the order of thousands of feet), and other factors such as height of release being equal, source type is not as important as when the distance to a property line or area of concern is short. At great distance, predicted concentrations will begin to converge as horizontal and vertical dispersion parameters increase and differences between them for a given source type decrease. However, for short distances there can be significant differences between horizontal and vertical dispersion parameters and thus between predicted concentrations of different source types.
- Height of release. While the height of release from a stack is obvious, the height of release from a fugitive source may not be obvious and is important because the height of release for a fugitive source is the plume centerline and the height of maximum concentration. With no plume rise, the maximum concentration in the plume will stay at the same height and concentrations can only reach the ground through vertical dispersion. For a pseudo-point and usually any point within an area, there is no initial vertical dispersion; however, a volume source has initial dispersion. Therefore, a volume source with the same level of emissions as a pseudo-point source can have a greater impact than a pseudo-point source within short distances because the plume reaches the ground more quickly.
- Shape of a non-point source. The shape of a non-point source will directly affect the model's prediction of the magnitude and location of maximum concentrations. In addition, the predicted frequency of occurrence will also be affected. Therefore, it would not be appropriate to represent the base of a long and narrow source of emissions as a single equivalent square, unless there were other mitigating factors such as great distance from the source to the property line or receptors of concern. Either multiple volumes, single area, or several areas may be an appropriate choice. Keep in mind that a justification for any choice of source type based on the specific factors for the project is required.

Appendix L - Downwash Applicability

Downwash is a term used to represent the potential effects of a building on the dispersion of emissions from a source. Downwash is considered for sources characterized as point sources. The stack height and proximity of a point source to a structure can be used to determine the applicability of downwash. Downwash does not apply to sources characterized as areas. Downwash is indirectly considered for volume sources by adjusting the initial dispersion factors.

Point sources with stack heights less than good engineering practice (GEP) stack height should consider dispersion impacts associated with building wake effects (downwash). GEP stack height is the greater of (40 CFR § 51.100(ii)):

(1) 65 meters, measured from the ground-level elevation at the base of the stack:

(2) (i) For stacks in existence on January 12, 1979, and for which the owner or operator had obtained all applicable permits or approvals required under 40 CFR parts 51 and 52.

$H_g = 2.5H$,

provided the owner or operator produces evidence that this equation was actually relied on in establishing an emission limitation:

(ii) For all other stacks,

$H_g = H + 1.5L$

where

H_g is the GEP stack height;

H is the structure height; and

L is the lesser of the structure height or maximum projected width (the width as seen from the source looking towards either the wind direction or the direction of interest) of the structure.

These formulas define the stack height above which building wake effects on the stack gas exhaust may be considered insignificant.

A structure is considered sufficiently close to a stack to cause downwash when the minimum distance between the stack and the building is less than or equal to five times the lesser of the structure height or maximum projected width of the structure (5L). This distance is commonly referred to as the structure's region of influence.

If the source is located near more than one structure, assess each structure and stack configuration separately. For SCREEN3, include the building with dimensions that result in the highest GEP stack height for that source, to evaluate the greatest downwash effects. Be aware that when screening tanks, the tank diameter should not be used. The SCREEN3 model uses the square root of the sum of the individual squares of both the width and length for a structure in order to calculate the projected width. Because most tanks are round, the projected width is constant for all flow vectors. However, using the actual tank diameter for both width and length will result in a projected width that is too large.

Therefore, when screening tanks, the diameter of the tank should be divided by the square root of 2.

For refined models, there are tools available for assessing each structure and stack configuration if a source is located near more than one structure. The Building Profile Input Program - Plume Rise Model Enhancements (BPIP-PRIME) is a multi-building dimensions program incorporating the GEP technical procedures for PRIME applications, which calculates direction-specific downwash parameters for use with air dispersion models. For more information on the user's guide and the program documentation, see the following url:
www.epa.gov/ttn/scram/dispersion_related.htm#bpipprm

Once downwash applicability is determined, provide documentation to support that determination. The documentation may include, but is not limited to, a plot plan with all sources and structures clearly labeled, a table of structure heights used in the downwash analysis, recent aerial photography, etc.

Note that for solid structures surrounded by porous structures, only include the dimensions for the solid structure. For example, if a building is surrounded by condensed piping, include the dimensions of the enclosed building in the downwash analysis and do not base the dimensions on the total size of the enclosed building and condensed piping.

Appendix M – Receptor Design

For modeling, receptors are locations where the model calculates a predicted concentration. Design a receptor grid with sufficient spatial coverage and density to determine the maximum predicted ground-level concentration in an off-property area or an area not controlled by the applicant. For NAAQS and PSD increment modeling, receptors should cover the entire area of de minimis impact. For example, if the model predictions at the edge of the receptor grid are greater than de minimis, extend the receptor grid until the model predictions are less than de minimis.

When designing a receptor grid, consider such factors as:

- Results of screening analyses;
- A source's release height;
- Proximity of sources to the property line;
- Location of non-industrial receptors and ambient air monitors; and
- Topography, climatology, and other relevant factors.

In addition, the location of *ambient air* receptors should guide the design of the receptor grid. Ambient air for minor New Source Review (NSR) modeling starts at the applicant's property line. If a single property line designation (SPLD) exists, then ambient air for minor NSR modeling starts at the single property line boundary. Note that the SPLD does not apply to federal reviews.

For Prevention of Significant Deterioration (PSD) modeling, ambient air starts at the applicant's fence line or other physical barrier to public access. Also, no receptors are required on the applicant's property because the air over an applicant's property is not ambient; therefore, in a regulatory sense, applicants cannot cause a condition of air pollution on their property from their own sources.

Generally, the spacing of receptors increases with distance from the sources being evaluated. Consider the following types of receptor spacing:

- *Tight receptors.* Spaced 25 meters apart. Tight receptors could extend up to 200-300 meters from the sources being evaluated. Consider the distance between the source and the property or fence line.
- *Fine receptors* Spaced 100 meters apart. Fine receptors could extend one kilometer (km) from each source being modeled.
- *Medium receptors.* Spaced 500 meters apart. Medium receptors could cover the area that lies between one and five km from each source.
- *Coarse receptors.* Spaced one km apart. This spacing could cover the area that lies beyond the medium receptors out to 50 km.

Enter receptor locations into air dispersion models in Universal Transverse Mercator (UTM) coordinates, in order to be consistent with on- and off-property source locations represented in the air permit application, and other reference material, such as United States Geological Survey (USGS) topographic maps. Provide the datum used for UTM coordinates. Applicable UTM zones in Texas are either 13 (from the west border to 102 degrees longitude), 14 (between 102 and 96 degrees longitude), or 15 (east of 96 degrees longitude to the east border). Do not use coordinate systems based on plant coordinates or other applicant-developed coordinate systems.

Special cases to consider when developing a receptor grid

In most cases, the property line is well defined and all sources of emissions are on property. However, for some activities, such as marine loading, sources may be located off-property and emitting directly into ambient air. For these cases, the following guidance for determining the points of evaluation is appropriate for the technical review process, and applies whether the analysis is for a standard or effects screening level (ESL), with one exception. The Texas legislature enacted Section 382.066 in the Texas Health and Safety Code (THSC) [House Bill (HB) 3040] for shipyard facilities. This section exempts shipbuilding or ship repair operations from modeling and effects review for non-criteria pollutants over coastal waters. Therefore, for these facilities, the following guidance only applies to reviews concerning criteria pollutants. For non-criteria pollutants, no receptors are required over water.

Off-property receptors over water

There are three basic approaches that could be used to determine where receptors should be placed when a source is located off-property in ambient air. These could be used individually or in combination. These distances would apply for technical review purposes only. The applicant must still comply with all the Agency's rules and regulations.

- *Set distance*: A fixed distance for modeled receptor grid points of 25 meters is normally used for low-level fugitive-type emissions and for emissions from stacks that could be affected by downwash. The points start at the property line and extend from about 100-200 meters before the suggested grid spacing changes. If the activity is located off-property in the water, the source of emissions is considered to be part of the property during actual operations. Since the general public would not be present at the source, receptors should be placed starting at a distance 25 meters from the edge of the source instead of on the actual property line.
- *Controlled or restricted distance*: There are two general distance limit scenarios.
  - Controlled: If the applicant can limit access to an area near the source of emissions for the duration of the operation such that the general public and off-site workers would not be exposed, the modeled receptor grid points could begin at the edge of the control area, as well as, on the property line in the uncontrolled areas. Use of buoys would be an example of a way to limit access.

- Restricted: If the applicant can show that access is restricted, the modeled receptor grid points could begin at the edge of the restricted area, as well as, on the property line in the unrestricted areas. For the purposes of modeling and effects review, a restricted area is accessible only to the applicant's employees, including personnel associated with marine vessel operations. If other individuals have access to the area, then the area is not restricted, and receptors would be placed in the area. Examples of restricted areas could be a coastal easement agreement with the General Land Office that allows the applicant to restrict access, or any other authority that allows the applicant to post signs that prohibit access to anyone other than the applicant's personnel. The applicant should provide documentation for restricted areas, including specific coordinates and any applicable specified conditions for the area, to the permit reviewer. Note that a restricted area could be a water area, shore area, or both.

- *Model limitation distance*: There is another consideration, in addition to the set or controlled distance consideration. The model may not be able to calculate a concentration immediately adjacent to the source. In that case, the modeled receptor grid points should begin at the closest point that the model can calculate a concentration from the source at or beyond 25 meters from the edge of the source. The distance of the grid points from the edge of the source would be linked to the limiting algorithm in the model. This distance could be a minimum of one meter for a point, pseudo-point, or an area source to about 47 meters from the center of a volume source with about a 91-meter base.

Note that a model's limitation is not related to a "property line" but to an algorithm in the model. Therefore, there may be sources that are located on a property at a distance that would prevent the model from calculating a concentration on a property line or on a grid receptor placed on a land location off the property.

Following are some receptor placement examples

Receptor Placement Example 1: Consider a site that has emissions from a stack on a ship that is moored at a dock in the water off the actual property of the applicant. Receptors should be placed starting at a distance of 25 meters from the edge of the ship in the water and out a sufficient distance to record the highest predicted concentrations and to demonstrate that concentrations are declining with distance.

Receptor Placement Example 2: Consider a site that conducts blasting operations in two locations at a site: a dock, located in the water off the applicant's actual property; and, outside a building located in the center of the property. Operations are such that the permit reviewer determines that PM_{10} (a criteria pollutant) should be evaluated per HB3040. During blasting at the dock, the applicant can control access out to a distance of 40 meters over water from all sides of the ship. For the controlled area, receptors should be placed at the start of the area. Normal receptor placement procedures would be used for the property-line receptors over land, and away from the controlled area over the water. Receptors over both land and water should extend out a sufficient distance to record the highest predicted concentrations and to demonstrate that concentrations are declining with distance.

If the dock and building operations can occur at the same time, then the controlled area for the dock operation will drive the creation of the receptor grid over water. However, if the operations can occur independently, and the area near the dock will not be controlled during operations at the building, then a separate model run may be required for this scenario depending on factors such as the amount of emissions and distance from the water. In this case, the receptors should start at the property line and extend directly over water.

Receptor Placement Example 3: Consider a site where the applicant unloads container ships at a dock. Assume that the width of the ship is 20 meters. In addition, assume that the operation can be represented by a volume created by the movement of a multiple scoop conveyor lifting material out of a compartment and onto another conveyor. The length and width of the volume are 16 meters based on the size of the compartment. With no other adjustments to the initial dimensions, receptors over water could be placed starting at a distance of about 9 meters from the center of the volume. However, since this distance is less than 25 meters from the edge of the ship, the greater distance should be used.

In this case, the receptors over water would begin at a distance of 45 meters from the dock (25 meters from the edge of the ship) and should continue out a sufficient distance over the water to record the highest predicted concentrations and to demonstrate that concentrations are declining. Normal receptor placement would be used for the property-line receptors away from the water. If the distance from the center of the volume to a non-water property line is less than 9 meters, the receptors over land would start at 9 meters from the center of the volume.

Appendix N - Surface Characteristics of the Modeling Domain

The modeling domain is the region that will influence the dispersion of the emissions from the facilities under review. Surface characteristics for the modeling domain should be evaluated when determining representative dispersion coefficients. Air dispersion models utilize dispersion coefficients to determine the rate of dispersion for a plume. Dispersion coefficients are influenced by factors such as land-use / land-cover (LULC), terrain, averaging period, and meteorological conditions.

Evaluating the LULC within the modeling domain is an integral component to air dispersion modeling. The data obtained from a LULC analysis can be used to determine representative dispersion coefficients. The selection of representative dispersion coefficients may be as simple as selecting between rural or urban land-use types. For more complex analyses, representative dispersion coefficients can be determined by parameters that are directly related to the LULC within the modeling domain.

LULC Analysis for ISC, ISC-PRIME, and SCREEN3

For the ISC, ISC-PRIME, and SCREEN3 models, the dispersion coefficients are based on whether the area is predominately rural or urban. The classification of the land use in the vicinity of sources of air pollution is needed because dispersion rates differ between rural and urban areas. In general, urban areas cause greater rates of dispersion because of increased turbulent mixing and buoyancy-induced mixing. This mixing is due to the combination of greater surface roughness caused by more buildings and structures and greater amounts of heat released from concrete and similar surfaces.

The Environmental Protection Agency (EPA) guidance provides two procedures to determine whether the character of an area is predominantly rural or urban. One procedure is based on land-use typing and the other is based on population density. Both procedures require an evaluation of characteristics within a three-kilometer radius from a source. The land-use typing method is based on the work of August Auer (Auer, 1978) and is preferred because it is more directly related to the surface characteristics of the evaluated area that affects dispersion rates.

While the Auer land-use typing method is more direct, it can be labor-intensive to apply. A simplified technique can be used as a screening tool. If the land-use designation is clear; that is, about 70 percent or more of the total land use is either rural or urban, then further refinement is not necessary.

Simplified Auer Land-Use Analysis

The Auer land-use approach considers four primary land-use types: Industrial (I), Commercial (C), Residential (R), and Agricultural (A). Within these primary types, subtypes are identified in Table N-1.

Table N - 1. Land Use Types and Corresponding Dispersion Classification

Type	Description	Class
I1	Heavy Industrial	Urban
I2	Light/Moderate Industrial	Urban
C1	Commercial	Urban
R1	Common Residential (Normal Easements)	Rural
R2	Compact Residential (Single-Family)	Urban
R3	Compact Residential (Multi-Family)	Urban
R4	Estate Residential (Multi-Acre)	Rural
A1	Metropolitan Natural	Rural
A2	Agricultural	Rural
A3	Undeveloped (Grass/Weeds)	Rural
A4	Undeveloped (Heavily Wooded)	Rural
A5	Water Surfaces	Rural

The goal in a simplified Auer land-use analysis is to estimate the percentage of the area within a three-kilometer radius of the source to be evaluated that is either rural or urban. Both land use types do not need to be evaluated since the land use type that has the greatest percentage will be the representative type.

The primary assumption for the simplified procedure is based on the premise that many facilities should have clear-cut rural or urban designations; that is, the percentage of the primary designation should be greater than about 70 percent. If the land-use designation represents less than 70 percent of the total, supplement the analysis with current aerial photography of the area surrounding the sources or with a detailed drive-through summary to support the land-use designation to be used in the modeling demonstration.

LULC Analysis for AERMOD and AERSCREEN

For AERMOD and AERSCREEN, dispersion coefficients are determined by parameters that are directly related to the LULC within the modeling domain. For example, albedo, Bowen ratio, and surface roughness length all vary for different land-use types and all three parameters affect processes that take place in the surface boundary layer.

- **Albedo** - defined as the ratio of reflected flux density to incident flux density, referenced to some surface. A high albedo value is associated with a greater amount of reflection of incoming solar radiation. An increase in the reflection of incoming solar radiation will result in less energy available for sensible or latent heat loss and thus a decrease in convective turbulence.
- **Bowen Ratio** - defined as the ratio of sensible heat flux to latent heat flux from the earth's surface up into the air. A low Bowen ratio is associated with a surface that has a larger latent heat flux than sensible heat flux. A large latent heat flux means less energy is available for sensible heat loss, and will result in a decrease in convective turbulence.
- **Surface Roughness Length** - defined as the height above the displacement plane at which the mean wind becomes zero when extrapolating the logarithmic wind speed profile downward through the surface layer. A high surface roughness length will result in greater mechanical turbulence and increased vertical mixing.

There are numerous field studies and references that document different values for these surface characteristic parameters based on LULC, as well as for different seasons of the year. In addition, a tool has been developed by the EPA (AERSURFACE) that can be used to process land cover data to determine the surface characteristic values of the modeling domain. To download AERSURFACE and the corresponding documentation, refer to: www.epa.gov/ttn/scram/dispersion_related.htm#aersurface

Provide the technical justification for model options selected, including any references for parameter values in the air quality analysis (AQA).

AERMOD and AERSCREEN also include an urban option so that the model can be run using urban algorithms. The urban option used in AERMOD and AERSCREEN is not the same as urban dispersion coefficients used with ISC, ISC-PRIME, and SCREEN3. The urban option in AERMOD and AERSCREEN is used to account for the dispersive nature of the "convective-like" boundary layer that forms during nighttime conditions due to the urban heat island effect. The urban heat island effect is due to industrial and urban development. In rural areas, a large part of the incoming solar energy is used to evaporate water from vegetation and soil. In cities, where less vegetation and exposed soil exists, the majority of the sun's energy is absorbed by urban structures and asphalt. At night, the solar energy (stored as vast quantities of heat in city buildings and roads) is slowly released into the city air. Additional city heat is given off at night by vehicles and factories, as well as by industrial and domestic heating and cooling units. The slow release of heat tends to keep nighttime city temperatures higher than those of the faster cooling rural areas. The magnitude of the urban heat island effect is driven by the urban-rural temperature difference that develops at night.

The urban option is used to enhance the turbulence for urban nighttime conditions over that which is expected in the adjacent rural, stable boundary layer. For most applications, the Land Use Procedure described in Section 7.2.3(c) of the Guideline on Air Quality Models (GAQM) is sufficient for determining the urban/rural status. However, there may be sources located within an urban area, but located close enough to a body of water or to other non-urban land-use categories to result in a predominately rural land use classification within three kilometers of the source following that procedure. Users are therefore cautioned against applying the Land Use Procedure on a source-by-source basis, but should also consider the potential for urban heat island influences across the full modeling domain. This is consistent with the fact that the urban heat island is not a localized effect, but is more regional in character.

For additional information about the urban option and the corresponding required input parameters for the urban option, see the guidance contained in the *AERMOD Implementation Guide*:
www.epa.gov/ttn/scram/7thconf/aermod/aermod_implmtn_guide_19March2009.pdf

Terrain

Much of Texas can be characterized as having relatively flat terrain; however, some areas of the state have simple-to-complex terrain. The Air Dispersion Modeling Team (ADMT) defines flat terrain as terrain equal to the elevation of the stack base; simple terrain as terrain lower than the height of the stack top; and, complex terrain as terrain above the height of the plume center line (for screening modeling, complex terrain is terrain above the height of the stack top). Terrain above the height of the stack top but below the height of the plume center line is known as intermediate terrain.

Evaluate the geography within the modeling domain to determine how terrain elevations should be addressed. There are many sources of terrain elevation data that can be used in air dispersion modeling demonstrations. However, the sources of terrain elevation data may differ in sampling interval, geographic reference system, areas covered, and accuracy of data. For example, Universal Transverse Mercator (UTM) is just one of many map projections used to represent locations on a flat surface. Also, be aware that there are several horizontal data coordinate systems or datum (North American Datum (NAD) 27, World Geodetic System (WGS) 72, NAD83, and WGS84) that are used to represent locations on the earth's surface in geographic coordinates (latitude and longitude). When representing receptor, building, and source locations in UTM coordinates, make certain that all of the coordinates originated in, or are converted to, the same horizontal datum.

For modeling with the ISC and ISC-PRIME models, use both the simple and complex terrain calculation options if other than flat terrain applies. That is, if terrain elevations for receptors are used, activate both simple and complex options. In cases where multiple sources with varying heights of emissions must be evaluated, use the ISC or ISC-PRIME models rather than the SCREEN3 model. Since the SCREEN3 model can only evaluate one source at a time, combined results for sources in intermediate-to-complex terrain might not be representative.

If other than flat terrain is modeled, use appropriate receptor elevations. Ensure that the higher terrain is always included in any direction from the source, not just the highest terrain. For example, if the highest terrain is to the north of the property, but the second highest terrain is to the south, include receptors at and in the general vicinity of each location. Conservative options may be used to reduce the effort of determining specific receptor heights for dense grid networks. For example:

- Omit terrain if only ground-level fugitive sources are modeled. Terrain is generally not a consideration when modeling releases from fugitive sources. Releases from these sources are typically neutrally buoyant and are essentially at ground level. Maximum concentrations from fugitive releases are thus expected to occur at the nearest downwind receptor location. However, include terrain near a property or fence line for elevated fugitive releases, or if non-fugitive point sources are included in the modeling demonstration.
- Set receptors to the stack base elevation, if some elevations are below stack base.
- If the terrain is all below stack base, choose the FLAT terrain height option keyword in the Control pathway of the ISC and ISC-PRIME models, which will cause the model to ignore terrain heights. Note: do not select the elevated terrain height option without including receptor elevations in the Source pathway.

For modeling with AERMOD and AERSCREEN, the model treats the plume as a combination of two limiting cases: a horizontal plume (terrain impacting) and a terrain-following plume. In flat terrain the two states are equivalent. In complex terrain, AERMOD incorporates the concept of the dividing streamline for stably-stratified conditions. Generally, in stable flows, a two-layer structure develops in which the lower layer remains horizontal while the upper layer tends to rise over the terrain. Since the plume is modeled as a combination of two limiting cases (horizontal plume and terrain-following plume), the model handles the computation of pollutant impacts in both flat and complex terrain within the same modeling framework thereby obviating the need to differentiate between the formulations for simple and complex terrain. The model's total concentration is calculated as a weighted sum of the concentrations associated with these two limiting cases or plume states.

A pre-processor program, AERMAP, has been developed to process terrain data in conjunction with a layout of receptors and sources to be used in AERMOD. Using gridded terrain data, AERMAP first determines the base elevation at each receptor and source. AERMAP then calculates a representative terrain-influence height for each receptor (hill height scale) with which AERMOD computes receptor-specific dividing streamline values. For more information on AERMAP and the corresponding documentation, refer to: www.epa.gov/ttn/scram/dispersion_related.htm#aermap

If there are significant problems with the resolution of the terrain data, that is, a mix of scales that could result in the omission of terrain features or significant changes in elevation, additional discrete receptors with appropriate elevations should be included in the receptor grid.

Appendix O - Meteorological Data

The Air Dispersion Modeling Team (ADMT) has prepared meteorological data sets for modeling demonstrations in order to establish consistency among modeling demonstrations across the state. These data sets are available by county for download from the ADMT Internet page as follows:

For ISC/ISC-PRIME
www.tceq.texas.gov/permitting/air/modeling/admtmet.html

For AERMOD
www.tceq.texas.gov/permitting/air/modeling/aermod_datasets.html

In addition to the meteorological data sets, the Internet pages above include information on how the meteorological data sets were developed, as well as the file naming conventions of the meteorological data sets.

For AERMOD, meteorological data sets have been developed using three surface roughness categories (low, medium, and high). Refer to Appendix N for additional guidance on determining the appropriate surface roughness category.

For minor New Source Review (NSR) permit applications, the use of one year of meteorological data may be sufficient. However, if five years of meteorological data are used, then use the same five year meteorological data for all applicable averaging periods for consistency. For Prevention of Significant Deterioration (PSD) demonstrations, use the most recent, readily available five years of meteorological data. Provide an ASCII version of the data with the air quality analysis (AQA) submittal.

Applicants may request to use other available meteorological data not available from the ADMT. If the request is approved, the applicant is responsible for obtaining, preparing, and processing the data. Before these data sets are used in any modeling demonstration, the applicant should submit them to the ADMT. The ADMT should review and approve the data sets and all the data used to develop the specific meteorological parameters required. Provide the following information:

- Surface and upper-air data. Provide how these data were obtained (e.g., National Climatic Data Center [NCDC], Support Center for Regulatory Atmospheric Modeling [SCRAM], or other source).
- Procedures for replacing missing data. Replacement of missing data must follow standard procedures. Follow the guidance in *Procedures for Substituting Values for Missing NWS Meteorological Data for Use in Regulatory Air Quality Models* (Atkinson, 1992) to replace missing values before processing them. Document and submit all occurrences of missing data and proposed replacement values.
- Technical justification and supporting documentation for all model selections (e.g., albedo, Bowen ratio, surface roughness length, etc.).

- Documentation for how these data will be processed, including quality assurance / quality control procedures.

Appendix P - Reporting Requirements

The air quality analysis (AQA) submitted to the Texas Commission on Environmental Quality (TCEQ) in support of an air permit application becomes an addendum to the air permit application. The analysis should include the items below, as appropriate.

Project Identification Information

- Provide the following information to clearly identify the analysis:
  - Applicant
  - Facility
  - Permit Application Number
  - Regulated Entity Number
  - Nearest City and County
  - Applicant's Modeler

Project Overview

- Include a brief discussion of the plant process(es), and types and locations of emissions under consideration.

Type of Permit Review

- Indicate the type of permit review required by the permit reviewer.

Constituents Evaluated

- List all constituents that were evaluated. Be sure to provide all relevant information for each constituent evaluated (standard/effects screening level (ESL), chemical abstract service (CAS) number, etc.).

Plot Plan

- Depending on the scope of the project, several plot plans may be needed to present all requested information.
- Include a plot plan that includes:
  - A clearly marked scale.
  - All property lines. For Prevention of Significant Deterioration (PSD) Analyses, include fence lines.
  - A true-north arrow.

- Universal Transverse Mercator (UTM) coordinates along the vertical and horizontal borders. Please do not use plant or other coordinates.
- Include the datum of your coordinates.
- Reference UTM coordinates and locations of all emission points including fugitive sources modeled.
- Labels/IDs and coordinates for emission points on the plot plan should correlate with the information contained in the AQA.
- Buildings and structures on-property or off-property which could cause downwash. Include length, width, and height.

Area Map

- For minor New Source Review (NSR) Analyses,
  - Include a copy of the area map submitted with the air permit application. The map should cover the area within a 1.9 mile (three kilometer) radius of the facility if used for the Auer land-use analysis.
  - The area map should include all property lines. For sites with a single property line designation (SPLD), include all property lines associated with the SPLD. Also include a copy of the SPLD petition with the AQA.
  - Add UTMs to the horizontal and vertical dimensions of the map section, as well as the date and title of the map. Include the datum of your coordinates.
  - Annotate schools within 3,000 feet of the sources nearest to the property line.
  - For the Health Effects Review, annotate the nearest non-industrial receptor of any type. Include any additional non-industrial receptors requested by the Toxicology Division.
- For PSD Analyses,
  - Include a copy of the area map submitted with the air permit application. The map should cover the area within a 1.9 mile (three kilometer) radius of the facility if used for the Auer land-use analysis.
  - The area map should include all fence lines.
  - Add UTMs to the horizontal and vertical dimensions of the map section, as well as the date and title of the map. Include the datum of your coordinates.
  - Include maps that show the location of:
  - PSD Class I areas within 10 kilometers (6.2 miles) or 100 kilometers (62 miles).
  - Urban areas, non-attainment areas, and topographic features within 50 kilometers (31 miles) or the distance to which the source has a significant impact, whichever is less.
  - Any on-site or local meteorological stations, both surface and upper air.

- State/local/on-site ambient air monitoring sites used for background concentrations.

Air Quality Monitoring Data

- For minor NSR and PSD National Ambient Air Quality Standards (NAAQS) Analyses,
  - Discuss how ambient background concentrations were obtained.
  - Include a summary of observations for each constituent and averaging time, if available.
- For the Health Effects Review, identify monitored data that was used to supplement or substitute for modeling. Demonstrate that the data represent near worst-case operational and meteorological conditions.

Modeling Emissions Inventory

- On-Property Sources to be Permitted,
  - Include a copy of the Table 1(a) that was submitted with the air permit application and subsequently approved by the permit reviewer. Ensure additional entries are provided on the Table 1(a) if stack parameters for any averaging period or load level could be different.
  - Identify special source types or characterizations such as covered stacks, horizontal exhausts, fugitive sources, area sources, open pit sources, volume sources, stockpiles, and flares.
  - Include all assumptions and calculations used to determine as appropriate the size, sides, rotation angles, heights of release, initial dispersion coefficients, effective stack diameter, gross heat release and weighted (by volume) average molecular weight of the mixture being burned.
  - Specify particulate emissions as a function of particle size; mass fraction for each particle size category; and particle density for each particle size category, as applicable.
- Other On-Property and Off-Property Sources,
  - Include the Air Permits Allowable Database (APAD) retrieval for each constituent.
  - Include an additional list for each constituent for any sources modeled but were not included in the APAD retrieval. This list should contain all the information required by the Table 1(a).
  - For PSD Analyses, include a list of secondary emissions, if applicable. Secondary emissions occur from any facility that is not a part of the facility being reviewed, that would only be constructed or would have an increase of emissions as a result of the permitted project.

Table Correlating the Emission Inventory Source Name and Emission Point Number (EPN) with the Source Number in the Modeling Output

- Include a table that cross-references the source identification numbers used in the modeling if they are different from the EPNs in the Table 1(a) or from any additional list of sources.

Stack Parameter Justification

- Include the basis for using the listed stack parameters (flow rates, temperatures, stack heights, velocities). This should include the calculations used to determine the parameters.
- If the production or load levels could be less than 100 percent, demonstrate how the modeled emission rates and stack parameters were obtained to produce the worst-case impacts (in certain cases lower production levels may result in higher predicted impacts).
- Include at least 25 percent, 50 percent, 75 percent and 100 percent production or load levels analyses, if the source could be operated at these reduced levels.

Scaling Factors

- Discuss how emission scalars were developed and used in the modeling demonstration. In addition, identify those scalars that should be included in an enforceable permit provision, such as restricted hours of operation.

Models Proposed and Modeling Techniques

- Include a detailed discussion of the models that were used, model version numbers, and the model entry data options such as the regulatory default option and the period option.
- Discuss any specialized modeling techniques such as screening, collocating sources, and ratioing.
- Include assumptions and sample calculations.

Selection of Dispersion Option

- Base the selection of urban or rural dispersion coefficients on the Auer land-use analysis.

- Include a detailed discussion and sufficient technical justification to support the selection of the dispersion option.

Building Wake Effects (Downwash)

- Discuss how downwash structures were determined and include applicable information required to use the EPA's BPIP-PRIME. Submit all input files and files generated by the BPIP-PRIME program, and any computer assisted drawing files.
- Provide a table of structure heights used in the downwash analysis.

Receptor Grid

- Discuss how the receptor grids were determined for each type of analysis.
- Include the datum of your coordinates.
- Discuss if terrain was applicable. If so, discuss how terrain for individual receptors was determined.

Meteorological Data

- Indicate the surface station, surface station anemometer height, surface station profile base elevation, upper-air station, and period of record, as applicable.
- Include the meteorological data files used for all demonstrations.
- Discuss how meteorological data were determined or replaced. Include ADMT approval of replacement data.

  In addition, submit all the supplementary data used to develop the specific input meteorological parameters required by the meteorological pre-processor programs.

Modeling Results

- Summarize and compare the modeling results relative to all applicable de minimis values, standards, guidelines, or reference air concentrations. Tabulated results are preferred.
- For the Health Effects Review, present the maximum concentrations predicted for non-industrial receptors separately and include the location of the receptor. Provide the predicted frequency of exceedance if applicable.
- For the Additional Impacts Analysis (for PSD Analyses), include the results of the additional impacts analysis for growth, visibility, and soils and vegetation.
- For the Class I Area Impacts Analysis (for PSD Analyses), include the results of the Class I area impacts analysis, as applicable.

Electronic Information (Model Input/Output and Associated Computer or Electronic Files)

- Include:
  - All input and output files for each air dispersion model run, including data, grid and plot files.
  - All files produced by a software entry program.
  - All automated downwash program input and output files and any computer assisted drawing files.
  - All meteorological data files in ASCII format.
  - All boundary files, including computer assisted drawing files, specifying coordinates for property lines.
  - For PSD Analyses, all boundary files, including computer assisted drawing files, specifying coordinates for fence lines.
  - Include all spreadsheet files used for comparison of predicted concentrations with standards or guidelines. This includes, but is not limited to, spreadsheet files used for ratio techniques.

Appendix Q - Conducting an Ambient Ozone Impacts Analysis

This appendix has been removed for further review.

Appendix R - Secondary Formation of Particulate Matter ($PM_{2.5}$)

The purpose of this appendix is to provide guidance for addressing secondary formation of $PM_{2.5}$. Please note that secondary formation of $PM_{2.5}$ must be addressed even if the predicted concentration for direct $PM_{2.5}$ is less than the significant impact levels (SILs). The information presented in this appendix is primarily based on the Environmental Protection Agency's (EPA's) *Guidance for $PM_{2.5}$ Permit Modeling*. As experience is gained with these National Ambient Air Quality Standards (NAAQS) compliance demonstrations, this guidance will likely evolve to provide further specificity on assessing the impacts of a single source on $PM_{2.5}$ predicted concentrations.

Terms

Direct PM emissions. Solid particles emitted directly from an air emissions source or activity, or gaseous emissions or liquid droplets from an air emissions source or activity which condense to form particulate matter at ambient temperatures. Direct $PM_{2.5}$ emissions include elemental carbon, directly emitted organic carbon, directly emitted sulfate, directly emitted nitrate, and other inorganic particles (including but not limited to crustal materials, metals, and sea salt).

Secondary PM Emissions. Those air pollutants other than $PM_{2.5}$ direct emissions that contribute to the formation of $PM_{2.5}$. $PM_{2.5}$ precursors include sulfur dioxide (SO_2) and nitrogen oxides (NO_x).

Overview

The complex chemistry of secondary formation of $PM_{2.5}$ is well documented and has historically presented significant challenges with the identification and establishment of particular models for assessing the impacts of individual stationary sources on the formation of this air pollutant. For example, the current preferred air dispersion model (i.e. AERMOD) can be used to simulate dispersion of direct $PM_{2.5}$ emissions but does not explicitly account for secondary formation of $PM_{2.5}$. As such, the appropriate methods for assessing $PM_{2.5}$ impacts are determined as part of the normal consultation process with the Texas Commission on Environmental Quality (TCEQ).

EPA's *Guidance for $PM_{2.5}$ Permit Modeling* lists four assessment cases for addressing direct and secondary formation of $PM_{2.5}$ based on the significant emission rates (SERs):

- Case 1:
    - Direct $PM_{2.5}$ emissions < 10 tons per year (tpy) SER – Model direct $PM_{2.5}$ emissions following guidance for a NAAQS analysis.
    - SO_2 and NO_x emissions < 40 tpy SER – Provide a discussion with the air quality analysis (AQA) as to why the proposed SO_2 and NO_x emissions would not result in a significant contribution to the secondary formation of $PM_{2.5}$.

An example discussion to address the secondary formation of $PM_{2.5}$ related to Case 1 would be as follows: The SO_2 and NO_x emissions are less than the SER of 40 tpy. As a result, it is not expected that the SO_2 and NO_x emissions would lead to a significant contribution to the secondary formation of $PM_{2.5}$ since the emissions are not significant. In addition, the location of maximum secondary $PM_{2.5}$ formed would not likely be well-correlated in space or time with the location of maximum direct $PM_{2.5}$ impacts since secondary $PM_{2.5}$ is formed through chemical reactions, which occur in the atmosphere gradually over time (hours or days depending on atmospheric conditions and other variables).

- Case 2:
    - Direct $PM_{2.5}$ emissions ≥ 10 tpy SER – Model direct $PM_{2.5}$ emissions following guidance for a NAAQS analysis.
    - SO_2 and NO_x emissions < 40 tpy SER – Provide a discussion with the AQA as to why the proposed SO_2 and NO_x emissions would not result in a significant contribution to the secondary formation of $PM_{2.5}$.

    See discussion above in Case 1 for an example discussion to address the secondary formation of $PM_{2.5}$.

- Case 3:
    - Direct $PM_{2.5}$ emissions ≥ 10 tpy SER – Model direct $PM_{2.5}$ emissions following guidance for a NAAQS analysis.
    - SO_2 and/or NO_x emissions ≥ 40 tpy SER – Provide a qualitative, hybrid qualitative/quantitative, or quantitative assessment of the secondary formation of $PM_{2.5}$.

    Qualitative Assessment: An example of a qualitative approach to address the secondary formation of $PM_{2.5}$ may include the following: An examination of the regional background $PM_{2.5}$ monitoring data and magnitude of secondary $PM_{2.5}$ precursor emissions from existing sources; the relative ratio of the combined modeled direct $PM_{2.5}$ predictions and background $PM_{2.5}$ concentrations to the level of the NAAQS; the spatial and temporal correlation of the location of maximum direct and secondary $PM_{2.5}$ impacts; meteorological characteristics of the region during periods of precursor pollutant emissions; the level of conservatism associated with the modeling of the direct $PM_{2.5}$ emissions and other elements of conservatism built into the overall NAAQS compliance demonstration; aspects of the precursor pollutant emissions in the context of limitations of other chemical species necessary for the photochemical reactions to form secondary $PM_{2.5}$; and an additional level of NAAQS protection through post-construction monitoring.

Hybrid Qualitative/Quantitative Assessment: An example of a hybrid qualitative/quantitative approach to address the secondary formation of $PM_{2.5}$ may include the following: For the qualitative aspect of this assessment, see the ***Qualitative Assessment*** discussion above. For the quantitative assessment, one method is to conservatively assume 100% conversion of emissions of SO_2 and NO_x emissions into equivalent amounts of direct $PM_{2.5}$ emissions and then use an air dispersion model to assess the impacts of the combination of direct $PM_{2.5}$ emissions and the equivalent direct $PM_{2.5}$ emissions. Any ratio other than 100% conversion would need to be technically justified.

Quantitative Assessment: An example of a quantitative approach to address the secondary formation of $PM_{2.5}$ may include the following: The use of a full quantitative photochemical grid modeling exercise. Please note that if this approach is used, then a protocol should be developed in consultation with the EPA regional office and the TCEQ on how the modeling will be conducted.

- Case 4:
    - Direct $PM_{2.5}$ emissions < 10 tpy SER – Model direct $PM_{2.5}$ emissions following guidance for a NAAQS analysis.
    - SO_2 and/or NO_x emissions ≥ 40 tpy SER – Provide a qualitative, hybrid qualitative/quantitative, or quantitative assessment of the secondary formation of $PM_{2.5}$.

    See discussion above in Case 3 for an example discussion to address the secondary formation of $PM_{2.5}$.

The assessment of the direct and secondary $PM_{2.5}$ emissions are provided to demonstrate that proposed emissions of direct and secondary $PM_{2.5}$ emissions from a new facility or from a modification of an existing facility will not cause or contribute to an exceedance of the NAAQS or increment.

Appendix S – Additional Guidance for evaluating 1-hour Nitrogen Dioxide and 1-hour Sulfur Dioxide

The purpose of this appendix is to provide additional guidance for addressing the 1-hour nitrogen dioxide (NO_2) and 1-hour sulfur dioxide (SO_2) National Ambient Air Quality Standards (NAAQS). The Environmental Protection Agency (EPA) issued a memorandum on March 1, 2011 with a subject, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard." This memorandum is meant to supplement the memorandum issued by the EPA on June 29, 2010 with a subject, "Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program." The March 1 memorandum provides further clarification and guidance on the application of Appendix W guidance for the 1-hour NO_2 standard.

While the discussion of nitrogen oxides (NO_x) chemistry options in the March 1 memorandum is exclusive to the 1-hour NO_2 standard, the discussion of other topics in the memorandum should apply equally to the 1-hour SO_2 standard, accounting for the differences in the form of the two standards. The memorandum does not apply to the other averaging periods of NO_2 and SO_2, nor does it apply to other pollutants with a standard based on a multiyear average.

Approval and Application of a Tiering Approach for NO_2

There are different approaches to demonstrate compliance with the 1-hour NO_2 NAAQS:

1. Tier 1 – 100 percent conversion of NO_x to NO_2.
2. Tier 2 – updated from 0.75 to 0.80 for 1-hour NO_2 demonstrations as a default value without providing additional justification.
3. Tier 3 – use of the non-regulatory Ozone Limiting Method (OLM) and Plume Volume Molar Ratio Method (PVMRM) options within AERMOD (there is no preference for one option over the other). The key input variables for these model options are in-stack NO_2/NO_x ratios and background ozone concentrations.

- In-stack NO_2/NO_x ratios :
  - The EPA established a general acceptance of 0.50 as a default in-stack ratio of NO_2/NO_x for input to the OLM and PVMRM model options within AERMOD.
  - If proposing an in-stack NO_2/NO_x ratio other than the default, sufficient justification and documentation will need to be provided to support the source-specific data on the in-stack NO_2/NO_x ratio.
- Background ozone concentrations:
  - There are many options for utilizing the background ozone data in the OLM and PVMRM model options. Be sure to provide sufficient justification and

documentation to support the use of the ozone data (representativeness of the monitor, filling in missing data, etc.).

Prior approval (submitting modeling protocols to Air Permits Division (APD) and the EPA) is required for any applicant proposing to use a Tier 3 approach. Sufficient documentation and justification must be provided when developing the modeling protocol.

Treatment of Intermittent Emissions for 1-hour NO_2 and 1-hour SO_2 NAAQS

An assumption of continuous operation for intermittent emissions using the maximum allowable emissions may be an overly conservative assumption and could result in them becoming the controlling emission scenario for determining compliance with the 1-hour NO_2 and 1-hour SO_2 standards. To account for this, the March 1 memorandum discusses different approaches for evaluating intermittent emissions:

- Excluding certain types of intermittent emissions from the compliance demonstrations for the 1-hour NO_2 and 1-hour SO_2 standards. The most appropriate data to use for compliance demonstrations for the 1-hour NO_2 and 1-hour SO_2 NAAQS are those based on emissions scenarios that are continuous enough or frequent enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations.
- Using model scalars to limit the hours modeled to account for meteorological conditions that are more representative of actual operations. A permit condition can be used to restrict operation to certain hours of the day.
- Modeling the impacts from intermittent emissions based on an average hourly rate, rather than the maximum hourly emission rate.

The March 1 memorandum is limited to what intermittent emissions are related to. An emergency generator is provided as an example of an intermittent emissions unit, and startup/shutdown operations are provided as examples of intermittent emissions scenarios. The memorandum does not have a discussion regarding a specific cut off on the number of hours of operation per year that constitutes intermittent or infrequent. Furthermore, there is no discussion on the frequency of intermittent emissions needed to be considered to contribute significantly to the annual distribution of daily maximum 1-hour concentrations. Also important for determining and evaluating intermittent emissions is the distinction between intermittent emissions that can be scheduled with some degree of flexibility and intermittent emissions that cannot be scheduled.

The recommendation is that compliance demonstrations for the 1-hour NO_2 and 1-hour SO_2 NAAQS be based on emission scenarios that can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations. There are unique case-by-case factors, as it relates to determining whether or not emissions are intermittent, that can affect the application of the guidance in the March 1 memorandum. The proposed operation of the unit or operating scenarios will need to be fully explained and documented in order to determine the appropriateness of following the guidance in the memorandum. For example:

- How many units are there;
- How often will the unit operate per year;
- What is the duration of operation once the unit is operating;
- Will the unit be operated on a known schedule or will it operate randomly;
- Does the unit operate simultaneously with other sources?

APPENDIX G

November 7, 2017

Texas Commission on Environmental Quality
Air Permits Division, MC-163
P.O. Box 13087
Austin, Texas 78711-3087

Project No.: 10003-458

Attention: Joel Stanford

Subject: Revised Air Quality Analysis Modeling Report – Complete Replacement of Original Air Quality Analysis Modeling Report
Vulcan Construction Materials, LLC – CN600355465
Pending **EXPEDITED** NSR Air Quality Permit Application for Permit No. 147392L001 for Portable Crushing Plant – RN109829721
Bulverde, Comal County, Texas

Mr. Stanford,

On behalf of Vulcan Construction Materials, LLC (VULCAN), Westward Environmental, Inc. (WESTWARD) is submitting the enclosed revised Air Quality Analysis (AQA) modeling report as part of the permit application for the proposed portable crushing plant (the first part of which was submitted to the TCEQ on June 26, 2017). The revisions in the revised AQA modeling report were made to address TCEQ's October 26, 2017 request for additional information regarding the original AQA modeling report that was submitted to the TCEQ on October 5, 2017. The revised AQA modeling report is a complete replacement of the original AQA modeling report.

The revised AQA modeling report includes the information specified in applicable written and oral TCEQ guidance, including, among others, TCEQ's Air Quality Modeling Guidelines (APDG 6232, v2, revised 04/15). A DVD containing the revised modeling input and output datasets and files is provided in Appendix C.

The purpose of the revised AQA modeling report is to demonstrate that the maximum allowable emissions from the proposed portable crushing plant will (i) meet the requirement in 30 TAC §116.111(a)(2)(A)(i) and in §382.0518(b)(2) of the Texas Health and Safety Code that such emissions will comply with the intent of the Texas Clean Air Act, including protection of the health, welfare, and property of the public, and (ii) will not cause or contribute to a condition of air pollution under §382.085(a) of the Texas Health and Safety Code or a nuisance under 30 TAC §101.4.

WESTWARD will serve as a technical representative for VULCAN on this modeling project. After completion of the TCEQ's modeling audit, please submit an electronic copy of the signed TCEQ Modeling Audit Letter to WESTWARD for our file. If you have any questions, please contact me.

Respectfully submitted,
WESTWARD ENVIRONMENTAL, INC.

David S. Knollhoff, CCM
Modeling Team Leader

Distribution: Addressee
Mr. Eddie Saucedo – Vulcan Construction Materials, LLC (Electronic Copy Only)
WEI 10003-458 file

Attachments

Vulcan Construction Materials, LLC
Revised Air Quality Analysis Modeling Report
Pending EXPEDITED NSR Air Quality Permit Application
Air Quality Permit No. 147392L001
Bulverde, Comal County, Texas

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November 2017

Westward Environmental, Inc.

Project No.: 10003-458

www.westwardenv.com

EXECUTIVE SUMMARY

The purpose of the Air Quality Analyses ("AQA") air dispersion modeling ("modeling") report is to demonstrate that the maximum allowable emissions from Vulcan Construction Materials, LLC's proposed portable crushing plant that is subject to the application for Permit No. 147392L001 ("proposed crushing plant") will meet the requirement in 30 TAC §116.111(a)(2)(A)(i) and in §382.0518(b)(2) of the Texas Health and Safety Code that such emissions will comply with the intent of the Texas Clean Air Act, including protection of the health, welfare, and property of the public. Further, even though there is no requirement for Vulcan to demonstrate through modeling that the maximum allowable emissions from the proposed portable crushing plant will not cause or contribute to a condition of air pollution under §382.085(a) of the Texas Health and Safety Code or to a nuisance under 30 TAC §101.4, those demonstrations in this modeling report also demonstrate that the operation of the proposed crushing plant will not cause or contribute to a condition of air pollution or to a nuisance.

The air quality analyses that were conducted -- Minor NAAQS Analyses, TCEQ State Property Line Standard ("SPLS") Analysis, and Health Effects Analyses -- make those demonstrations because they demonstrate that the maximum allowable emissions of each pollutant from the proposed crushing plant will not cause or contribute to an exceedance of the applicable National Ambient Air Quality Standards ("NAAQS") for that pollutant (i.e., carbon monoxide ("CO"), nitrogen dioxide ("NO_2"), sulfur dioxide ("SO_2"), particulate matter with nominal aerodynamic diameters of 10 microns or less ("PM_{10}"), and particulate matter with nominal aerodynamic diameters of 2.5 microns or less ("$PM_{2.5}$")), the TCEQ's SPLS for SO_2, or any TCEQ Effect Screening Level ("ESL") for diesel fuel or silica. Those air quality analyses involved many conservative assumptions and aspects that resulted in the maximum off-site ground level concentrations predicted by them being higher than what the actual maximum off-site ground level concentrations are expected to be upon operation of the proposed crushing plant.

The air dispersion modeling associated with those air quality analyses was conducted using the ("AERMOD") model and in accordance with all applicable written and oral TCEQ guidance, including, among others, TCEQ's Air Quality Modeling Guidelines (APDG 6232, v2, revised 04/15).

The maximum off-site ground level concentrations predicted by those air quality analyses, and the comparisons of those concentrations to the applicable NAAQS, SPLS, and ESL, are summarized in the table below:

Air Quality Analysis	Maximum Off-site Ground Level Concentration (µg/m^3)	NAAQS, SPLS, or ESL (µg/m^3)	Percent of NAAQS, SPLS, or ESL
24-hr PM_{10} Minor NAAQS	70.16	150	46.8%
24-hr $PM_{2.5}$ Minor NAAQS	24.03	35	68.7%

Air Quality Analysis	Maximum Off-site Ground Level Concentration ($\mu g/m^3$)	NAAQS, SPLS, or ESL ($\mu g/m^3$)	Percent of NAAQS, SPLS, or ESL
Annual $PM_{2.5}$ Minor NAAQS (w/o modeled road emissions)	8.57	12	71.4%
Annual $PM_{2.5}$ Minor NAAQS (w/ modeled road emissions)	9.10	12	75.8%
1-hr NO_2 Minor NAAQS	112.30	188	59.7%
Annual NO_2 Minor NAAQS	8.98	100	9.0%
1-hr SO_2 Minor NAAQS	48.35	196	24.7%
3-hr SO_2 Minor NAAQS	21.42	1,300	1.6%
24-hr SO_2 Minor NAAQS	8.72	365	2.4%
Annual SO_2 Minor NAAQS	2.42	80	3.0%
1-hr CO Minor NAAQS	507.08	40,000	1.3%
8-hr CO Minor NAAQS	357.67	10,000	3.6%
1-hr SO_2 SPLS	15.42	1,021	1.5%
1-hr Diesel Fuel ESL	33.70	1,000	3.4%
Annual Diesel Fuel ESL	0.35	100	0.4%
1-hr Silica ESL	0.09	14	0.7%
Annual Silica ESL (w/o modeled road emissions)	0.0001	0.27	0.04%
Annual Silica ESL (w/ modeled road emissions)	0.002	0.27	0.8%

As reflected in the table, the maximum off-site ground level concentration from each of those air quality analyses is well below the applicable NAAQS, SPLS, and ESL. This demonstrates that the maximum allowable emissions from the proposed crushing plant will comply with the intent of the Texas Clean Air Act, including protection of the health, welfare, and property of the public, and also that they will not cause or contribute to a condition of air pollution under §382.085(a) of the Texas Health and Safety Code or to a nuisance under 30 TAC §101.4.

AIR QUALITY ANALYSIS MODELING REPORT

This Air Quality Analysis ("AQA") air dispersion modeling ("modeling") report is part of the air quality permit application for the proposed portable crushing plant (No. 147392L001) ("the permit application"), the first part of which was submitted to the TCEQ on June 26, 2017. This modeling report is a revised version of Vulcan's original AQA modeling report that was submitted to the TCEQ on October 5, 2017. The revisions in this report were made to address TCEQ's October 26, 2017 request for additional information regarding the original modeling report. This modeling report is a complete replacement of the original modeling report.

The modeling analyses discussed in this report were conducted in accordance with written and oral TCEQ guidance, including TCEQ's Air Quality Modeling Guidelines (APDG 6232, v2, revised 04/15) ("TCEQ Modeling Guidelines"), TCEQ's July 18, 2017 letter requesting such modeling, TCEQ's Modeling and Effects Review Applicability ("MERA") Guidance (APDG 5874v5, revised 09/17), and TCEQ's October 26, 2017 request for additional information regarding the original modeling report.

Project Identification Information

Applicant – Vulcan Construction Materials, LLC (CN600355465) ("Vulcan")
Project – Proposed portable crushing plant (RN109829721) that will be located at Vulcan's property located at the intersection of Hwy 46 and FM 3009, just east of Bulverde, Comal County, Texas ("proposed crushing plant").
Pending Permit Application Number No. 147392L001
Applicant's Modeler – WESTWARD – David S. Knollhoff, CCM, phone (830) 249-8284, email: dknollhoff@westwardenv.com

Project Overview

The property on which the proposed crushing plant will be located is at the southwest corner of Hwy 46 and FM 3009, just east of Bulverde, Comal County, Texas ("project site"). The proposed crushing plant will be located no closer than 2,119 feet in distance from any property line of the project site (see the drawing labeled "Plot Plan – Modeling" on page 42). No other facilities will be at the project site when the proposed crushing plant will commence operations.

The proposed crushing plant will have maximum production limits of 800 tons per hour ("TPH") and 1,500,000 tons per year ("TPY") at a maximum operating schedule of 24 hours per day, 7 days per week, 52 weeks per year, i.e., 8,760 hours per year. The proposed crushing plant will comprise a total of 16 emission points (EPNs 1-16, including three engine/generator sets and one diesel fuel storage tank), as well as a total of no more than five (5) acres of active stockpiles (EPN STK) that will be located throughout the plant's footprint. The peak height of each stockpile will be no greater than 45 feet above ground level.

Type of Permit Review and Modeling Analyses

For the reasons discussed in the permit application, the proposed crushing plant will not be a major source of emissions for any pollutant for which National Ambient Air Quality Standards ("NAAQS") exist for purposes of Prevention of Significant Deterioration ("PSD") permit review. Therefore, the permit application is not subject to PSD review and, instead, is only subject to minor new source review ("NSR") under 30 TAC Chapter 116, Subchapter B, Division 1.

Because the permit application is only subject to minor NSR, the following air quality analyses were conducted for the proposed crushing plant: (i) a Minor NAAQS Analysis for each of the following pollutants for which NAAQS exist and that will be emitted from the proposed crushing plant: carbon monoxide ("CO"), nitrogen dioxide ("NO_2"), sulfur dioxide ("SO_2"), particulate matter with nominal aerodynamic diameters of 10 microns or less ("PM_{10}"), and particulate matter with nominal aerodynamic diameters of 2.5 microns or less ("$PM_{2.5}$"); (ii) TCEQ State Property Line Standard ("SPLS") Analysis for SO_2; and (iii) Health Effects Analyses for air contaminants for which no NAAQS exists and that will be emitted from the proposed crushing plant (TCEQ Modeling Guidelines, pp. 16-20). Each of those analyses is discussed below in the section entitled "Descriptions of Minor NAAQS, SPLS for SO_2, and Health Effects Analyses".

The following analyses are not required for the proposed crushing plant for the specified reasons: (i) ozone ambient impact analysis, since the maximum allowable annual emissions rates of nitrogen oxides ("NOx") and volatile organic compounds ("VOCs") are each much less than the applicable 100 tpy ozone impacts analysis applicability trigger (*see* TCEQ Modeling Guidelines, p. 51), (ii) the additional impacts analysis (covering growth analysis, visibility impairment analysis and soils and vegetation analysis), since such analysis is not required for a permit application that is not subject to PSD review, or (iii) a Minor NAAQS Analysis for lead, since no lead will be emitted from the proposed crushing plant.

Constituents Evaluated

By letter dated July 18, 2017, TCEQ requested that Vulcan conduct modeling analyses to demonstrate that (i) the emissions from the proposed crushing plant (comprising EPNs 1-16 and STK in Table 1(a) of the permit application)) will comply with the NAAQS for CO (1-hour and 8-hour), NO_2 (1-hour and annual), SO_2 (1-hour, 3-hour, 24-hour, and annual), PM_{10} (24-hour), and $PM_{2.5}$ (24-hour and annual) (which are Minor NAAQS Analyses), and (ii) that the SO_2 emissions from the proposed crushing plant (all of which will emit from EPNs 13-15) will comply with the SPLS for SO_2 (which is the SPLS Analysis for SO_2) ("TCEQ's modeling request"). A copy of TCEQ's modeling request is attached on pages 37-40. All of the NAAQS evaluated by the Minor NAAQS Analyses are primary NAAQS or a combined primary and secondary NAAQS, except for the 3-hr SO_2 NAAQS, which is a secondary NAAQS.

A teleconference pre-modeling meeting with Ahmed Omar and Robert Scalise from the TCEQ's Air Dispersion Modeling Team (ADMT) and David S. Knollhoff, CCM from WESTWARD occurred on Thursday, August 17, 2017. The proposed refined modeling strategy described in

Vulcan's AQA Modeling Protocol dated August 11, 2017, which was submitted to the TCEQ by WESTWARD was discussed at that meeting.

During that meeting, Vulcan voluntarily committed to also conduct modeling for the maximum allowable emissions of diesel fuel (CAS # 68334-30-5) that may be emitted from the proposed crushing plant (specifically, from EPNs 13-16 (which are the three engine/generator sets and one diesel fuel storage tank)), and compare the maximum hourly and annual off-site ground level concentrations ("GLC_{max}") of diesel fuel predicted by such modeling to the TCEQ's short-term and long-term Effects Screening Levels ("ESLs") for diesel fuel. This Health Effects Analysis for diesel fuel emissions was voluntary because TCEQ's modeling request does not require that Vulcan conduct such analysis.

In addition, subsequent to that meeting, Vulcan decided to voluntarily conduct Health Effects Analysis modeling for the maximum allowable emissions of "silica, crystalline (quartz)" (CAS# 14808-60-7) ("silica") that may be emitted from the proposed crushing plant (specifically, from EPNs 1-12 and STK, and for the maximum allowable annual emission of silica from paved and unpaved roads (specifically, from the following EPNs that were created solely for modeling purposes: PR1A-PR1D and UP1A-UP1C) (see Table 4 in Appendix A), and compare the GLC_{max} values of silica predicted by such modeling to the TCEQ's short-term and long-term ESLs for silica. This Health Effects Analysis was voluntary because (i) TCEQ's modeling request does not require that Vulcan conduct such analysis, and (ii) according to Appendix B of TCEQ's MERA Guidance, TCEQ does not require a Health Effects Analysis for the emissions of specific constituents of particulate matter, such as silica, from rock crushers because TCEQ has already reviewed such emissions and has determined that they are not be expected to cause any adverse health impacts.

<u>Pollutants whose emissions were evaluated through appropriate modeling analyses</u>

Pollutant	CAS #	Averaging Time	Type of Analysis
CO	630-08-0	1-hr and 8-hr	Minor NSR NAAQS
NO_2	10102-44-0	1-hr and Annual	Minor NSR NAAQS
SO_2	7446-09-5	1-hr, 3-hr, 24-hr, and Annual	Minor NSR NAAQS
PM_{10}	N/A	24-hr	Minor NSR NAAQS
$PM_{2.5}$	N/A	24-hr and Annual	Minor NSR NAAQS
SO_2	7446-09-5	30-minute	State Property Line Standard
Diesel fuel	68334-30-5	Short term and long term	Health Effects Analysis
Silica, crystalline (quartz)	14808-60-7	Short term and long term	Health Effects Analysis

Descriptions of Minor NAAQS, SPLS for SO_2, and Health Effects Analyses

The Minor NAAQS Analyses, SPLS Analysis for SO_2, and Health Effects Analyses are discussed in detail below. The results of those analyses are provided in the Executive Summary to this modeling report, at the end of this report in the section entitled "Modeling Results", in Tables 1 - 3 in Appendix A, and electronically on the DVD in Appendix C.

The modeling associated with those analyses included many conservative assumptions and aspects, which are discussed immediately below, as well as later in this report within the sections where they are relevant. Those conservative assumptions and aspects make the results of such modeling very conservative, which means that the GLC_{max} of each pollutant predicted by such modeling is higher than what the GLC_{max} is expected to be upon operation of the proposed crushing plant. Conservative assumptions and aspects used in the modeling include the following:

- The modeling assumed that all emissions sources whose maximum allowable emissions were input to the modeling will operate continuously throughout the year (i.e., 24 hours per day, 7 days per week, 52 weeks per year, i.e., 8,760 hours per year). But, in reality, those emissions sources are parts of batch, rather than continuous, processes that will not operate continuously throughout the year for various reasons, such as variable production demands, planned maintenance, and inclement weather.

- For purposes of the Minor NAAQS Analyses, SPLS Analysis for SO_2, and Health Effects Analyses covering averaging periods of less than one year, the modeling assumed that during every hour throughout the year, every emissions source whose emissions were modeled will operate at the maximum allowable hourly production rates, and thus, emit emissions at the maximum allowable hourly emissions rates. That assumption is conservative because the proposed crushing plant will not operate at the maximum allowable hourly production rates for every hour during the year, which means that the actual emissions rates during some hours will be lower than the maximum allowable emissions rates that were input into the modeling.

- The modeling assumed that none of the PM_{10} and $PM_{2.5}$ in the emission plume from each emissions source that was modeled will fall out of the plume as it disperses outwardly from the source in space and time; instead, it assumed that all of the PM_{10} and $PM_{2.5}$ emissions from each emissions source that was modeled will disperse across the receptor grid.

- Many of the hoppers, crushers, screens, and conveyor transfers whose emissions were modeled were characterized in the modeling as pseudo-point sources. That is a conservative assumption for the reasons discussed below in the section entitled "Characterizations of Pseudo-Point Source Groupings".

- The stockpile release heights that were assumed in the modeling are lower than they will actually be. That is a conservative assumption because use of lower stockpile release heights in modeling results in higher predicted offsite concentrations.

Minor NAAQS Analyses

A Minor NAAQS Analysis was conducted for each NAAQS pollutant (i.e., PM_{10}, $PM_{2.5}$, NO_2, SO_2, and CO) and NAAQS averaging time in a manner that is consistent with the Minor NAAQS Analysis process described on pages 17-18 and in Appendix E of TCEQ Modeling Guidelines. As discussed below, each of those Minor NAAQS Analyses demonstrates that the GLC_{max} for each of the pollutants from the proposed crushing plant and each of the NAAQS averaging times will not cause nor contribute to an exceedance of the applicable NAAQS. And, that is true even though multiple levels of conservatism were applied in those Minor NAAQS Analyses, as discussed below:

- As discussed above, the modeling associated with each Minor NAAQS Analysis included many conservative assumptions and aspects, which caused the modeling to over-predict the GLC_{max} for each pollutant and NAAQS averaging time.

- As discussed in more detail later in this section, Vulcan conducted a full Minor NAAQS Analysis for each pollutant and NAAQS averaging time, even where modeling of the maximum allowable emissions of the pollutant and NAAQS averaging time showed a GLC_{max} that is less than the applicable NAAQS Significant Impact Level ("SIL") at all off-site locations. That is conservative because (i) a full Minor NAAQS analysis is required by the TCEQ Modeling Guidelines for a pollutant and NAAQS averaging time <u>only if</u> the GLC_{max} predicted by such modeling exceeds the SIL for that pollutant and NAAQS averaging time, and (ii) a full Minor NAAQS analysis always results in much higher maximum off-site concentration of the pollutant over the applicable NAAQS averaging time, which must be compared to, and be lower than, the applicable NAAQS.

- As discussed further below in the section entitled "Air Quality Monitoring Data", the representative background concentration for each pollutant and NAAQS averaging time that was used in its full Minor NAAQS Analysis is conservatively high, i.e., it is higher than the background concentration for that pollutant and NAAQS averaging time is expected to be in the area around the proposed crushing plant.

For each pollutant and NAAQS averaging time, the full Minor NAAQS Analysis involved the following steps:

- Conducting modeling of its maximum allowable emissions from the proposed crushing plant (specifically, from EPNs 1-16 and STK) ("modeled project-related emissions"), and, for one modeling run for the annual $PM_{2.5}$ NAAQS, modeling of both the modeled project-related emissions and the emissions from paved and unpaved roads (specifically, from the following EPNs that were created solely for modeling purposes: PR1A-PR1D and UP1A-UP1C) ("modeled road emissions") (see Table 4 in Appendix A), and using the results of that modeling (referred to as "NAAQS AOI modeling") to identify the significant receptors and define the Area of Impact ("AOI"). "Significant receptors" are receptors for which the off-site ground level concentrations predicted by the modeling are greater than the applicable SIL. The AOI is the circular area with a radius equal to the distance to the significant receptor that is the farthest away. For each pollutant and

NAAQS averaging time for which the GLC_{max} predicted by the NAAQS AOI modeling is below the applicable SIL, there are no significant receptors, and, thus, there is no AOI;

- Conducting modeling (referred to as "full NAAQS modeling") of that pollutant's (i) modeled project-related emissions, and, for one modeling run for the annual $PM_{2.5}$ NAAQS, both its project-related modeled emissions and its modeled road emissions, and (ii) maximum allowable emissions from each emissions source(s) identified in the TCEQ-developed list of the TCEQ Regulated Entity Numbers ("RNs") for emissions sources located within a 10 km (approximately 6.2 miles) radial distance from the center of the proposed crushing plant.[1] For each pollutant and NAAQS averaging time for which there is no AOI (because the GLC_{max} predicted by the NAAQS AOI modeling was below the applicable SIL), the receptor grid that was used in the full NAAQS modeling was the same receptor grid as was used in the NAAQS AOI modeling for that pollutant and NAAQS averaging time;

- Summing the GLC_{max} from the full NAAQS modeling with a representative monitored background concentration for that pollutant and NAAQS averaging time to calculate the total maximum offsite ground level concentration for such pollutant and NAAQS averaging time; and

- Comparing the total maximum offsite ground level concentration to the NAAQS for that pollutant and NAAQS averaging time.

Therefore, each full Minor NAAQS Analysis is a cumulative effects analysis.

As discussed in Vulcan's August 11, 2017 AQA Modeling Protocol, which was discussed with TCEQ Air Dispersion Modeling Team staff in the August 17, 2017 pre-modeling meeting, the list of TCEQ RNs for emissions sources within a 10 km radial distance from the center of the proposed crushing plant contains one such source -- Martin Marietta Material's ("Martin Marietta") crushing plant (RN101112407) that is authorized by Permit No. 79037L001. The center of that plant is located at 29590 Lower Smithson Valley Road in Bexar County, Texas, and is approximately 9.3 km (approximately 6 miles) southwest of the center of the proposed crushing plant. The full Minor NAAQS modeling included the maximum permitted allowable emissions from EPNs 1-27 and STK in Permit No. 79037L001, which are presented in Table 8 of Appendix B (in addition to the modeled project-related emissions).

The representative monitored background concentration that was used in the full Minor NAAQS Analysis for each pollutant and NAAQS averaging time, and how it was determined, are discussed below in the section entitled "Air Quality Monitoring Data".

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[1] This TCEQ RN list, which was provided by the TCEQ Air Dispersion Modeling Team staff, is shown on an MS Excel spreadsheet on the DVD and is named 170915_003-458_TCEQ-10km-RN-Analysis.xls.

SPLS Analysis for SO_2

The SPLS Analysis for SO_2 was conducted in a manner that meets the guidance on pages 18-19 and in Appendix F of TCEQ's Modeling Guidelines. That analysis involved (i) modeling of the maximum allowable hourly SO_2 emissions from the proposed crushing plant, all of which will occur from EPNs 13-15 (as shown in Table 1(a) and Table 4 of Appendix A), and (ii) comparison of the GLC_{max} from that modeling to the SPLS for SO_2 of 1,021 $\mu g/m^3$.

Health Effects (ESLs) Analyses

Even though no Health Effects Analysis was requested or required by the TCEQ, Health Effects Analyses were voluntarily conducted for the emissions of diesel fuel and silica in a manner that meets the Health Effects Analysis guidance on pages 19-20 and in Appendix G of TCEQ's Modeling Guidelines.

In conducting the Health Effects Analysis for diesel fuel (CAS# 68334-30-5), all of the maximum allowable hourly and annual VOC emissions from the proposed crushing plant, all of which will occur from EPNs 13-16 (as shown in Table 1(a)), were assumed to be emissions of diesel fuel. Those maximum allowable hourly and annual emissions were modeled, and the hourly and annual GLC_{max} values from that modeling were compared to the short-term and long-term diesel fuel ESLs of 1,000 $\mu g/m^3$ and of 100 $\mu g/m^3$, respectively.[2]

The Health Effects Analysis for silica (CAS# 14808-60-7) included separate modeling runs that included the following emissions as inputs, at the maximum emissions rates specified in Table 4 in Appendix A: (i) the modeled project-related emissions of silica, and (ii) the modeled project-related emissions of silica and the modeled road emissions of silica. The hourly and annual GLC_{max} values predicted by such modeling were compared to the short-term and long-term silica ESLs. The maximum silica emissions rates that were used in such modeling, which are shown in Table 4 in Appendix A, were calculated as follows. The maximum silica emissions rates will be a component of the modeled project-related emissions that will be particulate matter and the modeled road emissions that will be emitted from EPNs 1-12 and STK and PR1A-PR1D and UP1A-UP1C. Such particulate matter will be the limestone that will be processed and handled at the proposed crushing plant. Based on an analysis of samples that Vulcan obtained of such limestone, 0.2% of it is silica. A copy of the analytical report for silica is provided within Appendix A. The modeled project-related emissions of silica and the modeled road emissions of silica that were used in the Health Effects Analysis modeling for silica were calculated by applying the 0.2% to the maximum calculated hourly and annual PM_{10} emissions from the EPNs 1-12 and STK and PR1A-PR1D and UP1A-UP1C, as indicated Table 4 in Appendix A. The hourly and annual GLC_{max} values predicted by such modeling runs were compared to the short-term and long-term silica ESLs of 14 $\mu g/m^3$ and 0.27 $\mu g/m^3$, respectively, as is discussed in the section below titled "Modeling Results".

[2] The short-term and long-term diesel fuel ESLs came from the latest available TCEQ ESLs list, which is provided on an MS Excel spreadsheet on the DVD and is named 170808_003-458_TCEQ-ESLs-Nov2016.

Area Map

An area map showing the project site, major roads in the area, two benchmark locations and their UTM coordinates, marked scale, the true north arrow, a background topographic map, land use types (a qualitative representation of land-use land-cover analysis ("LULC") and terrain) within a 3 km radial distance of the project site, and other general labels, is attached on page 41, and an electronic copy of it is provided on the DVD.[3] A legend showing the land use types (including industrial, commercial, and residential) is provided on the area map. The area map shows that there is no elementary, junior high/middle, or senior high school within 3,000 feet of where the proposed crushing plant will be located. The property lines of the project site and the layout of the proposed crushing plant are shown on the area map.

The names of the four Digital Raster Graphics (DRGs) quadrangle images used to make up the background topographic map are Bat Cave, Smithson Valley, Bulverde and Anhalt. These 1:24k scaled images were downloaded from the Texas Natural Resources Information System (TNRIS). The source data of the DRGs is provided by the U.S. Geological Survey (USGS). The publication date of each DRG image is 1996. The UTM NAD83 Zone 14 datum coordinates (in units of meters) were used.

There is no Single Property Line Designation ("SPLD") associated with this project.

Plot Plan & Supplemental Drawings

A plot plan showing the project site, where the proposed crushing plant will be located on it, background aerial imagery, a marked scale, the true north arrow, and other general labels is provided on page 42.

Supplemental drawings showing the scaled layout and proposed location of the proposed crushing plant, including related stockpiles and paved and unpaved roads, background aerial imagery, a marked scale, the true north arrow, and other general labels are provided on pages 43 - 44. Additionally, these drawings are project-specific with the proposed locations of the EPNs noted, equipment labeled and a source group identification (i.e., VLXEPN1) labeled for each modeled source group, the modeled stockpile areas, and modeled roads included.

Note that while neither the plot plan nor any supplemental drawings include the UTM coordinates of emissions points, such coordinates are specified in the Table 1(a) Parameters sheets in Appendix A.

The UTM NAD83 Zone 14 datum coordinates (in units of meters) were used for the plot plan and the supplemental drawings. The source data of the 2017 aerial imagery is provided by Google Earth. The electronic copy of the plot plan and the supplemental drawings are provided on the DVD.

[3] This area map is different than, and supersedes, the area map in the original application.

Flow Diagram

The flow diagram for the proposed crushing plant is attached on page 45. The diagram shows the proposed three crushers, two screens, eleven conveyors, three engines, and the one diesel fuel storage tank. The EPN number for each emission point, the equipment name and the maximum allowable hourly production rate in tons per hour ("TPH") are provided on the flow diagram. The flow diagram is not drawn to scale.

Air Quality Monitoring Data

As discussed below, the monitored background concentration that was used for each pollutant and NAAQS averaging time in each Minor NAAQS Analysis was determined in a manner that met or exceeded the guidance in Appendix D of the TCEQ Modeling Guidelines for determining representative monitored background concentrations for use in Minor NAAQS Analyses. Therefore, each such monitored background concentration is at least representative of the background concentration for that pollutant and NAAQS averaging time in the area around the proposed crushing plant. In fact, each such monitored background concentration is expected to be conservatively higher than is representative of the background concentration for that pollutant and NAAQS averaging time expected in the area around the proposed crushing plant.

The area around the proposed crushing plant is predominantly rural, with several residential areas and a few commercial businesses within 3 km from the center of the proposed crushing plant. In fact, based on National Land Cover Database 2011 ("NLCD 2011") datasets from a land use tool that was downloaded from NaviKnow's website (http://www.landuse.naviknow.com), the area around the proposed crushing plant area is about 91% rural and about 9% urban. As discussed above, the list of TCEQ RNs for emissions sources within a 10 km radial distance from the center of the proposed crushing plant contains one such source -- Martin Marietta's existing rock crushing plant. The heavily traveled Highway 281 and Interstate 35 corridors are outside of the 10 km radial distance from the center of the proposed crushing plant. Highway 46 runs west/east on the northern perimeter of the project site, and FM 3009 runs north/south on the eastern perimeter of the project site.

There is no monitor in Comal County that measures ambient concentrations of PM_{10}, $PM_{2.5}$, NO_2, SO_2, or CO. Accordingly, monitors had to be identified in other counties that provide ambient concentrations of PM_{10}, $PM_{2.5}$, NO_2, SO_2, and CO that are at least representative of the background concentration of those pollutants over the different NAAQS averaging times in the area around the proposed crushing plant.[4] The possible monitors in other counties from which to obtain monitored background concentrations were evaluated consistent with the guidance in

[4] While the August 11, 2017 AQA Modeling Protocol proposed that the TCEQ's 1998 Screening Background Concentrations be used for the Minor NAAQS Analyses for the 24-hr PM_{10} NAAQS, 3-hr SO_2 NAAQS, 24-hr SO_2 NAAQS, annual SO_2 NAAQS, 1-hr CO NAAQS, and 8-hr CO NAAQS, during the August 17, 2017 pre-modeling meeting, TCEQ stated that it is no longer acceptable to use the TCEQ's 1998 Screening Background Concentrations as background concentrations because they are no longer publicly available. Therefore, appropriate concentrations from actual monitors were used as the monitored background concentrations for the pollutants and NAAQS averaging times.

Appendix D of TCEQ's Modeling Guidelines. A monitor was considered for use for a particular pollutant and NAAQS averaging time only if the monitoring data for that monitor are complete. The below-discussed evaluation of each of the possible monitors demonstrates that each of them provides monitoring concentrations that are at least representative of, and in fact, are expected to be conservatively higher than, the background concentrations for one or more pollutants and NAAQS averaging times expected in the area around the proposed crushing plant.

- Selma C301 monitor: This monitor provided the 24-hr PM_{10} monitored background concentration that was used in the 24-hr PM_{10} Minor NAAQS Analysis. That 24-hr PM_{10} monitored background concentration is expected to be conservatively higher than is representative of the 24-hr PM_{10} background concentration expected for the area around the proposed crushing plant because there are much more PM_{10} emissions in the area around this monitor than there are in the area around the proposed crushing plant. That is demonstrated by the information in the following table, including the comparisons of (i) the PM_{10} emissions in the county where this monitor is located (Bexar County) compared to the PM_{10} emissions in Comal County where the proposed crushing plant will be located, and (ii) the PM_{10} emissions within 10 km of this monitor compared to the PM_{10} emissions within 10 km of the center of the proposed crushing plant. There are much more PM_{10} emissions in the area around this monitor than in the area around the proposed crushing plant for several reasons, including: (i) there are several large industrial sources of PM_{10} emissions in the area around this monitor that emit many more tons of PM_{10} emissions than are emitted by sources in the area around the proposed crushing plant, (ii) this monitor is located in an area whose land use is about 49% urban and 51% rural, in contrast to the area around the proposed crushing plant, which is 91% rural and only 9% urban, and (iii) this monitor is located very close to Interstate I-35 and FM 1604, which are very heavily traveled highway corridors, whereas there are no similarly sized and traveled highways in the area around the proposed crushing plant, and more vehicles on highways in the area means more PM_{10} emissions in the area.

- Heritage Middle School C622 monitor: This monitor provided the 24-hr $PM_{2.5}$ and annual $PM_{2.5}$ monitored background concentrations that were used in the 24-hr $PM_{2.5}$ and annual $PM_{2.5}$ Minor NAAQS Analyses. Those monitored background concentrations are expected to be conservatively higher than what are representative of the background concentrations for 24-hr $PM_{2.5}$ and annual $PM_{2.5}$ for the area around the proposed crushing plant because there are much more $PM_{2.5}$ emissions in the area around this monitor than in the area around the proposed crushing plant. That is demonstrated by the information in the following table, including the comparisons of (i) the $PM_{2.5}$ emissions in the county where this monitor is located (Bexar County) compared to the $PM_{2.5}$ emissions in Comal County where the proposed crushing plant will be located, and (ii) the $PM_{2.5}$ emissions within 10 km of this monitor compared to the $PM_{2.5}$ emissions within 10 km of the center of the proposed crushing plant. There are much more $PM_{2.5}$ emissions in the area around this monitor than there are in the area around the proposed crushing plant for several reasons, including: (i) this monitor is located approximately 3 miles away from a very large industrial source of $PM_{2.5}$ emissions (i.e., CPS's coal fired power plant) that emit many more tons of $PM_{2.5}$ emissions than are emitted by sources in the area around the proposed crushing plant, and (ii) this monitor is located close to Hwy

87 and Interstate 410, which are heavily traveled highway corridors, whereas there are no similarly sized and traveled highways in the area around the proposed crushing plant, and more vehicles on highways in the area means more $PM_{2.5}$ emissions in the area.

- Midlothian OFW C52 monitor: This monitor provided the 1-hr NO_2 and annual NO_2 monitored background concentrations that were used in the 1-hr NO_2 and annual NO_2 Minor NAAQS Analyses. Those monitored background concentrations are expected to be conservatively higher than are representative of the NO_2 background concentration expected for the area around the proposed crushing plant because there are much more NO_2 emissions in the area around this monitor than there are in the area around the proposed crushing plant. That is demonstrated by the information in the following table, including the comparisons of (i) the NO_2 emissions in the county where this monitor is located (Ellis County) compared to the NO_2 emissions in Comal County where the proposed crushing plant will be located, and (ii) the NO_2 emissions within 10 km of this monitor compared to the NO_2 emissions within 10 km of the center of the proposed crushing plant. There are much more NO_2 emissions in the area around this monitor than there are in the area around the proposed crushing plant for several reasons, including: (i) this monitor is located approximately 1.5 miles away from some very large industrial sources of NO_2 emissions (i.e., TXI's cement plant, Chaparral Steel's steel plant, Qualico's steel plant, and an electric power generation plant) that emit many more tons of NO_2 emissions than are emitted by sources in the area around the proposed crushing plant, and (ii) this monitor is located close to Hwy 360 and Hwy 67, which are heavily traveled highway corridors, whereas there are no similarly sized and traveled highways in the area near the project site, and more vehicles on highways in the area means more NO_2 emissions in the area.

- Calaveras Lake C59 monitor: This monitor provided the 1-hr SO_2, 3-hr SO_2, 24-hr SO_2, and annual SO_2 monitored background concentrations that were used in the 1-hr SO_2, 3-hr SO_2, 24-hr SO_2, and annual SO_2 Minor NAAQS Analyses. Those monitored background concentrations are expected to be conservatively higher than are representative of the background concentrations for the 1-hr SO_2, 3-hr SO_2, 24-hr SO_2, and annual SO_2 expected for the area around the proposed crushing plant because there are much more SO_2 emissions in the area around this monitor than in the area around the proposed crushing plant. That is demonstrated by the information in the following table, including the comparisons of (i) the SO_2 emissions in the county where this monitor is located (Bexar County) compared to the SO_2 emissions in Comal County where the proposed crushing plant will be located, and (ii) the SO_2 emissions within 10 km of this monitor compared to the SO_2 emissions within 10 km of the center of the proposed crushing plant. There are much more SO_2 emissions in the area around this monitor than there are in the area around the proposed crushing plant for several reasons, including: (i) this monitor is located approximately 2 miles away from a very large industrial source of SO_2 emissions (i.e., CPS's coal fired power plant) that emit many more tons of SO_2 emissions than are emitted by sources in the area around the proposed crushing plant, and (ii) this monitor is located close to Hwy 181 and FM 1604, which are heavily traveled highway corridors, whereas there are no similarly sized and traveled highways in the area around the proposed crushing plant, and more vehicles on highways in the area means more SO_2 emissions in the area.

- Waco Mazanec C1037 monitor: This monitor provided the 1-hr CO and 8-hr CO monitored background concentrations that were used in the 1-hr CO and 8-hr CO Minor NAAQS Analyses. Those monitored background concentrations are expected to be conservatively higher than are representative of the CO background concentrations expected for the area around the proposed crushing plant because there are more CO emissions in the area around this monitor than in the area around the proposed crushing plant. That is demonstrated by the information in the following table, including the comparisons of (i) the CO emissions in the county where this monitor is located (McLennan County) compared to the CO emissions in Comal County where the proposed crushing plant will be located, and (ii) the CO emissions within 10 km of this monitor compared to the CO emissions within 10 km of the center of the proposed crushing plant. There are more CO emissions in the area around this monitor than in the area around the proposed crushing plant for several reasons, including: (i) this monitor is located near other CO emissions sources, such as the TSTC Waco Airport and an acrylic products manufacturing plant, and (ii) this monitor is located close to IH-35 and Hwy 84, which are heavily traveled highway corridors, whereas there are no similarly sized and traveled highways in the area around the proposed crushing plant, and more vehicles on highways in the area means more CO emissions in the area.

Support that each monitor provides concentration data that are at least representative of, and in fact, are conservatively higher than, the background concentrations for the area around the proposed crushing plant

Parameter	Selma C301 Monitor Bexar Co.	Heritage Middle School C622 Monitor Bexar Co.	Midlothian OFW C52 Monitor Ellis Co.	Calaveras Lake C59 Monitor Bexar Co.	Waco Mazanec C1037 Monitor McLennan Co.	Proposed crushing plant Comal Co.
Population of county[1]	1,917,932	1,917,932	178,372	1,917,932	246,680	132,578
PM_{10} emissions (TPY) in county[2]	47,217					23,592
$PM_{2.5}$ emissions (TPY) in county[2]		8,369				2,996

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Parameter	Selma C301 Monitor Bexar Co.	Heritage Middle School C622 Monitor Bexar Co.	Midlothian OFW C52 Monitor Ellis Co.	Calaveras Lake C59 Monitor Bexar Co.	Waco Mazanec C1037 Monitor McLennan Co.	Proposed crushing plant Comal Co.
NO_2 emissions (TPY) in county[2]			10,777			7,434
SO_2 emissions (TPY) in county[2]				18,656		458
CO emissions (TPY) in county[2]					32,158	22,432
PM_{10} emissions (TPY) within 10 km of monitor or center of proposed crushing plant [3]	86					0
$PM_{2.5}$ emissions (TPY) within 10 km of monitor or center of proposed crushing plant[3]		323				0

Parameter	Selma C301 Monitor Bexar Co.	Heritage Middle School C622 Monitor Bexar Co.	Midlothian OFW C52 Monitor Ellis Co.	Calaveras Lake C59 Monitor Bexar Co.	Waco Mazanec C1037 Monitor McLennan Co.	Proposed crushing plant Comal Co.
NO_2 emissions (TPY) within 10 km of monitor or center of proposed crushing plant[3]			3,101.22			0
SO_2 emissions (TPY) within 10 km of monitor or center of proposed crushing plant[3]				10,188		0
CO emissions (TPY) within 10 km of monitor or center of proposed crushing plant[3]					6	0
Land Use % Rural vs %Urban[4]	51% Rural vs 49% Urban	74% Rural vs 26% Urban	80% Rural vs 20% Urban	86% Rural vs 14% Urban	82% Rural vs 18% Urban	91% Rural vs 9% Urban

[1] 2016 population estimates, which were downloaded from the DSHS Center for Health Statistics website: https://www.dshs.texas.gov/chs/

[2] From 2014 NEI datasets, which were downloaded from the EPA website: https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data

[3] The dataset for RNs within 10 km of the project site and each of the four monitor sites was provided by the TCEQ Air Dispersion Modeling Team (ADMT). The emissions identified for each pollutant are the sum of its actual

emissions for the RNs in the dataset according to the emissions summary for those RNs in the TCEQ spreadsheet titled "2015statesum.xlsx", which were downloaded from the TCEQ website: https://www.tceq.texas.gov/airquality/point-source-ei/psei.html.

[4] Data from the National Land Cover Database 2011 ("NLCD 2011") was used to evaluate land use in each area defined by 20 km x 20 km around each monitor or the center of the proposed crushing plant. Such data were downloaded from NaviKnow's website:
http://www.landuse.naviknow.com/.

The highest monitored background concentration for each monitor for each pollutant and NAAQS averaging time is identified in the table below.[5] Each such monitored background concentration is in the form of the applicable NAAQS (i.e., exceedance-based NAAQS or a statistically-based NAAQS, as discussed in Appendix D of the TCEQ's Modeling Guidelines).[6] Not only is the monitored background concentration for each monitor for each pollutant and NAAQS averaging time in the table below expected to be conservatively higher than is representative of the background concentration of that pollutant and NAAQS averaging time expected for the area around the proposed crushing plant (as discussed above), as an extra measure of conservatism, the highest concentration measured at any of the monitors for each pollutant and NAAQS averaging time -- which is indicated in bold, **red** font in the table below -- was used in the Minor NAAQS Analysis for that pollutant and NAAQS averaging time.

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[5] The source of the monitored background concentration data in that table is monitor concentration datasets that were downloaded from the yearly summary reports on the TCEQ website at: https://www.tceq.texas.gov/cgi-bin/compliance/monops/yearly_summary.pl, or, for 24-hr PM_{10}, the EPA's Air Data website at: https://www.epa.gov/outdoor-air-quality-data.

[6] The monitored background concentrations are in the following form for the pollutants and NAAQS averaging times: (i) 24-hr PM_{10} NAAQS -- the Highest-Second-High ("H2H") monitored concentration for the 24-hr averaging time that encompasses the most recent three consecutive calendar years of complete data for the identified monitoring site, i.e., 2014 through 2016, (ii) 24-hr $PM_{2.5}$ NAAQS -- the most recent 3-year average of the calculated annual 98th percentile of the 24-hr values that encompasses the most recent three consecutive calendar years of complete data for the identified monitoring sites, i.e., 2014 through 2016, (iii) Annual $PM_{2.5}$ NAAQS -- the most recent 3-year average of the annual monitored concentrations that encompasses the most recent three consecutive calendar years of complete data for the identified monitoring sites, i.e., 2014 through 2016. (iv) 1-hr NO_2 NAAQS -- the most recent 3-year average of the calculated annual 98th percentile daily maximum 1-hr values that encompasses the most three consecutive calendar years of complete data for the identified monitoring sites, i.e., 2014 through 2016, (v) Annual NO_2 NAAQS -- the annual monitored concentration from the most recent complete year for annual averaging time for the identified monitoring sites, i.e., 2016, (vi) 1-hr SO_2 NAAQS -- the most recent 3-year average of the calculated annual 99th percentile daily maximum 1-hr values that encompasses the three consecutive calendar years of complete data for the identified monitoring sites, i.e., 2014 through 2016, (vii) 3-hr SO_2 NAAQ -- the H2H monitored concentration for the 3-hr averaging time from the most recent complete year for the identified monitoring sites, i.e., 2016, (viii) 24-hr SO_2 NAAQS -- the H2H monitored concentration for the 24-hr averaging time from the most recent complete year for the identified monitoring sites, i.e., 2016, (ix) Annual SO_2 NAAQS -- the annual monitored concentration from the most recent complete year for annual averaging time for the identified monitoring sites, i.e., 2016, (x) 1-hr CO NAAQS -- the H2H monitored concentration from the most recent complete year for the 1-hr averaging time for the identified monitoring sites, i.e., 2016, and (xi) 8-hr CO NAAQS -- the H2H monitored concentration from the most recent complete year for the 8-hr averaging time for the identified monitoring sites, i.e., 2016.

Highest monitored background concentration measured at each monitor for each pollutant and NAAQS averaging time

Pollutant and NAAQS Averaging Time	Selma C301 Monitor Bexar Co. (AQS Site # 480290053) (µg/m³)	Heritage Middle School C622 Monitor Bexar Co. (AQS Site # 480290622) (µg/m³)	Midlothian OFW C52 Monitor Ellis Co. (AQS Site # 481390016) (µg/m³)	Calaveras Lake C59 Monitor Bexar Co. (AQS Site # 480290059) (µg/m³)	Waco Mazanec C1037 Monitor McLennan Co. (AQS Site # 483091037) (µg/m³)
24-hr PM_{10}	**66.00**	N/A	N/A	N/A	N/A
24-hr $PM_{2.5}$	21.53	**23.35**	18.63	22.33	N/C
Annual $PM_{2.5}$	8.29	**8.53**	8.38	8.44	N/C
1-hr NO_2	N/A	N/C	**62.92**	59.85	46.87
Annual NO_2	N/A	N/C	**8.41**	7.19	6.05
1-hr SO_2	N/A	N/C	14.98	**32.93**	14.90
3-hr SO_2	N/A	N/C	10.54	**13.85**	9.58
24-hr SO_2	N/A	N/C	3.69	**7.26**	3.04
Annual SO_2	N/A	N/C	0.66	**2.24**	0.84
1-hr CO	N/A	N/C	N/A	N/A	**458.24**
8-hr CO	N/A	N/C	N/A	N/A	**343.68**

"N/A" means that no concentration data for the specified pollutant and NAAQS averaging time are available from the monitor.

"N/C" means that some concentration data for the specified pollutant and NAAQS averaging time are available, but such data are not sufficiently complete for use as a monitored background concentration.

The electronic copies of the datasets relating to the monitors in the tables above are included on the DVD.

Modeling Emissions Inventory

The emissions inventory that was used in the modeling is appropriate and accurate.

The maximum allowable emissions of PM_{10}, $PM_{2.5}$,[7] NO_2,[8] SO_2, CO, diesel fuel, and silica from the proposed crushing plant's EPNs 1-16 and STK, which are specified in Table 4 in Appendix

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[7] In calculating the maximum allowable emissions of $PM_{2.5}$ for use in the Minor NAAQS Analysis modeling, direct and secondary formation of $PM_{2.5}$ were addressed in accordance with the guidance provided in Appendix R of the TCEQ Modeling Guidelines. Per that guidance, there are four tiered assessment cases that may be used to address direct and secondary formation of $PM_{2.5}$. The proposed crushing plant meets the conditions of Case 1, which are that (i) the proposed maximum allowable annual direct $PM_{2.5}$ emissions must be < 10 TPY, and such emissions must be modeled according to a Minor NAAQS analysis, and (ii) the proposed maximum allowable annual SO_2 and NO_x emissions must each be < 40 TPY, and the modeling report must provide a discussion regarding why such emissions

A, were included in the modeling emissions inventories for the above-discussed Minor NAAQS Analyses, SPLS Analysis for SO_2, and Health Effects Analyses, as applicable. As discussed above, Vulcan also voluntarily included the maximum allowable annual emissions from related proposed paved and unpaved roads (EPNs PR1A-PR1D and UP1A-UP1C) (see Table 4 in Appendix A) in the modeling emissions inventories for the Minor NAAQS Analysis for the annual $PM_{2.5}$ NAAQS and the Health Effects Analysis for silica. Including such road emissions was voluntary because including any road emissions in the modeling for the proposed crushing plant is not legally required since roads are not "facilities" as defined in 30 TAC §116.10, and the only emissions for which modeling analysis is required are emissions that will occur from "facilities". (*See, e.g.*, Section 382.0518(b)(2) of the Texas Clean Air Act, 30 TAC §116.111(a)(2)(A)(i), TCEQ's Air Quality Modeling Guidelines, and TCEQ's MERA Guidance.) Moreover, in addition to including such road emissions being voluntary, it was also conservative because, as discussed above, the monitored background concentrations for PM_{10} and $PM_{2.5}$ that were used in the full NAAQS analyses are expected to be higher than are representative of the background concentrations for PM_{10} and $PM_{2.5}$ that are expected in the area around the proposed crushing plant.

The maximum allowable emissions of PM_{10}, $PM_{2.5}$, NO_2, SO_2, and CO from EPNs 1-27 and STK for Martin Marietta's existing rock crushing plant, which is authorized under Permit No. 79037L001, were included in the modeling emissions inventory for the above-discussed Minor NAAQS Analyses (but were not required to be included in the modeling emissions inventories for the above-discussed SPLS Analysis for SO_2 or Health Effects Analyses). Those maximum allowable emissions rates are shown in Table 8, as well as in the Table 1(a) from the application for Permit No. 79037L001 and the Maximum Allowable Emissions Rates Table ("MAERT") for that permit, all of which are in Appendix B.

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will not result in a significant contribution to the secondary formation of $PM_{2.5}$. The first condition is met because the proposed maximum allowable annual direct $PM_{2.5}$ emissions are only 1.07 TPY, and, as discussed elsewhere in this report, a Minor NAAQs analysis was conducted for such emissions, which demonstrates compliance with the 24-hr and annual $PM_{2.5}$ NAAQS. The second condition is also met because the proposed maximum allowable annual SO_2 and NO_x emissions are each less than 40 TPY, and following is a discussion regarding why such emissions will not result in a significant contribution to the secondary formation of $PM_{2.5}$, which, according to Appendix R of the TCEQ Modeling Guidelines, satisfies the second condition: The proposed maximum allowable annual SO_2 and NO_x emissions are only 5.58 TPY and 19.76 TPY, respectively, and, thus, are much < 40 TPY. As a result, it is not expected that such emissions would lead to a significant contribution to the secondary formation of $PM_{2.5}$. Additionally, the location of the maximum secondary $PM_{2.5}$ that may be formed would not likely be well-correlated in space or time with the location of the maximum direct $PM_{2.5}$ off-site ground level concentrations determined by the Minor NAAQS Analyses for $PM_{2.5}$ since any secondary $PM_{2.5}$ will be formed through chemical reactions that will occur in the atmosphere gradually over time (hours or days depending on atmospheric conditions and other variables).

[8] In calculating the maximum allowable emissions of NO_2 for use in the Minor NAAQS Analysis modeling, the revised Tier 2 ARM2 approach referenced in TCEQ's "Revisions to the Guideline on Air Quality Models" (APDG 6400v3, Rev. 7/17) was used to determine that the NO_2 maximum allowable emissions are 90% of the NOx maximum allowable emissions. TCEQ's Air Dispersion Modeling Team confirmed that such use of the revised Tier 2 ARM2 approach is appropriate.

The electronic copies of the spreadsheets and supporting documents for the modeled maximum allowable emission rates that were included in the modeling emissions inventories are provided on the DVD.

Stack Parameter Justification

Each emissions source at the proposed crushing plant and at Martin Marietta's crushing plant whose emissions are in the modeling emissions inventory was characterized and modeled in a manner that met or exceeded the guidance in Appendix K of the TCEQ Modeling Guidelines.

Each such emissions source was modeled as a point, a pseudo-point, a volume, a square area, or a rectangular area source characterization group.

The modeling input parameters for those emissions sources are described below, and relevant tables and supporting documents containing those modeling input parameters are provided in the appendices to this report. These tables provide the input variables and source characterizations of each modeled source group. Electronic copies of the tables, the Table 1(a) Parameters sheets, and supporting documents are provided on the DVD.

Characterization of the Point Source Groupings:

The small combustion engine/generator set emission sources were characterized as individual point sources within the modeling demonstrations since they disperse emissions with momentum and buoyancy from their vertical stacks during operations. The vertical exhaust stacks do not have rain caps constructed on them. There was a total of seven individual point source groupings modeled.

Three of the point source groups (IDs: VLXEPN13, VLXEPN14 and VLXEPN15) modeled are for the proposed engine/generator sets (EPNs 13-15) for the proposed crushing plant. The modeled release heights for them range from 6 feet above ground level to 10 feet above ground level. The modeled input parameters for the exhaust stack temperature, exhaust stack diameter, and exhaust stack flow rate for each of the proposed engine/generator sets are provided on the Table 1(a) Parameters sheet as well as in the manufacturer specifications within Appendix A of this modeling report.

The remaining four point source groups (IDs: ENG1, ENG2, ENG3 and ENG4) modeled are for the existing engine/generator sets (EPNs 24-27) for Martin Marietta's existing crushing plant. The modeled release heights for them range from 4 feet above ground level to 12 feet above ground level, which are typical peak heights of engine/generator sets at crushing plants. The modeled input parameters for the exhaust stack temperature, exhaust stack diameter and exhaust stack flow rate for the permitted engine/generator sets are provided on the Table 1(a) Parameters sheet as well as in its original modeling report and supporting documents from the TCEQ within Appendix B of this modeling report. The bases for those parameters are provided in the modeling report for the permit application for Martin Marietta's crushing plant.

Table 5 in Appendix A shows the source group IDs and the modeled source parameters for each of the seven individual point source groupings.

Characterization of the Pseudo-Point Source Groupings:

The hopper, crushers, screens, conveyor transfers, and diesel fuel storage tank for the proposed crushing plant, and the independent conveyor transfers for the existing Martin Marietta crushing plant were characterized as pseudo-point source groupings.

The TCEQ-accepted pseudo-point default parameters for stack diameter (0.0033 feet), exit velocity (0.0033 feet per second), and exit temperature (-459.67 °F) were used. Using those default parameters, results in the model assume that there will be no initial dispersion from pseudo-point sources, which leads to the modeling over-predicting off-site concentrations. Using those default parameters is a conservative modeling technique because a hopper has more initial dispersion based on its specific length and width and, thus, could have instead been modeled with specific dimensions as an area source, and crushers, screens, and conveyor transfers have more initial dispersion based on their lateral and vertical lengths and, thus, could have instead been modeled with specific larger dimensions as individual volume sources. Modeling those sources in those ways, instead of as pseudo-point sources, would have resulted in the modeling predicting lower concentrations.

The individual pseudo-point source groupings are for EPNs 1-12 & 16 for the proposed crushing plant (IDs: VLXEPN1 – VLXEPN12 & VLXEPN16), and for EPNs 5, 12 & 14-23 for Martin Marietta's existing crushing plant (IDs: PP5, PP12, PP14 – PP23). The modeled release heights varied and are based on equipment specifications for the pseudo-point source groupings.

Table 5 in Appendix A shows the source group IDs and the modeled source parameters for each of the individual pseudo-point source groupings.

Characterization of the Area Source Groupings:

Non-buoyant, low-momentum, fugitive-type source emissions from individual aggregate hoppers (EPNs 1, 6-7 & 13) from Martin Marietta's existing crushing plant under Permit No. 79037L001 were modeled as rectangular area source groups (IDs: FUGHOP1, FUGHOP2 and FUGHOP3). Emissions from aggregate hoppers initially disperse in two dimensions with little or no plume rise during material dumping operations. Modeled release heights and input parameters varied based on equipment specifications.

Aggregate stockpiles for the proposed crushing plant and the existing Martin Marietta crushing plant were modeled as individual square area source groups. The modeled release height of each modeled stockpile area source group was set at one-half the average height above ground level of the stockpiles, which is generally around 20 feet above ground level. Therefore, the modeled release height of each modeled stockpile was set at 10 feet above ground level. That is a conservative assumption relative to actual operations of the stockpiles because they will be allowed to be as high as 45 feet above ground level, and assuming a lower stockpile stack height when modeling the emissions from the stockpiles will result in higher predicted off-site concentrations from the stockpiles. Modeled stockpile release heights should not be construed as permit limitations. The proposed maximum allowable hourly and annual emissions from stockpiles were properly calculated and modeled. There is a total of eight individually modeled area source groupings (IDs: VLXSTK1A-VLXSTK1D & STK1-STK4) for the stockpiles associated with the proposed crushing plant and the Martin Marietta crushing plant.

One paved road segment (EPN PR1A) was modeled as an area source. That is discussed in the next section, along with the other paved roads and the unpaved roads that were characterized as volume sources.

Table 6 in Appendix A shows the source group IDs and the modeled source parameters for each of the modeled individual area source groupings.

Characterization of the Volume Source Groupings:

Non-buoyant, low-momentum, fugitive-type source emissions and their applicable emission points located close (within a few meters) to one another that have similar functionality were modeled in elevated single volume source groups. Crushers and screens from the existing Martin Marietta crushing plant were appropriately modeled as volume source groupings. Crushers and screens are typically characterized as volume source groupings within modeling demonstrations since they emit emissions into the atmosphere as an elevated "box" outward and away from the origins of the emissions. In total, two volume sources were modeled (IDs: FUGSC1 & FUGCR1). The source group id and modeled source parameters for each modeled volume source grouping are provided in tables within Appendix A of this report.

Volume source characterizations were not used for the crushers, screens, and conveyor transfers at the proposed crushing plant because, as discussed above, those crushers, screens, and conveyor transfers were conservatively modeled as pseudo-point source groups.

However, all of the paved and unpaved roads whose emissions were modeled (Tables EC-4 and EC-5 in Appendix A), except for one, were characterized as lines of adjacent volume sources.[9] Three individual lines were used for the volume source representations of the paved roads segments (EPNs PR1B, PR1C and PR1D), and three individual lines were used for the volume source representations of the unpaved roads segments (EPNs UP1A, UP1B and UP1C). Spacing of the adjacent volume sources along each line was set at 9 meters. The number of adjacent volume sources for each line was based on the length of the line divided by the set spacing of 9 meters, which was handled automatically within the model's tool for creating lines of adjacent volume sources. The calculations of the parameters for the lines of adjacent volumes used for each road segment used in the modeling are provided below:

- Paved Road 1B (EPN PR1B) Source IDs: VPR1B1 thru VPR1B32
  It is a two-lane roadway segment. Thirty-two adjacent volumes sources were automatically created by the model

[9] The basis of the discussion about the characterization of paved roads and unpaved roads is the March 2, 2012 EPA memo titled "Haul Road Workgroup Final Report Submission to EPA-OAQPS".

Vehicle Height (VH) = 3 meters (typical product trucks and fuel tankers)
Top of Plume Height (T) = 1.7 x VH = 1.7 x 3 meters = 5.1 meters
Volume Source Release Height (RH) = 0.5 x T = 0.5 x 5.1 meters = 2.55 meters
Road Width (RW) = 10 meters at its most narrow point
Width of Plume (WP) for two lanes = RW + 6 meters = 10 meters + 6 meters = 16 meters
Initial Sigma Z = T / 2.15 = 5.1 meters / 2.15 = 2.37 meters
Initial Sigma Y = WP / 2.15 = 16 meters / 2.15 = 7.44 meters

- Paved Road 1C (EPN PR1C) Source IDs: VPR1C1 thru VPR1C14
  It is a single lane roadway segment. Fourteen adjacent volume sources were automatically created
  Vehicle Height (VH) = 3 meters (typical product trucks and fuel tankers)
  Top of Plume Height (T) = 1.7 x VH = 1.7 x 3 meters = 5.1 meters
  Volume Source Release Height (RH) = 0.5 x T = 0.5 x 5.1 meters = 2.55 meters
  Vehicle Width (VW) = 3 meters (typical product trucks and fuel tankers)
  Width of Plume (WP) for single lane = VW + 6 meters = 3 meters + 6 meters = 9 meters
  Initial Sigma Z = T / 2.15 = 5.1 meters / 2.15 = 2.37 meters
  Initial Sigma Y = WP / 2.15 = 9 meters / 2.15 = 4.19 meters

- Paved Road 1D (EPN PR1D) Source IDs: VPR1D1 thru VPR1D24
  It is a single lane roadway segment. Twenty-four adjacent volume sources were automatically created
  Vehicle Height (VH) = 3 meters (typical product trucks and fuel tankers)
  Top of Plume Height (T) = 1.7 x VH = 1.7 x 3 meters = 5.1 meters
  Volume Source Release Height (RH) = 0.5 x T = 0.5 x 5.1 meters = 2.55 meters
  Vehicle Width (VW) = 3 meters (typical product trucks and fuel tankers)
  Width of Plume (WP) for single lane = VW + 6 meters = 3 meters + 6 meters = 9 meters
  Initial Sigma Z = T / 2.15 = 5.1 meters / 2.15 = 2.37 meters
  Initial Sigma Y = WP / 2.15 = 9 meters / 2.15 = 4.19 meters

- Unpaved Road 1A (EPN UP1A) Source IDs: VUP1A1 thru VUP1A50
  It is a single lane roadway segment. Fifty adjacent volume sources were automatically created
  Vehicle Height (VH) = 3 meters (typical product trucks and fuel tankers)
  Top of Plume Height (T) = 1.7 x VH = 1.7 x 3 meters = 5.1 meters
  Volume Source Release Height (RH) = 0.5 x T = 0.5 x 5.1 meters = 2.55 meters
  Vehicle Width (VW) = 3 meters (typical product trucks and fuel tankers)
  Width of Plume (WP) for single lane = VW + 6 meters = 3 meters + 6 meters = 9 meters
  Initial Sigma Z = T / 2.15 = 5.1 meters / 2.15 = 2.37 meters
  Initial Sigma Y = WP / 2.15 = 9 meters / 2.15 = 4.19 meters

- Unpaved Road 1B (EPN UP1B) Source IDs: VUP1B1 thru VUP1B10
  It is a two-lane roadway segment. Ten adjacent volumes sources were automatically created
  Vehicle Height (VH) = 3 meters (typical product trucks and fuel tankers)
  Top of Plume Height (T) = 1.7 x VH = 1.7 x 3 meters = 5.1 meters

Volume Source Release Height (RH) = 0.5 x T = 0.5 x 5.1 meters = 2.55 meters
Road Width (RW) = 10 meters at its most narrow point
Width of Plume (WP) for two lanes = RW + 6 meters = 10 meters + 6 meters = 16 meters
Initial Sigma Z = T / 2.15 = 5.1 meters / 2.15 = 2.37 meters
Initial Sigma Y = WP / 2.15 = 16 meters / 2.15 = 7.44 meters

- Unpaved Road 1C (EPN UP1C) Source IDs: VUP1C1 thru VUP1C36
  It is a single lane roadway segment. Fifty adjacent volume sources were automatically created
  Vehicle Height (VH) = 3 meters (typical product trucks and fuel tankers)
  Top of Plume Height (T) = 1.7 x VH = 1.7 x 3 meters = 5.1 meters
  Volume Source Release Height (RH) = 0.5 x T = 0.5 x 5.1 meters = 2.55 meters
  Vehicle Width (VW) = 3 meters (typical product trucks and fuel tankers)
  Width of Plume (WP) for single lane = VW + 6 meters = 3 meters + 6 meters = 9 meters
  Initial Sigma Z = T / 2.15 = 5.1 meters / 2.15 = 2.37 meters
  Initial Sigma Y = WP / 2.15 = 9 meters / 2.15 = 4.19 meters

The road that was not modeled as a line of adjacent volume sources was the paved road segment EPN PR1A. It was instead modeled as an area source because it is the road segment closest to the property line where the modeled receptor grid begins and the volume source characterization has a specified exclusion zone[10] where predicted concentrations from the model are not calculated, and the area source characterization does not have an exclusion zone. This paved road segment meets AERMOD's aspect ratio limit of 100:1 (see the calculations below), which makes it appropriate to be characterized as an area source. The calculations of the modeled parameters for this road segment in the modeling are provided below:

- Paved Road 1A (EPN PR1A) Source ID: VPR1A1
  It is a two-lane roadway segment. One area source is applicable
  Length of roadway segment (L) = 75 meters
  Vehicle Height (VH) = 3 meters (typical product trucks and fuel tankers)
  Top of Plume Height (T) = 1.7 x VH = 1.7 x 3 meters = 5.1 meters
  Release Height (RH) = 0.5 x T = 0.5 x 5.1 meters = 2.55 meters
  Road Width (RW) = 10 meters at its most narrow point
  Width of Plume (WP) for two lanes = RW + 6 meters = 10 meters + 6 meters = 16 meters
  Initial Sigma Z = T / 2.15 = 5.1 meters / 2.15 = 2.37 meters
  Aspect Ratio (AP) (unitless) = L / WP = 75 meters / 16 meters = ~5:1
  Angle from North is 23°

Table 7 in Appendix A shows the source group IDs and the modeled source parameters for each of the modeled volume source groupings.

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[10] The exclusion zone applicable to this modeling project was 17 meters from the center of the volume source (with 17 meters based on (2.15 x Sigma Y) + 1 meter).

Scaling Factors

No scaling factors were applied within the Minor NAAQS, SPLS, or Health Effects Analyses.

Model Used and Modeling Techniques

As discussed in this section and elsewhere in this report, an appropriate model was used in the modeling, and the modeling techniques that were used in the modeling met or exceeded the guidance in the TCEQ Modeling Guidelines.

The model that was used is the latest available version of EPA's AERMOD model (Version 16216r), which is an EPA-approved model that is an appropriate model for the modeling associated with the Minor NAAQS Analyses, SPLS Analysis for SO_2, and Health Effects Analyses. Regulatory default and the concentration options were used. The modeling conservatively assumed that PM_{10} and $PM_{2.5}$ in the emission plume from each PM_{10} and $PM_{2.5}$ emissions source will not fall out as the plume disperses outwardly in space and time from that source, but instead, assumed that all of the PM_{10} and $PM_{2.5}$ emissions from that source will disperse across the receptor grid.

Building Wake Effects (Downwash)

Building Wake Effects (Downwash) were addressed in the modeling in a manner that met the guidance in the TCEQ Modeling Guidelines, including in Appendix L of that document.

There will be no building structure located at the proposed crushing plant, but there will be a very small trailer building at the project site that will act as the administrative office and the scale house. This small building structure (labeled SCALE in the modeling files) will have a peak height of 12 feet above ground level and be located approximately 1,900 feet to the northeast from the proposed crushing plant.

A building structure is considered sufficiently close to a modeled point (or pseudo-point) source to cause downwash when the minimum distance between them is less than or equal to five times the lesser of the maximum projected height or width of the building structure, commonly referred to as the building structure's region of influence. The region of influence of the proposed building structure is calculated to be 60 feet. Since there is no modeled point (or pseudo-point) source within 60 feet of the proposed building structure, downwash is not applicable to modeled volume or area sources. Accordingly, downwash was not considered within any of the modeling analyses.

Receptor Grid

The receptor grids that were used in the modeling met the guidance in the TCEQ Modeling Guidelines, including in Appendix M of that document.

Except as provided in the next paragraph, for the NAAQS AOI modeling for each NAAQS pollutant and NAAQS averaging time, the SPLS Analysis for SO_2, and the Health Effects

Analyses for diesel fuel and silica, the receptor grids that were used were as follows: A tight grid of 25-meter spaced receptors were used along the property lines of the project site and were placed out to 500 meters from the property lines of the project site, and a fine grid of 100-meter spaced receptors was placed out to 3,000 meters from the property lines of the project site. A medium extended grid of 500-meter spaced receptors was placed out to 10,000 meters from the property lines of the project site. A course grid of 1,000-meter spaced receptors was placed out to 20,000 meters from the property lines of the project site. For the full NAAQS modeling for each NAAQS pollutant and NAAQS averaging time for which there is an AOI because the GLC_{max} predicted by the NAAQS AOI modeling exceeded the applicable SIL, only the significant receptors were used.

For the NAAQS AOI modeling and full NAAQS modeling for each NAAQS pollutant and NAAQS averaging time for which there is no AOI because the GLC_{max} predicted by the NAAQS AOI modeling was below the applicable SIL, the receptor grids that were used were as follows: A tight grid of 25-meter spaced receptors were used along the property lines of the project site and were placed out to 500 meters from the property lines of the project site, and a fine grid of 100-meter spaced receptors was placed out to 3,000 meters from the property lines of the project site. A medium extended grid of 500-meter spaced receptors was placed out to 5,000 meters from the property lines of the project site.

In all, a total ranging from about 30,000 to 33,000 receptors were created and used within the analyses. These receptor grids captured representative GLC_{max} values at and beyond the property lines of the project site, showed a trend of decreasing predicted off-site ground level concentrations as the distance from the property lines of the project site increased, and included the applicable significant receptors for each NAAQS pollutant and NAAQS averaging time for which there is an AOI. More specifically, the utilization of the tight 25-meter receptor grid out to 500 meters from the property lines of the project site ensured that the higher off-site concentrations that might occur closest to the property lines of project site were captured. Also, the use of additional receptors out to 20,000 meters from the property lines of the project site ensured the receptor grid captured off-site concentrations further downwind from the property lines of project site. The UTM NAD83 Zone 14 coordinate system was used to establish all receptor grids.

The EPA's AERMAP program (latest available Version 11103) was used to calculate the source base elevation for each modeled emissions source. AERMAP was also used to calculate the base elevation and its corresponding hill height for each receptor within the modeled receptor grids. The USGS's 1999 National Elevation Dataset (NED) at a resolution scale of 7.5-minute data with a GeoTIFF file format (file NED_71531153.tif) was used within the AERMAP runs. The AERMAP runs produced elevation output data with units of meters in the UTM NAD83 Zone 14 coordinate system.

The input and the output datasets for the AERMAP run are provided on the DVD.

Meteorological Data

The meteorological data that were used in the modeling met the guidance in the TCEQ Modeling Guidelines, including in Appendix O of that document, and oral guidance provided by the TCEQ Air Dispersion Modeling Team.

Because the modeling involved the use of AERMOD for a minor source, i.e., the proposed crushing plant, that will be located in Comal County, Texas, the 1-year 2012 meteorological dataset (Comal_BAZFWD12M.SFC and Comal_BAZFWD12M.PFL) for Comal County was used. That meteorological dataset was downloaded from the TCEQ Air Dispersion Modeling website: https://www.tceq.texas.gov/permitting/air/modeling/aermod-datasets.html. The surface meteorological data used in the modeling is from the New Braunfels Municipal Airport (BAZ) station (ID: 12971) and the upper air meteorological data used in the modeling is from the Dallas/Fort Worth National Weather Forecast Office (FWD) station (ID: 3990).

The surface meteorological station's base elevation of 196.6 meters was used in the modeling.

The EPA's AERSURFACE program (latest available Version 13016) was used to determine that the TCEQ's meteorological dataset with the medium surface roughness length value is the appropriate dataset for the modeling domain. The USGS's 1992 National Land Cover Dataset (NLCD) at a resolution scale of 30 meters with a GeoTIFF file format (file LC9269396502.tif) was used within the AERSURFACE run. A 1 km radius centered on the center of the proposed crushing plant (566821.9 m, 3293313.5 m) was used in the AERSURFACE program. The AERSURFACE run produced a medium surface roughness length value of <0. 284 meter which falls within the TCEQ's defined medium surface roughness length range of 0.1 meter < x < 0.7 meter.

The meteorological dataset and the input and the output datasets for the AERSURFACE run are provided on the DVD.

Modeling Results

Input and output modeled data files for the modeling associated with the Minor NAAQS Analyses, SPLS Analysis for SO_2, and Health Effects Analyses are provided on the DVD in Appendix C.

As demonstrated below, the Minor NAAQS Analyses, SPLS Analysis for SO_2, and Health Effects Analyses demonstrate that the maximum allowable emissions from the proposed crushing plant will not cause or contribute to an exceedance of the NAAQS for any pollutant and averaging time, the SPLS Analysis for SO_2, or the short-term or long-term ESL for diesel fuel or silica. It is critical to remember those analyses make that demonstration even though the results from them are conservatively high due to the many conservative assumptions and aspects of such analyses (as discussed above in the section entitled "Descriptions of Minor NAAQS, SPLS for SO_2, and Health Effects Analyses").

For the reasons discussed in the following paragraph, the demonstrations that the maximum allowable emissions from the proposed crushing plant will not cause or contribute to an exceedance of any NAAQS or any ESL demonstrate that operation of the proposed crushing plant will be protective of the health, welfare, and property of the public, as is required by 30 TAC §116.111(a)(2)(A)(i) and 382.0518(b)(2) of the Texas Health and Safety Code. Further, even though there is no requirement for Vulcan to demonstrate through modeling that the operation of the proposed crushing plant will not cause or contribute to a condition of air pollution under §382.085(a) of the Texas Health and Safety Code or to a nuisance under 30 TAC §101.4, those demonstrations in this modeling report also demonstrate that the operation of the proposed crushing plant will not cause or contribute to a condition of air pollution or to a nuisance for the reasons discussed in the following paragraph.

EPA established each primary NAAQS at a level of air quality that it has determined will protect public health, with an adequate margin of safety, including the health of sensitive members of the public, such as asthmatics, children, and the elderly. (40 CFR §50.2(b); 42 USC §7409(b)(1); https://www.epa.gov/criteria-air-pollutants/naaqs-table). EPA established each secondary NAAQS at a level of air quality that it has determined will protect public welfare, which includes, but is not limited to, effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being. (40 CFR §50.2(b); 42 USC §7409(b)(2); 42 USC §7602(h)). TCEQ established ESLs for pollutants with no NAAQS at levels that are below levels that are likely to cause any adverse effect on public health, including the health of those in sensitive subgroups, such as children, the elderly, pregnant women, and people with pre-existing health conditions, or on public welfare.[11] (TCEQ Guidelines to Develop Toxicity Factors (RG-442), at p. 10 (September 2015)). A condition of air pollution and a nuisance is each defined as the presence in the atmosphere of one or more air contaminants, or combination of air contaminants, in such concentration and of such duration that are or may tend to be injurious to or to adversely affect human health or welfare, animal life, vegetation, or property, or as to interfere with the normal use or enjoyment of animal life, vegetation, or property. (Section 382.003 of the Texas Health and Safety Code; 30 TAC §101.4). Based on that definition, and the discussion above about what the NAAQS and ESLs protect against, the NAAQS and ESLs also protect against a condition of air pollution or a nuisance occurring.

Results of Minor NAAQS Analyses

The discussion in the bulleted sections below, the table that follows such discussion, the table in the executive summary of this report, and Table 1 in Appendix A summarize the results of the Minor NAAQS Analyses for all pollutants and NAAQS averaging times. Those results demonstrate that the maximum allowable emissions from the proposed crushing plant will not cause or contribute to an exceedance of the NAAQS for any pollutant and NAAQS averaging time.

[11] ESLs are guidelines, rather than not-to-be-exceeded standards. (TCEQ Guidelines to Develop Toxicity Factors, at p. 10)

- 24-hr PM_{10} NAAQS

The GLC_{max} from the 24-hr PM_{10} NAAQS AOI modeling using the modeled project-related emissions is 4.16 $\mu g/m^3$, which is below the applicable NAAQS SIL of 5 $\mu g/m^3$. (The files for that modeling are labeled "24-hr PM_{10} NAAQS AOI Med SRL[12]".). In spite of that, full NAAQS modeling was conducted for the 24-hr PM_{10} NAAQS using the same receptor grid as was used in the 24-hr PM_{10} NAAQS AOI modeling. That modeling predicted the same GLC_{max} of 4.16 $\mu g/m^3$ -- i.e., the PM_{10} emissions from the Martin Marietta crushing plant will have no cumulative impact relative to the 24-hr PM_{10} NAAQS GLC_{max} predicted for the PM_{10} emissions from the proposed crushing plant. (The files for that modeling are labeled "24-hr PM_{10} NAAQS Full Med SRL".). Adding the conservatively representative 24-hr PM_{10} background concentration of 66.00 $\mu g/m^3$ to that GLC_{max} resulted in a total maximum 24-hr PM_{10} concentration of 70.16 $\mu g/m^3$, which is only approximately 47% of the 24-hr PM_{10} NAAQS of 150 $\mu g/m^3$.

- 24-hr $PM_{2.5}$ NAAQS

The GLC_{max} from the 24-hr $PM_{2.5}$ NAAQS AOI modeling using the modeled project-related emissions is 0.68 $\mu g/m^3$, which is below the applicable NAAQS SIL of 1.2 $\mu g/m^3$.[13] (The files for that modeling are labeled "24-hr $PM_{2.5}$ NAAQS AOI Med SRL".). In spite of that, full NAAQS modeling was conducted for the 24-hr $PM_{2.5}$ NAAQS using the same receptor grid as was used in the 24-hr $PM_{2.5}$ NAAQS AOI modeling. That modeling predicted the same GLC_{max} of 0.68 $\mu g/m^3$ -- i.e., the $PM_{2.5}$ emissions from the Martin Marietta crushing plant will have no cumulative impact relative to the 24-hr $PM_{2.5}$ NAAQS GLC_{max} predicted for the $PM_{2.5}$ emissions from the proposed crushing plant. (The files for that modeling are labeled "24-hr $PM_{2.5}$ NAAQS Full Med SRL".). Adding the conservatively representative 24-hr $PM_{2.5}$ background concentration of 23.35 $\mu g/m^3$ to that GLC_{max} resulted in a total maximum 24-hr $PM_{2.5}$ concentration of 24.03 $\mu g/m^3$, which is only approximately 69% of the 24-hr $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$.

- Annual $PM_{2.5}$ NAAQS

The GLC_{max} from the Annual $PM_{2.5}$ NAAQS AOI modeling using the modeled project-related emissions is 0.04 $\mu g/m^3$, which is below the applicable NAAQS SIL of 0.3 $\mu g/m^3$. (The files for that modeling are labeled "Annual $PM_{2.5}$ NAAQS AOI Med SRL".). In spite of that, full NAAQS modeling was conducted for the Annual $PM_{2.5}$ NAAQS using

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[12] "Med SRL" is an acronym for the use of the meteorological dataset based on the medium surface roughness length value. Refer to the section entitled "Meteorological Data" for more details on how the low surface roughness length is justified.

[13] The use of the default 24-hr $PM_{2.5}$ NAAQS SIL of 1.2 $\mu g/m^3$ is justified by an analysis as described in Appendix A of the TCEQ Modeling Guidelines. Because the difference between the 24-hr $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$ and the 24-hr $PM_{2.5}$ monitored background concentration of 23.35 $\mu g/m^3$ is greater than the 24-hr $PM_{2.5}$ NAAQS SIL of 1.2 $\mu g/m^3$, it is appropriate to use 1.2 $\mu g/m^3$ as the 24-hr $PM_{2.5}$ NAAQS SIL.

same receptor grid as was used in the Annual $PM_{2.5}$ NAAQS AOI modeling. The full NAAQS modeling predicted the same GLC_{max} value of 0.04 µg/m^3 -- i.e., the $PM_{2.5}$ emissions from the Martin Marietta crushing plant will have no cumulative impact relative to the Annual $PM_{2.5}$ NAAQS GLC_{max} predicted for the $PM_{2.5}$ emissions from the proposed crushing plant. (The files for that modeling are labeled "Annual $PM_{2.5}$ NAAQS Full ER Med SRL".). Adding the conservatively representative Annual $PM_{2.5}$ background concentration of 8.53 µg/m^3 to that GLC_{max} resulted in a total maximum concentration of 8.57 µg/m^3, which is only approximately 71% of the Annual $PM_{2.5}$ NAAQS of 12 µg/m^3.

The GLC_{max} from the Annual $PM_{2.5}$ NAAQS AOI modeling using the modeled project-related emissions and the modeled road emissions is 0.57 µg/m^3, which is above the applicable NAAQS SIL of 0.3 µg/m^3.[14] (The files for that modeling are labeled "Annual $PM_{2.5}$ NAAQS AOI Med SRL".). The Annual $PM_{2.5}$ NAAQS AOI has a radial distance of approximately 975 m from the center of the proposed crushing plant. The full NAAQS modeling predicted the same GLC_{max} value of 0.57 µg/m^3 i.e., the $PM_{2.5}$ emissions from the Martin Marietta crushing plant will have no cumulative impact relative to the Annual $PM_{2.5}$ NAAQS GLC_{max} predicted for the $PM_{2.5}$ emissions from the proposed crushing plant. (The files for that modeling are labeled "Annual $PM_{2.5}$ NAAQS Full WR Med SRL".). Adding the conservatively representative Annual $PM_{2.5}$ background concentration of 8.53 µg/m^3 to that GLC_{max} resulted in a total maximum concentration of 9.10 µg/m^3, which is only approximately 76% of the Annual $PM_{2.5}$ NAAQS of 12 µg/m^3.

- <u>1-hr NO_2 NAAQS</u>

The GLC_{max} from the 1-hr NO_2 NAAQS AOI modeling using the modeled project-related emissions is 49.37 µg/m^3, which is above the applicable NAAQS SIL of 7.5 µg/m^3. (The files for that modeling are labeled "1-hr NO_2 NAAQS AOI Med SRL ARM2".). The AOI has a radial distance of approximately 4.8 km from the center of the proposed crushing plant. The full NAAQS modeling for the 1-hr NO_2 NAAQS predicted a slightly higher GLC_{max} value of 49.38 µg/m^3 -- i.e., the NO_2 emissions from the Martin Marietta crushing plant will have essentially no cumulative impact relative to the 1-hr NO_2 NAAQS GLC_{max} predicted for the NO_2 emissions from the proposed crushing plant. (The files for that modeling are labeled "1-hr NO_2 NAAQS Full Med SRL ARM2".). Adding the conservatively representative 1-hr NO_2 background concentration of 62.92 µg/m^3 to that GLC_{max} resulted in a total maximum concentration of 112.30 µg/m^3, which is only approximately 60% of the 1-hr NO_2 NAAQS of 188 µg/m^3.

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[14] The use of the annual $PM_{2.5}$ NAAQS SIL of 0.3 µg/m^3 is justified by an analysis as described in Appendix A of the TCEQ Modeling Guidelines. Because the difference between the annual $PM_{2.5}$ NAAQS of 12 µg/m^3 and the annual $PM_{2.5}$ monitored background concentration of 8.53 µg/m^3 is greater than the annual $PM_{2.5}$ NAAQS SIL of 0.3 µg/m^3, it is appropriate to use 0.3 µg/m^3 as the annual $PM_{2.5}$ NAAQS SIL.

- Annual NO_2 NAAQS

  The GLC_{max} from the Annual NO_2 NAAQS AOI modeling using the modeled project-related emissions is 0.55 $\mu g/m^3$, which is below the applicable NAAQS SIL of 1 $\mu g/m^3$. (The files for that modeling are labeled "Annual NO_2 NAAQS AOI Med SRL ARM2".). In spite that, full NAAQS modeling was conducted for the Annual NO_2 NAAQS using the same receptor grid as was used in the Annual NO_2 NAAQS AOI modeling. That modeling predicted a slightly higher GLC_{max} value of 0.57 $\mu g/m^3$ -- i.e., the NO_2 emissions from the Martin Marietta crushing plant will have essentially no cumulative impact relative to the Annual NO_2 NAAQS GLC_{max} predicted for the NO_2 emissions from the proposed crushing plant. (The files for that modeling are labeled "1-hr Annual NO_2 NAAQS Full Med SRL ARM2".). Adding the conservatively representative Annual NO_2 background concentration of 8.41 $\mu g/m^3$ to that GLC_{max} resulted in a total maximum concentration of 8.98 $\mu g/m^3$, which is only approximately 9% of the Annual NO_2 NAAQS of 100 $\mu g/m^3$.

- 1-hr SO_2 NAAQS

  The GLC_{max} from the 1-hr SO_2 NAAQS AOI modeling using the modeled project-related emissions is 15.42 $\mu g/m^3$, which is above the applicable NAAQS SIL of 7.8 $\mu g/m^3$. (The files for that modeling are labeled "1-hr SO_2 NAAQS AOI Med SRL".). The AOI has a radial distance of approximately 1.5 km from the center of the proposed crushing plant. The full NAAQS modeling for the 1-hr SO_2 NAAQS predicted the same GLC_{max} of 15.42 $\mu g/m^3$ -- i.e., the SO_2 emissions from the Martin Marietta crushing plant will have no cumulative impact relative to the 1-hr SO_2 NAAQS GLC_{max} predicted for the SO_2 emissions from the proposed crushing plant. (The files for that modeling are labeled "1-hr SO_2 NAAQS Full Med SRL".). Adding the conservatively representative 1-hr SO_2 background concentration of 32.93 $\mu g/m^3$ to that GLC_{max} resulted in a total maximum concentration of 48.35 $\mu g/m^3$, which is only approximately 25% of the 1-hr SO_2 NAAQS of 196 $\mu g/m^3$.

- 3-hr SO_2 NAAQS

  The GLC_{max} from the 3-hr SO_2 NAAQS AOI modeling using the modeled project-related emissions is 7.57 $\mu g/m^3$, which is below the applicable NAAQS SIL of 25 $\mu g/m^3$. (The files for that modeling are labeled "3-hr 24-hr Annual SO_2 NAAQS AOI Med SRL".). In spite of that, full NAAQS modeling was conducted for the 3-hr SO_2 NAAQS using the same receptor grid as was used in the 3-hr SO_2 NAAQS AOI modeling. That modeling predicted the same GLC_{max} of 7.57 $\mu g/m^3$ -- i.e., the SO_2 emissions from the Martin Marietta crushing plant will have no cumulative impact relative to the 3-hr SO_2 NAAQS GLC_{max} predicted for the SO_2 emissions from the proposed crushing plant. (The files for that modeling are labeled "3-hr 24-hr Annual SO_2 NAAQS Full Med SRL".). Adding the conservatively representative 3-hr SO_2 background concentration of 13.85 $\mu g/m^3$ to that GLC_{max} resulted in a total maximum concentration of 21.42 $\mu g/m^3$, which is only approximately 2% of the 3-hr SO_2 NAAQS of 1,300 $\mu g/m^3$.

- 24-hr SO_2 NAAQS

The GLC_{max} from the 24-hr SO_2 NAAQS AOI modeling using the modeled project-related emissions is 1.46 μg/m^3, which is below the applicable NAAQS SIL of 5 μg/m^3. (The files for that modeling are labeled "3-hr 24-hr Annual SO_2 NAAQS AOI Med SRL".) In spite of that, full NAAQS modeling was conducted for the 24-hr SO_2 NAAQS using the same receptor grid as was used in the 24-hr SO_2 NAAQS AOI modeling. That modeling predicted the same GLC_{max} of 1.46 μg/m^3 -- i.e., the SO_2 emissions from the Martin Marietta crushing plant will have no cumulative impact relative to the 24-hr SO_2 NAAQS GLC_{max} predicted for the SO_2 emissions from the proposed crushing plant. (The files for that modeling are labeled "3-hr 24-hr Annual SO_2 NAAQS Full Med SRL".). Adding the conservatively representative 24-hr SO_2 background concentration of 7.26 μg/m^3 to that GLC_{max} resulted in a total maximum concentration of 8.72 μg/m^3, which is only approximately 2% of the 24-hr SO_2 NAAQS of 365 μg/m^3.

- Annual SO_2 NAAQS

The GLC_{max} from the Annual SO_2 NAAQS AOI modeling using the modeled project-related emissions is 0.17 μg/m^3, which is below the applicable NAAQS SIL of 1 μg/m^3. (The files for that modeling are labeled "3-hr 24-hr Annual SO_2 NAAQS AOI Med SRL".) In spite of that, full NAAQS modeling was conducted for the Annual SO_2 NAAQS using the same receptor grid as was used in the Annual SO_2 NAAQS AOI modeling. That modeling predicted a slightly higher GLC_{max} value of 0.18 μg/m^3 -- i.e., the SO_2 emissions from the Martin Marietta crushing plant will have essentially no cumulative impact relative to the Annual SO_2 NAAQS GLC_{max} predicted for the SO_2 emissions from the proposed crushing plant. (The files for that modeling are labeled "3-hr 24-hr Annual SO_2 NAAQS Full Med SRL".) Adding the conservatively representative Annual SO_2 background concentration of 2.24 μg/m^3 to that GLC_{max} resulted in a total maximum concentration of 2.42 μg/m^3, which is only approximately 3% of the Annual SO_2 NAAQS of 80 μg/m^3.

- 1-hr CO NAAQS

The GLC_{max} from the 1-hr CO NAAQS AOI modeling using the modeled project-related emissions is 23.54 μg/m^3, which is well below the applicable NAAQS SIL of 2,000 μg/m^3. (The files for that modeling are labeled "1-hr 8-hr CO NAAQS AOI Med SRL".) In spite of that, full NAAQS modeling was conducted for the 1-hr CO NAAQS using the same receptor grid as was used in the 1-hr CO NAAQS AOI modeling. That modeling predicted a higher GLC_{max} value of 48.84 μg/m^3. (The files for that modeling are labeled "1-hr 8-hr CO NAAQS Full Med SRL".) Adding the conservatively representative 1-hr CO background concentration of 458.24 μg/m^3 to that GLC_{max} resulted in a total maximum concentration of 507.08 μg/m^3, which is only approximately 1% of the 1-hr CO NAAQS of 40,000 μg/m^3.

- 8-hr CO NAAQS

The GLC_{max} from the 8-hr CO NAAQS AOI modeling using the modeled project-related emissions is 5.43 $\mu g/m^3$, which is well below the applicable NAAQS SIL of 500 $\mu g/m^3$. (The files for that modeling are labeled "1-hr 8-hr CO NAAQS AOI Med SRL".) In spite of that, full NAAQS modeling was conducted for the 8-hr CO NAAQS using the same receptor grid as was used in the 8-hr CO NAAQS AOI modeling. That modeling predicted a higher GLC_{max} value of 13.99 $\mu g/m^3$. (The files for that modeling are labeled "1-hr 8-hr CO NAAQS Full Med SRL".) Adding the conservatively representative 8-hr CO background concentration of 343.68 $\mu g/m^3$ to that GLC_{max} resulted in a total maximum concentration of 357.67 $\mu g/m^3$, which is only approximately 4% of the 8-hr CO NAAQS of 10,000 $\mu g/m^3$.

Results of the Minor NAAQS Modeling Analyses

Pollutant and Averaging Time	Maximum Off-site Predicted Concentration (GLC_{max})	Monitored Background Concentration (BC)	Total Maximum Off-site Concentration (TC) (TC = GLC_{max} + BC)	NAAQS	% of NAAQS
	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	(%)
24-hour PM_{10}	4.16	66.00	70.16	150	46.8%
24-hour $PM_{2.5}$	0.68	23.35	24.03	35	68.7%
Annual $PM_{2.5}$ (w/o modeled road emissions)	0.04	8.53	8.57	12	71.4%
Annual $PM_{2.5}$ (w/ modeled road emissions)	0.57	8.53	9.10	12	75.8%
1-hour NO_2	49.38	62.92	112.30	188	59.7%
Annual NO_2	0.57	8.41	8.98	100	9.0%
1-hour SO_2	15.42	32.93	48.35	196	24.7%
3-hour SO_2	7.57	13.85	21.42	1,300	1.6%
24-hour SO_2	1.46	7.26	8.72	365	2.4%
Annual SO_2	0.18	2.24	2.42	80	3.0%
1-hour CO	48.84	458.24	507.08	40,000	1.3%
8-hour CO	13.99	343.68	357.67	10,000	3.6%

SPLS Analysis for SO_2

As indicated in the table below, the table in the executive summary of this report, and Table 2 of Appendix A, the GLC_{max} predicted by the SPLS Analysis modeling was 15.42 $\mu g/m^3$, which is only approximately 2% of the SPLS for SO_2 of 1,021 $\mu g/m^3$. Therefore, the SPLS Analysis for SO_2 demonstrates that the maximum allowable SO_2 emissions from the proposed crushing plant will not cause or contribute to an exceedance of the SPLS for SO_2. (The files for that modeling are labeled "1-hr SO_2 SPL Reg II Med SRL".)

Results of SPLS Analysis

Pollutant	Averaging Time	Maximum Predicted Concentration (GLC_{max})	SPLS for SO_2	% of SPLS
		($\mu g/m^3$)	($\mu g/m^3$)	(%)
SO_2	30-Minute (1-hr)	15.42	1,021	1.5%

Health Effects (ESLs) Analyses

As demonstrated by the table below, the table in the executive summary of this report, and Table 3 of Appendix A, the GLC_{max} from the Health Effects Analyses modeling for the maximum allowable hourly diesel fuel emissions was 33.70 $\mu g/m^3$, which is only approximately 3% of the diesel fuel short-term ESL of 1,000 $\mu g/m^3$. The GLC_{max} from the Health Effects Analyses modeling for the maximum allowable annual diesel fuel emissions was 0.35 $\mu g/m^3$, which is only approximately 0.4% of the diesel fuel long-term ESL of 100 $\mu g/m^3$. (The files for that modeling are labeled "1-hr Annual DFV ESL 1X Med SRL".)

As demonstrated by the table below and in Table 3 of Appendix A, the GLC_{max} from the Health Effects Analyses modeling for the maximum allowable hourly silica emissions (calculated as discussed above in the section titled "Descriptions of Minor NAAQS, SPLS for SO_2, and Health Effects Analyses") was 0.09 $\mu g/m^3$, which is only approximately 1% of the short-term silica ESL of 14 $\mu g/m^3$. Further, the GLC_{max} from the Health Effects Analyses modeling for the maximum allowable annual silica emissions calculated as discussed above in the section titled "Descriptions of Minor NAAQS, SPLS for SO_2, and Health Effects Analyses" was 0.0001 $\mu g/m^3$ when the modeled road emissions were not included in the modeling, and 0.002 $\mu g/m^3$ when the modeled road emissions were included in the modeling. Those GLC_{max} values are only approximately 0.04% and 0.8%, respectively, of the long-term silica ESL of 0.27 $\mu g/m^3$. (The files for that modeling are labeled "1-hr Crystalline Silica TCEQ ESL 1X Med SRL 0.2P", and "Annual Crystalline Silica TCEQ ESL Med SRL 0.2P".)

Results of Health Effects Analyses

Pollutant	Averaging Time	Maximum Off-site Predicted Concentration (GLC_{max})	TCEQ Effects Screening Level (ESL)	% of TCEQ ESL
		(µg/m³)	(µg/m³)	(%)
Diesel Fuel (CAS# 68334-30-5)	1-hr	33.70	1,000	3.4%
	Annual	0.35	100	0.4%
Silica, Crystalline (Quartz) (CAS# 14808-60-7)	1-hr	0.09	14	0.7%
	Annual (w/o modeled road emissions)	0.0001	0.27	0.04%
	Annual (w/ modeled road emissions)	0.002	0.27	0.8%

Therefore, the Health Effects Analyses for diesel fuel and silica show that the maximum allowable emissions of diesel fuel and silica from the proposed crushing plant will not cause or contribute to an exceedance of the short-term or long-term ESLs for diesel fuel or silica, respectively.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

July 18, 2017

MR. EDDIE SAUCEDO
ENVIRONMENTAL SERVICES MANAGER
VULCAN CONSTRUCTION MATERIALS LLC
PO BOX 791550
SAN ANTONIO TX 78279-1550

Re: Permit Requirements
Permit Number: 147392L001
Rock Crushing Plant
Bulverde, Comal County
Regulated Entity Number: RN109829721
Customer Reference Number: CN600355465

Dear Mr. Saucedo:

This is in response to your Form PI-1 (General Application for Air Preconstruction Permits and Amendments) to the above-referenced permit concerning the proposed rock crushing plant.

We believe an air dispersion modeling analysis is necessary to show compliance with all applicable state and federal regulations. The Texas Commission on Environmental Quality (TCEQ) does not perform routine modeling for the air quality analysis associated with the review of permit-related activities. Atmospheric dispersion modeling for state and federal permits must be performed by the applicant following the procedures outlined in the TCEQ air quality modeling guidelines. The modeling guidelines can be obtained from the TCEQ website at
https://www.tceq.texas.gov/assets/public/permitting/air/Modeling/guidance/airquality-mod-guidelines6232.pdf

The guidelines for the modeling effects and review applicability can be obtained from the TCEQ Web site at
www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/mera.pdf

The permit applicant will submit all supporting information, model input and output files, and all reports maps and graphs in electronic format unless otherwise directed by the TCEQ Air Dispersion Modeling Team.

Please provide atmospheric modeling results that demonstrate compliance with all applicable state and federal regulations for the air contaminant(s) and averaging time(s) as indicated below.

Table 1 : NAAQS Analyses

Air Contaminant	Averaging Time	Type of Evaluation
Carbon Monoxide (CO)	1-hr & 8-hr	State NAAQS
Nitrogen Dioxide (NO_2)	1-hr & Annual	State NAAQS
Sulfur Dioxide (SO_2)	1-hr, 3-hr, 24-hr, & Annual	State NAAQS
PM10	24-hour	State NAAQS

PM2.5	24-hr & Annual	State NAAQS

Table 2: State Property Line Analyses

Air Contaminant	Averaging Time
Sulfur Dioxide (SO_2)	30-minute

After my review, the modeling results will be sent to the TCEQ Toxicology Section for an off-property impacts analysis. Additional information may be required, depending on the modeling results, to demonstrate that the off-property impacts are acceptable.

If you have any modeling questions, please contact the Air Dispersion Modeling Team, at (512) 239-1250. When I receive the requested modeling, I will continue with my evaluation of your application.

Failure to submit all the requested information within 30 days of the date of this letter may result in the voiding of your application. Following a voidance, the permit fee will be retained for 180 days. If you still wish to pursue the project following the voidance, you will need to submit a new Form PI-1 and an entirely new application. The new application will be subject to the state and federal rules and regulations in place at the time of submittal, i.e., we will review state and federal applicability (best available control technology, netting, offsets, etc.). You may be required to republish if public notice was required in the original application. Additional fees need not be submitted with the new application if the project scope has not increased and the original fee was correct.

If a new Form PI-1 and new application are not submitted within 180 days from the date of the voidance, you will lose the original permit fee. A new Form PI-1, new application and a new fee must be submitted if you desire to pursue the project beyond the 180 days.

This application was accepted for review in the expedited program. In order to provide a high level of efficient service and commitment to the processing of your application with additional resources, all responses to any requests for information should be provided in a timely manner. Projects with delayed responses, deficient or incomplete responses, or other excessive applicant initiated delays will be removed from the expedited permitting program and the remaining surcharge will be refunded.

Thank you for your cooperation in this matter. If you have any questions, please contact me at (512) 239-0270, or write to me at Texas Commission on Environmental Quality, Office of Air, Air Permits Division, MC-163, P.O. Box 13087, Austin, Texas 78711-3087.

Sincerely,

Joel Stanford
Air Permits Division
Texas Commission on Environmental Quality

cc: Katy Sipe, Westward Environmental Inc, Boerne
Dianne Anderson, Air Dispersion Modeling Team, Permit Support Section, Air Permits Division

Project Number: 270926

Dave Knollhoff

From: Rachel Melton <Rachel.Melton@tceq.texas.gov>
Sent: Friday, October 27, 2017 10:40 AM
To: Dave Knollhoff
Subject: RE: VULCAN CONSTRUCTION MATERIALS LLC (permit #147392L001): AQA Questions

Hey David,

I received your voicemail this morning and wanted to follow up regarding number 3 below. I looked at the input file for annual silica in AERMOD and I can see the rate reported was what was modeled. Therefore, please disregard question number 3. I will try to follow up with about clarification on question 4 today before I leave at 12.

Let me know if you have any other questions.

Thanks,
Rachel

From: Rachel Melton
Sent: Thursday, October 26, 2017 1:16 PM
To: David Knollhoff (dknollhoff@westwardenv.com)
Cc: Joel Stanford; Dianne Anderson; Daniel Menendez
Subject: VULCAN CONSTRUCTION MATERIALS LLC (permit #147392L001): AQA Questions

Good afternoon David,

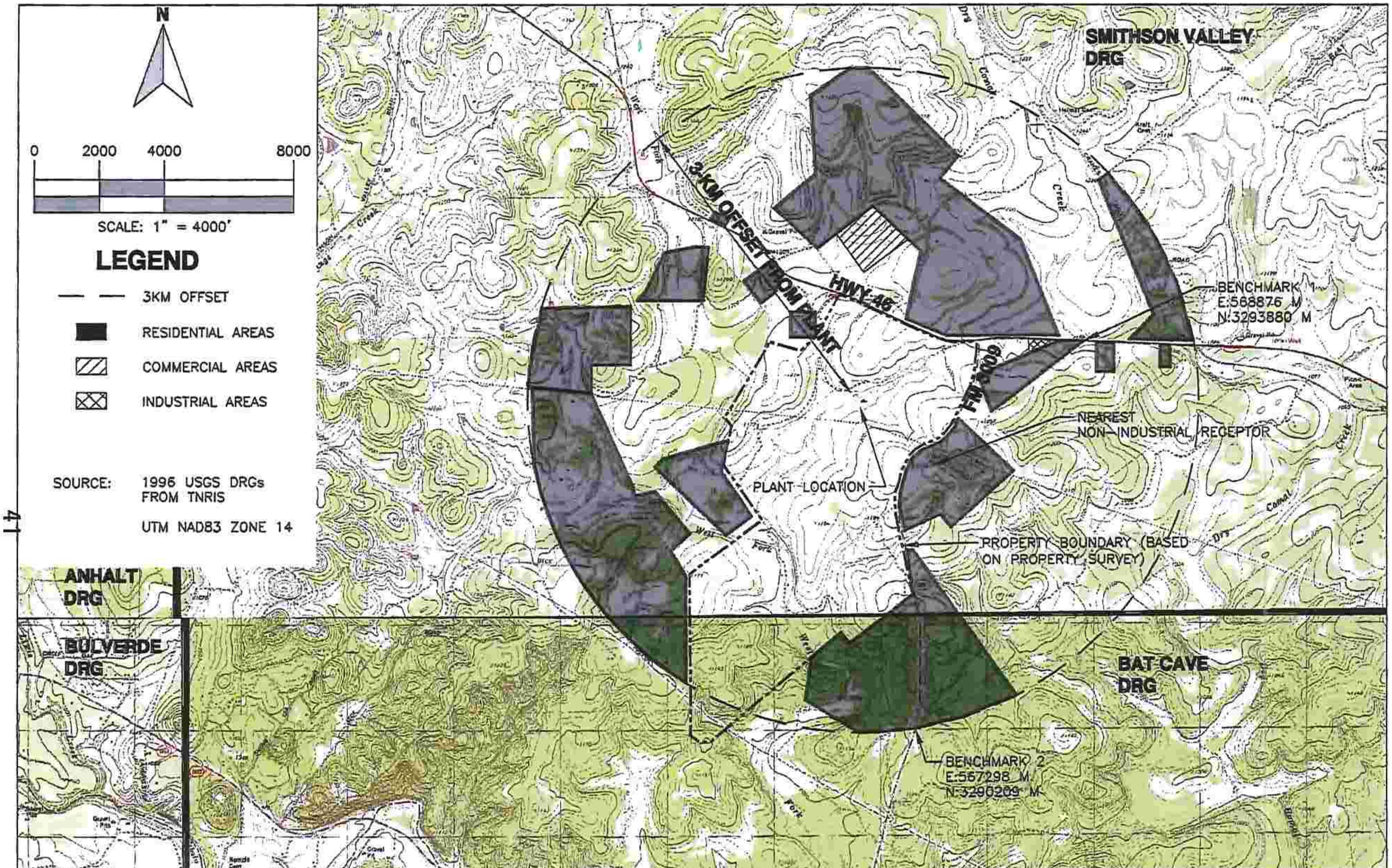
As discussed, below is the request for additional information regarding the Air Quality Analysis provided for Vulcan Construction Materials LLC:

1. Please provide a table of modeled emission rates for off-property sources. The Table1(a) provided for Martin Marietta does not include emission rates for each EPN or emissions for each grouping of EPNs as modeled. Additionally the off property stockpiles modeled included both active and inactive stockpiles, however only one emission rate is include in the Table1(a) for the entire 10 acre stockpile.
2. Please note for those NAAQS pollutants and averaging times that were De Minimis and a full NAAQS analysis was conducted, the receptor gird should not change. It is not appropriate to rely on significant receptors from other averaging times. Revised modeling should use the same receptor grid for the De Minims analysis and the full NAAQS analysis.
3. The following sources modeled emission rate for annual silica were all less than the reported emissions: VLXEPN1, VLXEPN4, VLXEPN7. Please address.
4. As noted in the modeling report, roads are not required to be modeled under the TCAA or the TCEQ rules or guidance. However, if roads are included in the modeling demonstration please use source groups to distinguish the impacts. Some recommended source groups are as follows: (1) proposed Vulcan Construction Materials LLC sources, (2) proposed Vulcan Construction Materials LLC sources and off property sources, and (3) Vulcan Construction Materials LLC sources, off property sources, and roads.

Failure to submit all of the requested information within 15 days of the date of this notification will delay the technical review of your application. Additionally, APD may deem your application deficient and may void it using our current voidance policy. Following a voidance, the permit fee will be retained for 180 days. If you still wish to pursue the project following the voidance, you will need to submit a new Form PI-1 (General Application for Air Preconstruction Permits and Amendments) and an entirely new application. The new application will be subject to the state and federal rules and regulations in place at the time of submittal, i.e., we will review state and federal applicability (best available control technology, netting, offsets, etc.). If public notice was required in the original application, you may be required to republish the notice. You do not need to submit additional fees with the new application if the project scope has not increased and the original fee was correct.

Please let me know if you have any questions.

Thanks,
Rachel Melton
Texas Commission on Environmental Quality
Air Permits Division
Air Dispersion Modeling Team
T: 512-239-2358
E: Rachel.Melton@tceq.texas.gov

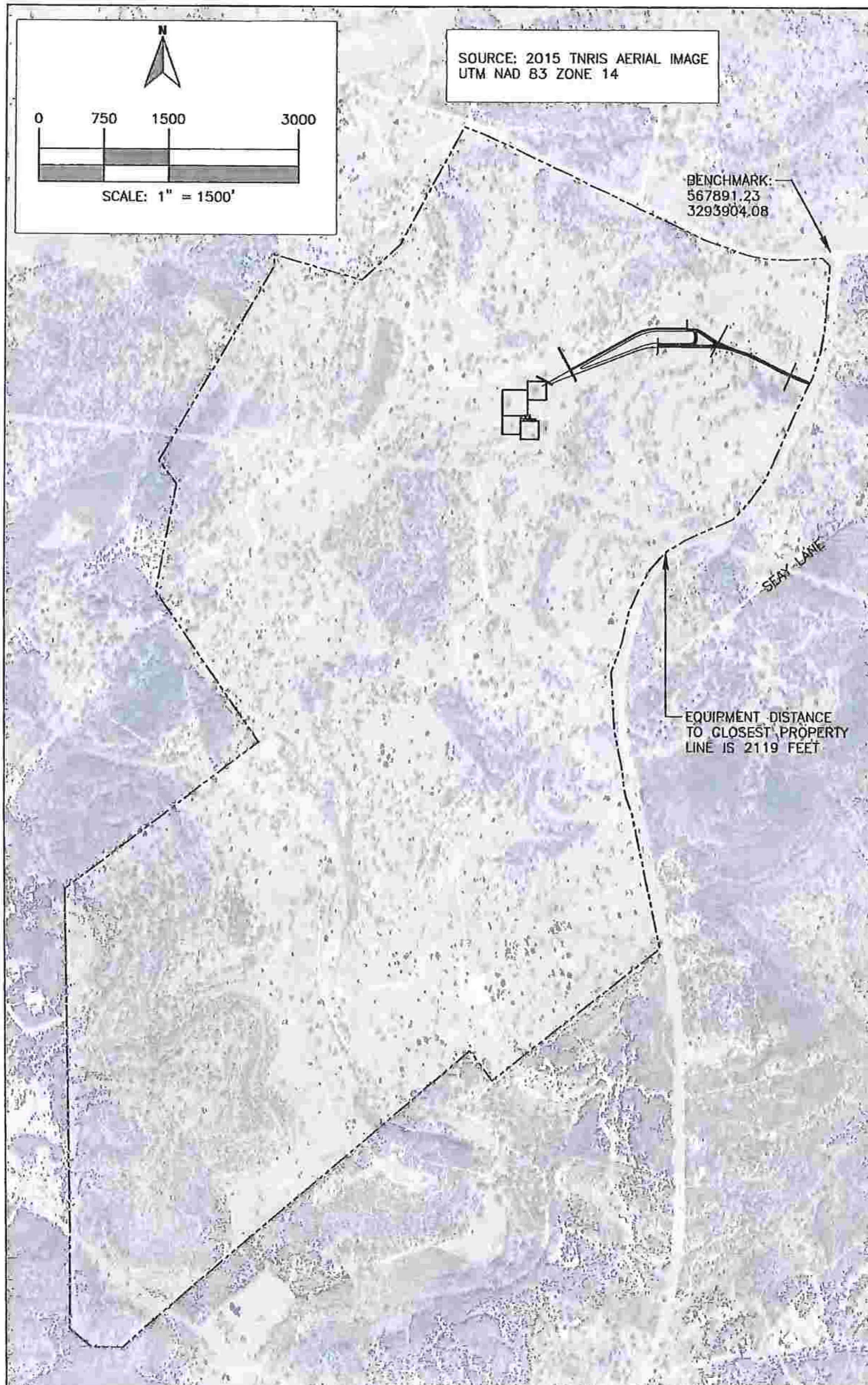


SHEET NO.: 1 OF 1	IMAGE: SMITHSON VALLEY	
	ISSUE DATE:	9/14/2017
	DRAWN BY:	ES
	CHECKED BY:	DSK
	SCALE: 1" =	4000'
	JOB NO.:	10003-458

AREA MAP
NSR AIR QUALITY PERMIT
VULCAN CONSTRUCTION MATERIALS, LLC
BULVERDE, COMAL COUNTY, TEXAS

REV.	DESCRIPTION	BY	DATE

WESTWARD
Environmental. Engineering. Natural Resources.
P.O. Box 2205 Boerne, Texas 78006
(830) 249-8284 Fax: (830) 249-0221
TBPE REG. NO.: F-4524
TBPG REG. NO.: 50112



WESTWARD

Environmental. Engineering. Natural Resources.
P.O. Box 2205 Boerne, Texas 78006
(830) 249-8284 Fax: (830) 249-0221
TBPE REG. NO.: F-4524
TBPG REG. NO.: 50112

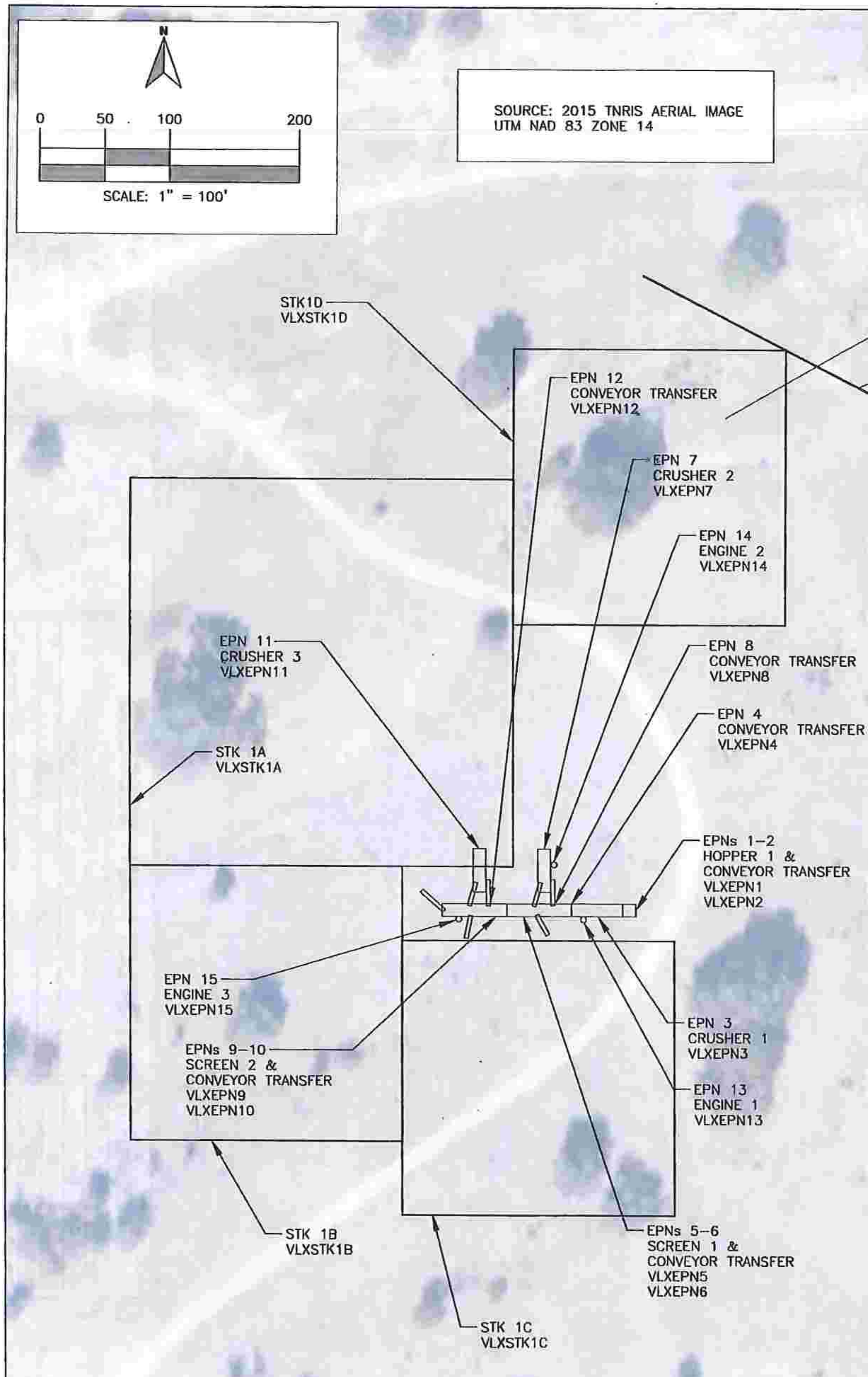
PLOT PLAN - MODELING

PENDING PERMIT 147392L001
VULCAN CONSTRUCTION MATERIALS, LLC
BULVERDE, COMAL COUNTY, TEXAS

REV.	DESCRIPTION	BY	DATE

IMAGE:	2015 SMITHSON VALLEY SE
ISSUE DATE:	10/04//2017
DRAWN BY:	AK
CHECKED BY:	DSK
SCALE: 1" =	1500'
JOB NO.:	10003-458

SHEET NO.:
1
OF 3



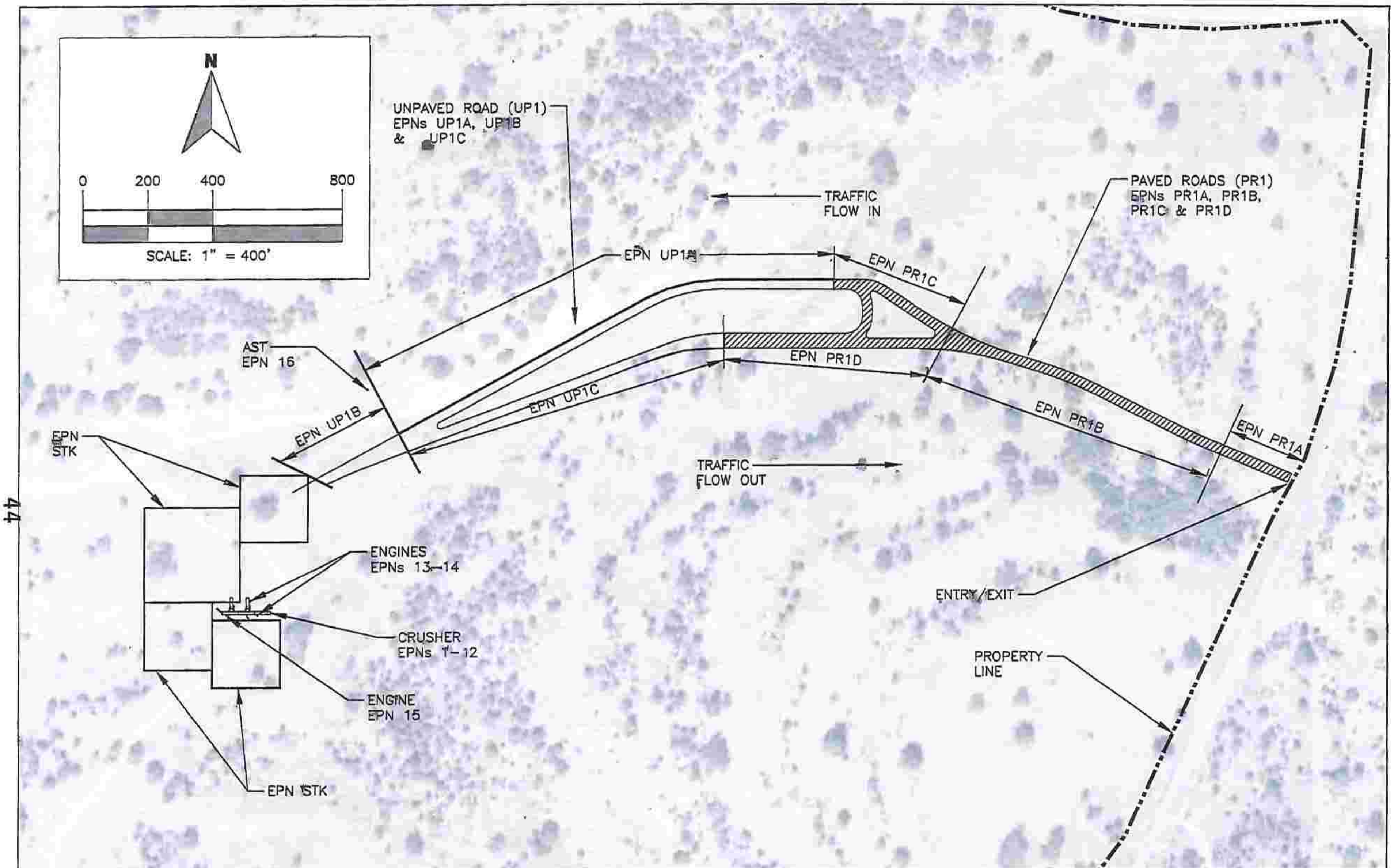
WESTWARD
Environmental. Engineering. Natural Resources.
P.O. Box 2205 Boerne, Texas 78006
(830) 249-8284 Fax: (830) 249-0221
TBPE REG. NO.: F-4524
TBPG REG. NO.: 50112

PLANT DETAIL - MODELING
PENDING PERMIT 147392L001
VULCAN CONSTRUCTION MATERIALS, LLC
BULVERDE, COMAL COUNTY, TEXAS

REV.	DESCRIPTION	BY	DATE

IMAGE:	2015 SMITHSON VALLEY SE
ISSUE DATE:	10/04/2017
DRAWN BY:	AK
CHECKED BY:	DSK
SCALE: 1" =	100'
JOB NO.:	10003-458

SHEET NO.: 2 OF 3



SHEET NO.:	IMAGE: 2015 SMITHSON VALLEY SE	
3 OF 3	ISSUE DATE:	10/04/2017
	DRAWN BY:	AK
	CHECKED BY:	DSK
	SCALE: 1" =	400'
	JOB NO.:	10003-498

ROAD DETAIL - MODELING

PENDING AIR PERMIT 147392L001
VULCAN CONSTRUCTION MATERIALS, LLC
BULVERDE, COMAL COUNTY, TEXAS

REV.	DESCRIPTION	BY	DATE

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(830) 249-8284 Fax: (830) 249-0221
TBPE REG. NO.: F-4524
TBPG REG. NO.: 50112

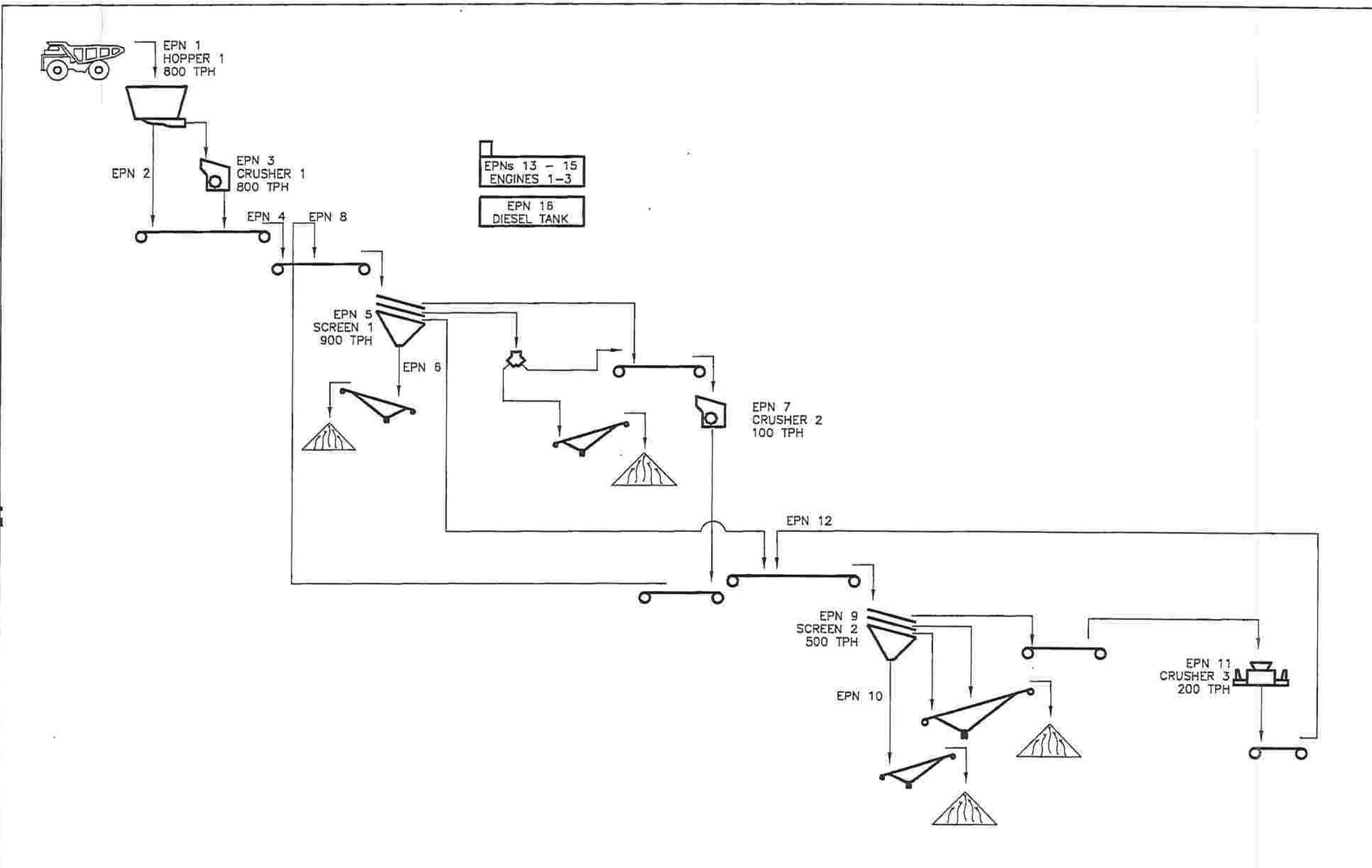

IMAGE: N/A	
ISSUE DATE:	06/14/2017
DRAWN BY:	KS
CHECKED BY:	MF
SCALE: 1" =	NTS
JOB NO.:	10003-452

FLOW DIAGRAM

AIR QUALITY PERMIT APPLICATION
VULCAN CONSTRUCTION MATERIALS, LLC
BULVERDE, COMAL COUNTY, TEXAS

REV.	DESCRIPTION	BY	DATE

SHEET NO.: 1 OF 1

WESTWARD
Environmental. Engineering. Natural Resources.
P.O. Box 2205 Boerne, Texas 78006
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TBPE REG. NO.: F-4524
TBPG REG. NO.: 50112

Appendix A

Vulcan Construction Materials, LLC

Pending NSR Air Permit No. 147392L001

Portable Crushing Plant

Table 1. Results of the Minor NAAQS Modeling Analyses								
Pollutant	Averaging Time	Minor NAAQS Modeling Analysis	Maximum Off-site Predicted Concentration (GLC_{max})	NAAQS Significant Impact Level (SIL)	Monitored Background Concentration (BC)	Total Maximum Off-site Concentration (TC) ($TC = GLC_{max} + BC$)	NAAQS	% of NAAQS
			(μg/m³)	(μg/m³)	(μg/m³)	(μg/m³)	(μg/m³)	(%)
PM_{10}	24-hr	AOI	4.16	5				
		Full	4.16		66.00	70.16	150	46.8%
$PM_{2.5}$	24-hr	AOI	0.68	1.2				
		Full	0.68		23.35	24.03	35	68.7%
	Annual	AOI (w/o modeled road emissions)	0.04	0.3				
		AOI (w/ modeled road emissions)	0.57	0.3				
		Full (w/o modeled road emissions)	0.04		8.53	8.57	12	71.4%
		Full (w/ modeled road emissions)	0.57		8.53	9.10	12	75.8%
NO_2	1-hr	AOI	49.37	7.5				
		Full	49.38		62.92	112.30	188	59.7%
	Annual	AOI	0.55	1.0				
		Full	0.57		8.41	8.98	100	9.0%
SO_2	1-hr	AOI	15.42	7.8				
		Full	15.42		32.93	48.35	196	24.7%
	3-hr	AOI	7.57	25				
		Full	7.57		13.85	21.42	1,300	1.6%
	24-hr	AOI	1.46	5				
		Full	1.46		7.26	8.72	365	2.4%
	Annual	AOI	0.17	1				
		Full	0.18		2.24	2.42	80	3.0%
CO	1-hr	AOI	23.54	2,000				
		Full	48.84		458.24	507.08	40,000	1.3%
	8-hr	AOI	5.43	500				
		Full	13.99		343.68	357.67	10,000	3.6%

Table 2. Results of the TCEQ State Property Line Standard Analysis

Pollutant	Averaging Time	Maximum Off-site Predicted Concentration (GLC_{max})	TCEQ State Property Line Standard for SO_2	% of TCEQ State Property Line Standard
		($\mu g/m^3$)	($\mu g/m^3$)	(%)
SO_2	30-Minute (1-hr)	15.42	1,021	1.5%

Table 3. Results of the TCEQ Health Effects Analyses

Pollutant	Averaging Time	Maximum Off-site Predicted Concentration (GLC_{max})	TCEQ Effects Screening Level (ESL)	% of TCEQ ESL
		(µg/m³)	(µg/m³)	(%)
Diesel Fuel CAS# 68334-30-5	1-hr	33.70	1,000	3.4%
	Annual	0.35	100	0.4%
Silica, Crystalline (Quartz) CAS# 14808-60-7	1-hr	0.09	14	0.7%
	Annual (w/o modeled road emissions)	0.0001	0.27	0.04%
	Annual (w/ modeled road emissions)	0.002	0.27	0.74%

Table 4. Maximum Allowable Emissions Input into Modeling

Source Group ID	EPN	Source[1]	24-hr $PM_{2.5}$ NAAQS AOI & Full Analyses	Annual $PM_{2.5}$ NAAQS AOI & Full Analyses	24-hr PM_{10} NAAQS AOI & Full Analyses	1-hr & Annual NO_2 NAAQS AOI & Full Analyses	1-hr, 3-hr, 24-hr & Annual SO_2 NAAQS AOI & Full Analyses, and TCEQ SO_2 State Property Line Standard Analysis	1-hr & 8-hr CO NAAQS AOI & Full Analyses	1-hr & Annual Diesel Fuel ESL Analyses	1-hr Crystalline Silica ESL Analysis	Annual Crystalline Silica ESL Analysis
			Max. Hourly $PM_{2.5}$ Emission Rate (lb/hr)	Max. Annual $PM_{2.5}$ Emission Rate[2] (TPY)	Max. Hourly PM_{10} Emission Rate (lb/hr)	Max. Hourly NO_2 Emission Rate (lb/hr)	Max. Hourly SO_2 Emission Rate (lb/hr)	Max. Hourly CO Emission Rate (lb/hr)	Max. Hourly VOC Emission Rate (lb/hr)	Max. Hourly Crystalline Silica Emission Rate[3] (lb/hr)	Max. Annual Crystalline Silica Emission Rate[2,4] (TPY)
VLXEPN1	1	Hopper 1 (Conveyor Transfer - Wet)	0.010400	0.009750	0.036800					0.000074	0.000028
VLXEPN2	2	Conveyor Transfer 1 (Conveyor Transfer - Wet)	0.001300	0.001219	0.004600					0.000009	0.000003
VLXEPN3	3	Crusher 1 (Primary Crusher - Wet)	0.080000	0.075000	0.432000					0.000864	0.000327
VLXEPN4	4	Conveyor Transfer 2 (Conveyor Transfer - Wet)	0.010400	0.009750	0.036800					0.000074	0.000028
VLXEPN5	5	Screen 1 Inlet (Screening (All) - Wet)	0.045000	0.042188	0.666000					0.001332	0.000504
VLXEPN6	6	Screen 1 Outlets - Conveyor Transfer 3 (Conveyor Transfer - Wet)	0.011700	0.010969	0.041400					0.000083	0.000031
VLXEPN7	7	Crusher 2 (Secondary Crushing - Wet)	0.010000	0.009375	0.054000					0.000108	0.000041
VLXEPN8	8	Conveyor Transfer 4 (Conveyor Transfer - Wet)	0.001300	0.001219	0.004600					0.000009	0.000003
VLXEPN9	9	Screen 2 Inlet (Screening (All) - Wet)	0.025000	0.023438	0.370000					0.000740	0.000280
VLXEPN10	10	Screen 2 Outlets - Conveyor Transfer 5 (Conveyor Transfer - Wet)	0.006500	0.006094	0.023000					0.000046	0.000017
VLXEPN11	11	Crusher 3 (Secondary Crushing - Wet)	0.020000	0.018750	0.108000					0.000216	0.000082
VLXEPN12	12	Conveyor Transfer 6 (Conveyor Transfer - Wet)	0.002600	0.002438	0.009200					0.000018	0.000007
VLXEPN13	13	Engine 1	0.072335	0.316829	0.072335	2.604074	0.902000	1.591379	1.086800		
VLXEPN14	14	Engine 2	0.022644	0.099182	0.022644	1.034939	0.198850	0.175413	0.124384		
VLXEPN15	15	Engine 3	0.039267	0.171988	0.039267	0.873368	0.174250	0.162097	0.209950		

Table 4. Maximum Allowable Emissions Input into Modeling

Source Group ID	EPN	Source[1]	24-hr $PM_{2.5}$ NAAQS AOI & Full Analyses	Annual $PM_{2.5}$ NAAQS AOI & Full Analyses	24-hr PM_{10} NAAQS AOI & Full Analyses	1-hr & Annual NO_2 NAAQS AOI & Full Analyses	1-hr, 3-hr, 24-hr & Annual SO_2 NAAQS AOI & Full Analyses, and TCEQ SO_2 State Property Line Standard Analysis	1-hr & 8-hr CO NAAQS AOI & Full Analyses	1-hr & Annual Diesel Fuel ESL Analyses	1-hr Crystalline Silica ESL Analysis	Annual Crystalline Silica ESL Analysis
			Max. Hourly $PM_{2.5}$ Emission Rate (lb/hr)	Max. Annual $PM_{2.5}$ Emission Rate[2] (TPY)	Max. Hourly PM_{10} Emission Rate (lb/hr)	Max. Hourly NO_2 Emission Rate (lb/hr)	Max. Hourly SO_2 Emission Rate (lb/hr)	Max. Hourly CO Emission Rate (lb/hr)	Max. Hourly VOC Emission Rate (lb/hr)	Max. Hourly Crystalline Silica Emission Rate[3] (lb/hr)	Max. Annual Crystalline Silica Emission Rate[2,4] (TPY)
VLXEPN16	16	Diesel Fuel Tank	0.000000	0.000000	0.000000				0.684700		
VLXSTK1A	STK	2 Acres Active Stockpiles	0.024986	0.109438	0.165000					0.000330	0.000583
VLXSTK1B	STK	1 Acre Active Stockpiles	0.012493	0.054719	0.082500					0.000165	0.000292
VLXSTK1C	STK	1 Acre Active Stockpiles	0.012493	0.054719	0.082500					0.000165	0.000292
VLXSTK1D	STK	1 Acre Active Stockpiles	0.012493	0.054719	0.082500					0.000165	0.000292
VPR1A1	PR1A	Paved Road 1A 1 Area Source		0.030419							0.000100
VPR1B1 - VPR1B32	PR1B	Paved Road 1B 32 Adjacent Volume Sources		0.003536							0.000012
VPR1C1 - VPR1C14	PR1C	Paved Road 1C 14 Adjacent Volume Sources		0.001811							0.000006
VPR1D1 - VPR1D24	PR1D	Paved Road 1D 24 Adjacent Volume Sources		0.001715							0.000006
VUP1A1 - VUP1A50	UP1A	Unpaved Road 1A 50 Adjacent Volume Sources		0.017392							0.000140
VUP1B1 - VUP1B10	UP1B	Unpaved Road 1B 10 Adjacent Volume Sources		0.033763							0.000272
VUP1C1 - VUP1C36	UP1C	Unpaved Road 1C 36 Adjacent Volume Sources		0.017122							0.000138

[1]The language in the parenthetical in the entry in this column for each of EPN 1 – EPN 12 is the name given for the source in the table in Appendix A entitled "Plant Emissions".

[2]The emission rate in the entry in this column for each of EPNs PR1B, PR1C, PR1D, UP1A, UP1B, and UP1C is the emission rate for each adjacent volume source covered by that EPN.

[3]The maximum allowable emission rate for each applicable source group that was used in the 1-hr Crystalline Silica ESL analysis modeling was calculated by multiplying the PM_{10} maximum hourly emission rate (lb/hr) for that source group by the measured silica content of 0.2%.

[4]The maximum allowable emission rate for each applicable source group that was used in the Annual Crystalline Silica ESL analysis modeling was calculated by (i) multiplying the PM_{10} maximum annual emission rate (TPY) for that source group by the PM_4 conversion factor of 0.4034 to calculate the PM_4 maximum annual emission rate (TPY) for that source group, and (ii) then multiplying that PM_4 emission rate by the measured silica content of 0.2%. The PM_4 conversion factor of 0.4034 is the ratio of particle size multipliers (k-values) for PM_{10} and PM_4 from EPA AP-42 Chapter 13.2.4. The k-value for PM_4 (0.1412) was interpolated from the k-values for PM_5 (0.20) and $PM_{2.5}$ (0.053), and then ratioed with the k-value for PM_{10} (0.35) to get 0.4034.

Table 5. Modeled Source Parameters for Point & Pseudo-Point Sources							
Source ID	Easting (X)	Northing (Y)	Base Elevation	Stack Exit Height	Stack Exit Temperature	Stack Exit Velocity	Stack Exit Diameter
	(m)	(m)	(m)	(m)	(K)	(m/s)	(m)
VLXEPN1	566837.92	3293315.05	352.1	3.44	0.00	0.001	0.001
VLXEPN2	566836.46	3293315.05	352.1	1.00	0.00	0.001	0.001
VLXEPN3	566834.88	3293315.06	352.1	1.72	0.00	0.001	0.001
VLXEPN4	566822.76	3293314.95	351.8	1.00	0.00	0.001	0.001
VLXEPN5	566821.91	3293314.99	351.8	2.95	0.00	0.001	0.001
VLXEPN6	566814.59	3293313.95	351.6	1.00	0.00	0.001	0.001
VLXEPN7	566815.45	3293321.58	351.5	1.72	0.00	0.001	0.001
VLXEPN8	566818.46	3293316.16	351.7	1.00	0.00	0.001	0.001
VLXEPN9	566806.69	3293315.08	351.4	2.95	0.00	0.001	0.001
VLXEPN10	566792.88	3293314.94	351.1	1.00	0.00	0.001	0.001
VLXEPN11	566800.30	3293321.58	351.2	1.72	0.00	0.001	0.001
VLXEPN12	566803.22	3293316.13	351.3	1.00	0.00	0.001	0.001
VLXEPN13	566825.46	3293312.92	351.9	3.05	718.65	29.64	0.13
VLXEPN14	566818.53	3293325.64	351.6	1.83	833.15	18.18	0.15
VLXEPN15	566796.22	3293312.94	351.2	1.83	794.26	49.16	0.08
VLXEPN16	566928.82	3293526.89	360.8	3.00	0.00	0.001	0.001
ENG1	558457.00	3289306.00	308.6	1.22	644.26	223.81	0.05
ENG2	558475.12	3289310.40	308.1	3.66	644.26	25.87	0.15
ENG3	558465.07	3289303.84	308.4	1.83	644.26	59.39	0.10
ENG4	558484.86	3289228.91	308.7	1.83	644.26	223.81	0.05
PP5	558465.00	3289302.00	308.5	2.13	0.00	0.001	0.001
PP12	558478.00	3289299.00	308.2	2.13	0.00	0.001	0.001
PP14	558474.00	3289302.00	308.2	1.52	0.00	0.001	0.001
PP15	558466.00	3289295.00	308.5	2.13	0.00	0.001	0.001
PP16	558467.00	3289294.00	308.5	2.13	0.00	0.001	0.001
PP17	558473.00	3289286.00	308.4	2.13	0.00	0.001	0.001
PP18	558476.00	3289276.00	308.4	2.13	0.00	0.001	0.001
PP19	558478.00	3289267.00	308.5	2.13	0.00	0.001	0.001
PP20	558481.00	3289258.00	308.5	2.13	0.00	0.001	0.001
PP21	558484.00	3289249.00	308.5	2.13	0.00	0.001	0.001
PP22	558487.00	3289240.00	308.6	2.13	0.00	0.001	0.001
PP23	558489.00	3289231.00	308.6	2.13	0.00	0.001	0.001

Table 6. Modeled Source Parameters for Area Sources

Source ID	Easting (X)	Northing (Y)	Base Elevation	Release Height	Easterly Length	Northerly Length	Angle From North	Initial Vertical Dimension
	(m)	(m)	(m)	(m)	(K)	(m/s)	(m)	(m)
VLXSTK1A	566719.00	3293324.94	350.4	3.05	89.97	89.97	0.0	
VLXSTK1B	566719.20	3293261.32	351.2	3.05	63.61	63.61	0.0	
VLXSTK1C	566782.95	3293243.99	353.0	3.05	63.61	63.61	0.0	
VLXSTK1D	566808.96	3293381.44	351.1	3.05	63.61	63.61	0.0	
VPR1A1	567728.10	3293461.46	372.7	2.55	75.00	16.00	23.0	2.37
FUGHOP1	558457.00	3289302.00	308.6	3.66	5.49	1.83	-30.0	
FUGHOP3	558466.00	3289295.00	308.5	3.35	1.83	3.66	-30.0	
FUGHOP2	558471.00	3289311.00	308.2	3.66	1.22	4.57	-30.0	
STK1	558429.00	3289285.00	309.5	3.05	63.40	63.40	0.0	
STK2	558458.00	3289188.00	309.7	3.05	63.40	63.40	0.0	
STK3	558505.00	3289050.00	311.0	3.05	142.24	142.24	0.0	
STK4	558552.00	3289294.00	306.6	3.05	110.18	110.18	0.0	

Table 7. Modeled Source Parameters for Volume Sources						
Source ID	Easting (X)	Northing (Y)	Base Elevation	Release Height	Initial Horizontal Dimension (σy)	Initial Vertical Dimension (σz)
	(m)	(m)	(m)	(m)	(m)	(m)
VPR1B1	567727.52	3293471.15	372.8	2.55	7.44	2.37
VPR1B2	567719.15	3293474.46	372.3	2.55	7.44	2.37
VPR1B3	567710.78	3293477.77	371.8	2.55	7.44	2.37
VPR1B4	567702.41	3293481.09	371.3	2.55	7.44	2.37
VPR1B5	567694.34	3293485.04	370.8	2.55	7.44	2.37
VPR1B6	567686.35	3293489.18	370.1	2.55	7.44	2.37
VPR1B7	567678.36	3293493.33	369.4	2.55	7.44	2.37
VPR1B8	567670.32	3293497.38	368.7	2.55	7.44	2.37
VPR1B9	567662.29	3293501.43	368.0	2.55	7.44	2.37
VPR1B10	567654.25	3293505.48	367.2	2.55	7.44	2.37
VPR1B11	567646.25	3293509.61	366.5	2.55	7.44	2.37
VPR1B12	567638.28	3293513.79	366.1	2.55	7.44	2.37
VPR1B13	567630.31	3293517.97	365.8	2.55	7.44	2.37
VPR1B14	567622.20	3293521.87	365.5	2.55	7.44	2.37
VPR1B15	567614.08	3293525.74	365.1	2.55	7.44	2.37
VPR1B16	567605.98	3293529.67	364.9	2.55	7.44	2.37
VPR1B17	567597.81	3293533.43	364.6	2.55	7.44	2.37
VPR1B18	567589.47	3293536.82	364.3	2.55	7.44	2.37
VPR1B19	567581.08	3293540.06	363.9	2.55	7.44	2.37
VPR1B20	567572.66	3293543.26	363.6	2.55	7.44	2.37
VPR1B21	567564.15	3293546.19	363.2	2.55	7.44	2.37
VPR1B22	567555.64	3293549.12	363.1	2.55	7.44	2.37
VPR1B23	567547.06	3293551.81	363.0	2.55	7.44	2.37
VPR1B24	567538.45	3293554.44	362.8	2.55	7.44	2.37
VPR1B25	567529.84	3293557.06	362.6	2.55	7.44	2.37
VPR1B26	567521.23	3293559.69	362.4	2.55	7.44	2.37
VPR1B27	567512.62	3293562.31	362.3	2.55	7.44	2.37
VPR1B28	567504.01	3293564.93	362.0	2.55	7.44	2.37
VPR1B29	567495.32	3293567.25	361.9	2.55	7.44	2.37
VPR1B30	567486.62	3293569.58	361.7	2.55	7.44	2.37
VPR1B31	567478.02	3293572.21	361.5	2.55	7.44	2.37
VPR1B32	567472.22	3293574.08	361.4	2.55	7.44	2.37

Table 7. Modeled Source Parameters for Volume Sources						
Source ID	Easting (X)	Northing (Y)	Base Elevation	Release Height	Initial Horizontal Dimension (σy)	Initial Vertical Dimension (σz)
	(m)	(m)	(m)	(m)	(m)	(m)
VPR1C1	567469.68	3293577.78	361.3	2.55	4.19	2.37
VPR1C2	567464.58	3293585.15	361.1	2.55	4.19	2.37
VPR1C3	567457.03	3293590.04	360.8	2.55	4.19	2.37
VPR1C4	567449.48	3293594.93	360.5	2.55	4.19	2.37
VPR1C5	567441.98	3293599.91	360.4	2.55	4.19	2.37
VPR1C6	567434.56	3293605.01	360.4	2.55	4.19	2.37
VPR1C7	567427.14	3293610.10	360.3	2.55	4.19	2.37
VPR1C8	567419.73	3293615.20	360.2	2.55	4.19	2.37
VPR1C9	567412.31	3293620.29	360.1	2.55	4.19	2.37
VPR1C10	567404.20	3293624.09	360.0	2.55	4.19	2.37
VPR1C11	567395.30	3293625.28	359.9	2.55	4.19	2.37
VPR1C12	567386.30	3293625.41	359.9	2.55	4.19	2.37
VPR1C13	567377.30	3293625.54	359.8	2.55	4.19	2.37
VPR1C14	567368.31	3293625.82	359.7	2.55	4.19	2.37
VPR1D1	567467.76	3293572.14	361.2	2.55	4.19	2.37
VPR1D2	567459.17	3293570.01	361.0	2.55	4.19	2.37
VPR1D3	567450.17	3293570.01	360.7	2.55	4.19	2.37
VPR1D4	567441.17	3293570.01	360.3	2.55	4.19	2.37
VPR1D5	567432.17	3293569.99	359.9	2.55	4.19	2.37
VPR1D6	567423.17	3293569.97	359.7	2.55	4.19	2.37
VPR1D7	567414.17	3293569.96	359.6	2.55	4.19	2.37
VPR1D8	567405.17	3293569.97	359.5	2.55	4.19	2.37
VPR1D9	567396.17	3293569.98	359.4	2.55	4.19	2.37
VPR1D10	567387.18	3293570.21	359.2	2.55	4.19	2.37
VPR1D11	567378.19	3293570.78	359.0	2.55	4.19	2.37
VPR1D12	567369.21	3293571.35	358.8	2.55	4.19	2.37
VPR1D13	567360.23	3293571.90	358.5	2.55	4.19	2.37
VPR1D14	567351.23	3293571.94	358.3	2.55	4.19	2.37
VPR1D15	567342.23	3293571.98	358.1	2.55	4.19	2.37
VPR1D16	567333.23	3293572.02	357.9	2.55	4.19	2.37
VPR1D17	567324.23	3293572.02	357.8	2.55	4.19	2.37
VPR1D18	567315.23	3293572.02	357.6	2.55	4.19	2.37

Table 7. Modeled Source Parameters for Volume Sources						
Source ID	Easting (X)	Northing (Y)	Base Elevation	Release Height	Initial Horizontal Dimension (σy)	Initial Vertical Dimension (σz)
	(m)	(m)	(m)	(m)	(m)	(m)
VPR1D19	567306.23	3293572.02	357.4	2.55	4.19	2.37
VPR1D20	567297.23	3293572.02	357.3	2.55	4.19	2.37
VPR1D21	567288.23	3293572.14	357.0	2.55	4.19	2.37
VPR1D22	567279.23	3293572.29	356.8	2.55	4.19	2.37
VPR1D23	567270.23	3293572.45	356.5	2.55	4.19	2.37
VPR1D24	567263.88	3293572.55	356.3	2.55	4.19	2.37
VUP1A1	567361.45	3293625.41	359.4	2.55	4.19	2.37
VUP1A2	567352.45	3293625.44	359.2	2.55	4.19	2.37
VUP1A3	567343.45	3293625.48	359.0	2.55	4.19	2.37
VUP1A4	567334.45	3293625.51	358.8	2.55	4.19	2.37
VUP1A5	567325.45	3293625.55	358.6	2.55	4.19	2.37
VUP1A6	567316.45	3293625.58	358.5	2.55	4.19	2.37
VUP1A7	567307.45	3293625.62	358.4	2.55	4.19	2.37
VUP1A8	567298.45	3293625.65	358.3	2.55	4.19	2.37
VUP1A9	567289.45	3293625.69	358.2	2.55	4.19	2.37
VUP1A10	567280.45	3293625.72	358.3	2.55	4.19	2.37
VUP1A11	567271.45	3293625.76	358.3	2.55	4.19	2.37
VUP1A12	567262.45	3293625.79	358.5	2.55	4.19	2.37
VUP1A13	567253.46	3293625.44	358.8	2.55	4.19	2.37
VUP1A14	567244.51	3293624.55	359.0	2.55	4.19	2.37
VUP1A15	567235.64	3293623.07	359.1	2.55	4.19	2.37
VUP1A16	567226.84	3293621.19	359.2	2.55	4.19	2.37
VUP1A17	567218.11	3293619.03	359.2	2.55	4.19	2.37
VUP1A18	567209.62	3293616.06	359.2	2.55	4.19	2.37
VUP1A19	567201.21	3293612.86	359.2	2.55	4.19	2.37
VUP1A20	567193.22	3293608.74	359.1	2.55	4.19	2.37
VUP1A21	567185.31	3293604.44	359.0	2.55	4.19	2.37
VUP1A22	567177.40	3293600.14	358.6	2.55	4.19	2.37
VUP1A23	567169.50	3293595.84	358.3	2.55	4.19	2.37
VUP1A24	567161.59	3293591.54	357.9	2.55	4.19	2.37
VUP1A25	567153.68	3293587.24	357.6	2.55	4.19	2.37
VUP1A26	567145.78	3293582.94	357.5	2.55	4.19	2.37

Table 7. Modeled Source Parameters for Volume Sources

Source ID	Easting (X)	Northing (Y)	Base Elevation	Release Height	Initial Horizontal Dimension (σy)	Initial Vertical Dimension (σz)
	(m)	(m)	(m)	(m)	(m)	(m)
VUP1A27	567137.88	3293578.62	357.5	2.55	4.19	2.37
VUP1A28	567129.99	3293574.30	357.6	2.55	4.19	2.37
VUP1A29	567122.09	3293569.97	357.8	2.55	4.19	2.37
VUP1A30	567114.21	3293565.64	358.0	2.55	4.19	2.37
VUP1A31	567106.33	3293561.29	358.1	2.55	4.19	2.37
VUP1A32	567098.45	3293556.93	358.0	2.55	4.19	2.37
VUP1A33	567090.58	3293552.58	358.0	2.55	4.19	2.37
VUP1A34	567082.70	3293548.22	358.0	2.55	4.19	2.37
VUP1A35	567074.82	3293543.87	358.0	2.55	4.19	2.37
VUP1A36	567066.95	3293539.52	358.0	2.55	4.19	2.37
VUP1A37	567059.07	3293535.16	358.1	2.55	4.19	2.37
VUP1A38	567051.19	3293530.81	358.1	2.55	4.19	2.37
VUP1A39	567043.30	3293526.47	357.9	2.55	4.19	2.37
VUP1A40	567035.42	3293522.14	357.7	2.55	4.19	2.37
VUP1A41	567027.54	3293517.80	357.5	2.55	4.19	2.37
VUP1A42	567019.65	3293513.46	357.2	2.55	4.19	2.37
VUP1A43	567011.77	3293509.12	356.9	2.55	4.19	2.37
VUP1A44	567003.88	3293504.78	356.7	2.55	4.19	2.37
VUP1A45	566996.00	3293500.44	356.6	2.55	4.19	2.37
VUP1A46	566988.11	3293496.10	356.6	2.55	4.19	2.37
VUP1A47	566980.23	3293491.76	356.4	2.55	4.19	2.37
VUP1A48	566972.34	3293487.42	356.3	2.55	4.19	2.37
VUP1A49	566964.46	3293483.08	356.0	2.55	4.19	2.37
VUP1A50	566960.00	3293480.62	355.8	2.55	4.19	2.37
VUP1B1	566958.26	3293475.39	355.4	2.55	7.44	2.37
VUP1B2	566950.22	3293471.36	355.1	2.55	7.44	2.37
VUP1B3	566942.18	3293467.32	354.8	2.55	7.44	2.37
VUP1B4	566934.13	3293463.29	354.6	2.55	7.44	2.37
VUP1B5	566926.09	3293459.25	354.4	2.55	7.44	2.37
VUP1B6	566918.04	3293455.22	354.1	2.55	7.44	2.37
VUP1B7	566909.96	3293451.25	354.0	2.55	7.44	2.37
VUP1B8	566901.87	3293447.32	353.9	2.55	7.44	2.37

Table 7. Modeled Source Parameters for Volume Sources						
Source ID	Easting (X)	Northing (Y)	Base Elevation	Release Height	Initial Horizontal Dimension (σy)	Initial Vertical Dimension (σz)
	(m)	(m)	(m)	(m)	(m)	(m)
VUP1B9	566893.77	3293443.38	353.8	2.55	7.44	2.37
VUP1B10	566885.68	3293439.45	353.7	2.55	7.44	2.37
VUP1C1	566967.97	3293475.42	355.2	2.55	4.19	2.37
VUP1C2	566976.56	3293478.12	355.3	2.55	4.19	2.37
VUP1C3	566985.14	3293480.82	355.3	2.55	4.19	2.37
VUP1C4	566993.73	3293483.53	355.3	2.55	4.19	2.37
VUP1C5	567002.23	3293486.47	355.2	2.55	4.19	2.37
VUP1C6	567010.68	3293489.57	355.2	2.55	4.19	2.37
VUP1C7	567019.12	3293492.68	355.1	2.55	4.19	2.37
VUP1C8	567027.57	3293495.79	355.1	2.55	4.19	2.37
VUP1C9	567036.02	3293498.89	355.1	2.55	4.19	2.37
VUP1C10	567044.46	3293502.01	355.1	2.55	4.19	2.37
VUP1C11	567052.88	3293505.19	355.2	2.55	4.19	2.37
VUP1C12	567061.30	3293508.37	355.1	2.55	4.19	2.37
VUP1C13	567069.72	3293511.55	355.0	2.55	4.19	2.37
VUP1C14	567078.14	3293514.73	354.8	2.55	4.19	2.37
VUP1C15	567086.56	3293517.91	354.8	2.55	4.19	2.37
VUP1C16	567094.98	3293521.10	354.6	2.55	4.19	2.37
VUP1C17	567103.39	3293524.28	354.2	2.55	4.19	2.37
VUP1C18	567111.81	3293527.46	354.0	2.55	4.19	2.37
VUP1C19	567120.23	3293530.65	353.9	2.55	4.19	2.37
VUP1C20	567128.65	3293533.83	353.6	2.55	4.19	2.37
VUP1C21	567137.05	3293537.05	353.8	2.55	4.19	2.37
VUP1C22	567145.45	3293540.28	354.0	2.55	4.19	2.37
VUP1C23	567153.85	3293543.51	354.2	2.55	4.19	2.37
VUP1C24	567162.26	3293546.73	354.3	2.55	4.19	2.37
VUP1C25	567170.67	3293549.93	354.4	2.55	4.19	2.37
VUP1C26	567179.10	3293553.09	354.5	2.55	4.19	2.37
VUP1C27	567187.52	3293556.25	354.4	2.55	4.19	2.37
VUP1C28	567195.95	3293559.41	354.6	2.55	4.19	2.37
VUP1C29	567204.41	3293562.48	354.8	2.55	4.19	2.37
VUP1C30	567212.89	3293565.49	355.0	2.55	4.19	2.37

Table 7. Modeled Source Parameters for Volume Sources						
Source ID	Easting (X)	Northing (Y)	Base Elevation	Release Height	Initial Horizontal Dimension (σy)	Initial Vertical Dimension (σz)
	(m)	(m)	(m)	(m)	(m)	(m)
VUP1C31	567221.62	3293567.66	355.4	2.55	4.19	2.37
VUP1C32	567230.44	3293569.45	355.7	2.55	4.19	2.37
VUP1C33	567239.33	3293570.84	355.9	2.55	4.19	2.37
VUP1C34	567248.31	3293571.38	356.0	2.55	4.19	2.37
VUP1C35	567257.30	3293571.67	356.2	2.55	4.19	2.37
VUP1C36	567263.98	3293571.87	356.3	2.55	4.19	2.37
FUGSC1	558464.00	3289307.00	308.4	2.41	0.81	0.57
FUGCR1	558475.00	3289304.00	308.2	3.54	0.74	0.28

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary
Modeled Parameters

Date:	11/2/2017	Permit No.:	Pending NSR Permit No. 147392L001	Regulated Entity No.:	RN109829721
Area Name:	Bulverde, Comal County, TX			Customer Reference No.:	CN600355465

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS										
1. Emission Point			4. UTM Coordinates of Emission Point			Source							
								7. Stack Exit Data			8. Fugitives		
EPN	FIN	Name (Source Group Characterization) [Source Group ID]	UTM NAD83 Zone 14	Easting (X)	Northing (Y)	5. Building Height	6. Height Above Ground	Diameter	Velocity	Temperature	Length (Easterly)	Width (Northerly)	Axis
(A)	(B)	(C)		(Meters)	(Meters)	(Ft.)	(Ft.)	(Ft.) (A)	(FPS) (B)	(°F) (C)	(Ft.) (A)	(Ft.) (B)	Degrees (C)
1		Hopper 1 (Pseudo-Point Source Group) [VLXEPN1]		566838	3293315		11.3	0.0033	0.0033	-459.67	-----	-----	-----
2		Conveyor Transfer 1 (Pseudo-Point Source Group) [VLXEPN2]		566836	3293315		3.3	0.0033	0.0033	-459.67	-----	-----	-----
3		Crusher 1 Inlet and Outlet (Pseudo-Point Source Group) [VLXEPN3]		566835	3293315		5.6	0.0033	0.0033	-459.67	-----	-----	-----
4		Conveyor Transfer 2 (Pseudo-Point Source Group) [VLXEPN4]		566823	3293315		3.3	0.0033	0.0033	-459.67	-----	-----	-----
5		Screen 1 Inlet (Pseudo-Point Source Group) [VLXEPN5]		566822	3293315		9.7	0.0033	0.0033	-459.67	-----	-----	-----
6		Screen 1 Outlets (Pseudo-Point Source Group) [VLXEPN6]		566815	3293314		3.3	0.0033	0.0033	-459.67	-----	-----	-----
7		Crusher 2 Inlet and Outlet (Pseudo-Point Source Group) [VLXEPN7]		566815	3293322		5.6	0.0033	0.0033	-459.67	-----	-----	-----
8		Conveyor Transfer 4 (Pseudo-Point Source Group) [VLXEPN8]	14	566818	3293316	12	3.3	0.0033	0.0033	-459.67	-----	-----	-----
9		Screen 2 Inlet (Pseudo-Point Source Group) [VLXEPN9]		566807	3293315		9.7	0.0033	0.0033	-459.67	-----	-----	-----
10		Screen 2 Outlets (Pseudo-Point Source Group) [VLXEPN10]		566793	3293315		3.3	0.0033	0.0033	-459.67	-----	-----	-----
11		Crusher 3 Inlet and Outlet (Pseudo-Point Source Group) [VLXEPN11]		566800	3293322		5.6	0.0033	0.0033	-459.67	-----	-----	-----
12		Conveyor Transfer 6 (Pseudo-Point Source Group) [VLXEPN12]		566803	3293316		3.3	0.0033	0.0033	-459.67	-----	-----	-----
13		Engine 1 (Point Source Group) [VLXEPN13]		566825	3293313		10.0	0.42	97.25	833.9	-----	-----	-----
14		Engine 2 (Point Source Group) [VLXEPN14]		566819	3293326		6.0	0.50	59.65	1040.0	-----	-----	-----
15		Engine 3 (Point Source Group) [VLXEPN15]		566796	3293313		6.0	0.25	161.28	970.0	-----	-----	-----
16		Diesel Fuel Tank (Pseudo-Point Source Group) [VLXEPN16]		566929	3293527		9.8	0.0033	0.0033	-459.67	-----	-----	-----

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary
Modeled Parameters

Date:	11/2/2017	Permit No.:	Pending NSR Permit No. 147392L001	Regulated Entity No.:	RN109829721
Area Name:	Bulverde, Comal County, TX			Customer Reference No.:	CN600355465

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS										
1. Emission Point			4. UTM Coordinates of Emission Point			Source							
						5. Building Height	6. Height Above Ground	7. Stack Exit Data			8. Fugitives		
EPN	FIN	Name (Source Group Characterization) [Source Group ID]	UTM NAD83 Zone 14	Easting (X)	Northing (Y)			Diameter	Velocity	Temperature	Length (Easterly)	Width (Northerly)	Axis
(A)	(B)	(C)		(Meters)	(Meters)	(Ft.)	(Ft.)	(Ft.) (A)	(FPS) (B)	(°F) (C)	(Ft.) (A)	(Ft.) (B)	Degrees (C)
STK		2 Acres Active Stockpile (Area Source Group) [VLXSTK1A]	14	566719	3293325	12	10.0	-----	-----	-----	295.18	295.18	0.0
		1 Acre Active Stockpile (Area Source Group) [VLXSTK1B]		566719	3293261		10.0	-----	-----	-----	208.69	208.69	0.0
		1 Acre Active Stockpile (Area Source Group) [VLXSTK1C]		566783	3293244		10.0	-----	-----	-----	208.69	208.69	0.0
		1 Acre Active Stockpile (Area Source Group) [VLXSTK1D]		566809	3293381		10.0	-----	-----	-----	208.69	208.69	0.0

EPN = Emission Point Number

FIN = Facility Identification Number

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Table 1(a) Emission Point Summary

Permit Number:	Pending 147392L001	RN Number:	RN109829721	Date:	November-17
Company:	Vulcan Construction Materials, LLC			Portable Crushing Plant	

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Air Contaminant Name	3. Air Contaminant Emission Rate	
EPN (A)	FIN (B)	NAME (C)		Pounds / Hour	Tons / Year
3		Crusher #1	PM	0.96	0.90
			PM10	0.43	0.41
			PM2.5	0.08	0.08
7		Crusher #2	PM	0.12	0.11
			PM10	0.05	0.05
			PM2.5	0.01	0.01
11		Crusher #3	PM	0.24	0.23
			PM10	0.11	0.10
			PM2.5	0.02	0.02
5		Screen #1	PM	1.98	1.86
			PM10	0.67	0.62
			PM2.5	0.05	0.04
9		Screen #2	PM	1.10	1.03
			PM10	0.37	0.35
			PM2.5	0.03	0.02
1, 2, 4, 6-8, 10, 12		Material Handling	PM	0.48	0.45
			PM10	0.16	0.15
			PM2.5	0.04	0.04
13		Engine #1	PM	0.07	0.32
			PM10	0.07	0.32
			PM2.5	0.07	0.32
			VOC	1.09	4.76
			NOx	2.60	11.41
			SO2	0.90	3.95
			CO	1.59	6.97
14		Engine #2	PM	0.02	0.10
			PM10	0.02	0.10
			PM2.5	0.02	0.10
			VOC	0.12	0.54
			NOx	1.03	4.53
			SO2	0.20	0.87
			CO	0.18	0.77
16		Tank	VOC	0.68	0.01
15		Engine #3	PM	0.04	0.17
			PM10	0.04	0.17
			PM2.5	0.04	0.17
			VOC	0.21	0.92
			NOx	0.87	3.83
			SO2	0.17	0.76
			CO	0.16	0.71
STK		Stockpiles (including loading/unloading)	PM	0.83	3.61
			PM10	0.41	1.81
			PM2.5	0.06	0.27

EPN = Emission Point Number FIN = Facility Identification Number

This form is for use by sources subject to air quality permit requirements and may be revised periodically.

Emission rates in this table are estimates only and should not be considered to be the maximum emission rates. They will be enforceable through compliance with the applicable special condition(s) that will be in the permit and the applicable representations in this permit application.

Table EC-4

Vulcan Construction Materials, LLC
Portable Crushing Plant

Nov-17
10003-452

Annual Road Emissions - Unpaved Roads
From EPA's AP 42, Fifth Edition, Volume I Chapter 13.2.2 Unpaved Roads (11/06)

Emissions Calculations Prepared By Westward Environmental, Inc.

EF (lbs/VMT) = $k(s/12)^a \times (W/3)^b$

	Product Trucks			Fuel Tanker			
	Unpaved Road 1A (EPN UP1A) Single-Lane In	Unpaved Road 1B (EPN UP1B) Two-Lane In/Out	Unpaved Road 1C (EPN UP1C) Single-Lane Out	Unpaved Road 1A (EPN UP1A) Single-Lane In	Unpaved Road 1B (EPN UP1B) Two-Lane In/Out	Unpaved Road 1C (EPN UP1C) Single-Lane Out	
k, particle size multiplier PM	4.9	4.9	4.9	4.9	4.9	4.9	
k, particle size multiplier PM10	1.5	1.5	1.5	1.5	1.5	1.5	
k, particle size multiplier PM2.5	0.15	0.15	0.15	0.15	0.15	0.15	
s, silt content (%)	10	10	10	10	10	10	
a, constant PM	0.7	0.7	0.7	0.7	0.7	0.7	
a, constant PM10	0.9	0.9	0.9	0.9	0.9	0.9	
a, constant PM2.5	0.9	0.9	0.9	0.9	0.9	0.9	
W, avg. vehicle weight (tons)	27.0	27.0	27.0	28.5	28.5	28.5	
b, constant PM	0.45	0.45	0.45	0.45	0.45	0.45	
b, constant PM10	0.45	0.45	0.45	0.45	0.45	0.45	
b, constant PM2.5	0.45	0.45	0.45	0.45	0.45	0.45	
AP, annual prod. Rate (tons)	1,500,000	1,500,000	1,500,000	1,314	1,314	1,314	
DT, dist per round trip (mi)	0.28	0.11	0.20	0.28	0.11	0.20	
VC, avg. vehicle capacity (tons)	24.4	24.4	24.4	27.0	27.0	27.0	
EF, emission factor PM (lb/VMT)	11.60	11.60	11.60	11.88	11.88	11.88	
EF, emission factor PM10 (lb/VMT)	3.42	3.42	3.42	3.51	3.51	3.51	
EF, emission factor PM2.5 (lb/VMT)	0.34	0.34	0.34	0.35	0.35	0.35	
CF, control factor	0.30	0.30	0.30	0.30	0.30	0.30	
VMT/year, vehicle miles traveled/year	16,922	6,570	11,995	13	5	9	
							Totals
E, PM (tons/yr)	29.44	11.43	20.87	0.02	0.01	0.02	61.78
E, PM10 (tons/yr)	8.69	3.37	6.16	0.007	0.003	0.005	18.24
E, PM2.5 (tons/yr)	0.8689	0.3374	0.6159	0.0007	0.0003	0.0005	1.82

s = Mean value for stone quarrying and processing from AP 42 Chapter 13.2.2 Table 13.2.2-1.

W (Product Trucks) = (95% x 27.5) + (5% x 18) = 27.0 tons. (95% trailer trucks, 5% tandem trucks. A trailer truck is 40 tons full & 15 tons empty for avg. 27.5 tons. A tandem truck is 24 tons full and 12 tons empty for avg. 18 tons.)
W (Fuel Tanker) = A 7,500 gallon fuel tanker is 42 tons full and 15 tons empty which averages to 28.5 tons.

AP (Product Trucks) = Maximum annual saleable plant production is 1,500,000 tons per year.
AP (Fuel Tanker) = 360,000 gallons of diesel consumed/year. (360,000 gal x 7.3 lb/gal / 2,000 lb/ton = 1,314 tons/year).

DT Unpaved Road = ~3,048 feet total or ~0.58 miles total round trip. From Paved Road 1C to the edge of the stockpile area and back to Paved Road 1D.
DT Unpaved Road 1A = ~1454 feet one way or ~0.28 mi. round trip. End of Paved Road 1A to product stockpile area.
DT Unpaved Road 1B = ~282 feet one way or ~0.11 mi. round trip. From product stockpile area to Unpaved Road 1C.
DT Unpaced Road 1C = ~1030 feet one way or ~0.20 mi. round trip. From Unpaved Road 1B to Paved Road 1D.

VC (Product Trucks) = Trailer Truck (95% x 25 ton capacity) + Tandem Truck (5% x 12 ton capacity) = 24.4 tons.
VC (Fuel Tanker) = Fuel Tanker capacity is 7,500 gallons of ~7.3 lb/gallon diesel = 27.0 tons.

CF = 70% control efficiency utilized for watered unpaved roads per TCEQ Guidance.
VMT = APxDT/VC.
EF = $k(s/12)^a \times (W/3)^b$.
E = EFxVMTx1/2000xCF.

Table EC-5

Vulcan Construction Materials, LLC
Portable Crushing Plant

Sep-17
10003-452

Annual Road Emissions - Paved Roads
From AP 42 13.2.1 Paved Road Emissions (1/11)

Emissions Calculations Prepared By Westward Environmental, Inc.

	Product Trucks				Fuel Tanker				
	Paved Road 1A (EPN PR1A) Two-Lane In/Out	Paved Road 1B (EPN PR1B) Two-Lane In/Out	Paved Road 1C (EPN PR1C) Single-Lane In	Paved Road 1D (EPN PR1D) Single-Lane Out	Paved Road 1A (EPN PR1A) Two-Lane In/Out	Paved Road 1B (EPN PR1B) Two-Lane In/Out	Paved Road 1C (EPN PR1C) Single-Lane In	Paved Road 1D (EPN PR1D) Single-Lane Out	
k, particle size multiplier PM	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	
k, particle size multiplier PM10	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	
k, particle size multiplier PM 2.5	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	0.00054	
sL, road surface silt loading (g/m^2)	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	
sL x sL CF, road surface silt loading (g/m^2)	2.46	2.46	2.46	2.46	2.46	2.46	2.46	2.46	
W, avg. vehicle weight (tons)	27.0	27.0	27.0	27.0	28.5	28.5	28.5	28.5	
AP, annual prod. Rate (tons)	1,500,000	1,500,000	1,500,000	1,500,000	1,314	1,314	1,314	1,314	
DT, dist per round trip (mi)	0.09	0.35	0.08	0.13	0.09	0.35	0.08	0.13	
VC, avg veh. capacity (tons)	24.4	24.4	24.4	24.4	27.0	27.0	27.0	27.0	
EF, emission factor PM (lbs/VMT)	0.72	0.72	0.72	0.72	0.76	0.76	0.76	0.76	
EF, emission factor PM10 (lb/VMT)	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	
EF, emission factor PM2.5 (lb/VMT)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
sL CF, silt loading control factor	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	
EF CF, emission factor control factor	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	
VMT/year, vehicle miles traveled	5,730	21,315	4,775	7,754	5	17	4	6	
									Totals
E, PM (tons/yr)	0.619127	2.303153	0.515939	0.837885	0.000517	0.001925	0.000431	0.000700	4.28
E, PM10 (tons/yr)	0.123825	0.460631	0.103188	0.167577	0.000103	0.000385	0.000086	0.000140	0.86
E, PM2.5 (tons/yr)	0.030394	0.113064	0.025328	0.041133	0.000025	0.000094	0.000021	0.000034	0.21

$EF\ (lbs/VMT) = k(sL)^{0.91} \times (W)^{1.02}$

sL = Mean value for quarry used from AP 42 Chapter 13.2.1 Table 13.2.1-4.

W (Product Trucks) = (95% x 27.5) + (5% x 18) = 27.0 tons. (95% trailer trucks, 5% tandem trucks. A trailer truck is 40 tons full & 15 tons empty for avg. 27.5 tons. A tandem truck is 24 tons full & 12 tons empty for avg. 18 tons.)
W (Fuel Tanker) = A 7,500 gallon fuel tanker is 42 tons full and 15 tons empty which averages to 28.5 tons.

AP (Product Trucks) = Maximum annual saleable plant production is 1,500,000 tons.
AP (Fuel Tanker) = 360,000 gallons of diesel consumed/year. (360,000 gal x 7.3 lb/gal / 2,000 lb/ton = 1,314 tons/year).

DT Paved Road = ~3399 feet total round trip or ~0.64 miles total round trip. From project site entry/exit to Unpaved Road 1A and then from Unpaved Road 1C back to site entry/exit.
DT Paved Road 1A = ~246 feet one way or ~0.09 miles round trip. Project site entry/exit to Paved Road 1B.
DT Paved Road 1B = ~915 feet one way or ~0.35 miles round trip. From Paved Road 1A to the location where Paved Road 1C begine and then back down to Paved Road 1A.
DT Paved Road 1C = ~410 feet one way or ~0.08 miles round trip. From Paved Road 1B to location where Unpaved Road 1A begins.
DT Paved Road 1D = ~667 feet one way or ~0.13 miles round trip. From Unpaved Road 1C to the scale house and then to Paved Road 1B.

VC (Product Trucks) = (95% trailer truck x 25 tons) + (5% tandem truck x 12 tons) = 24.4 tons.
VC (Fuel Tanker) = Fuel Tanker capacity is 7,500 gallons of ~7.3 lb/gallon diesel = 27.0 tons.

sL CF = 70% control efficiency utilized for sweeping paved road with vacuum truck and applied to silt loading value. Control Factor = (1 - Control Eff.): 1 - 0.70 = 0.30. Assumes no wheel wash.
EF CF = 70% control efficiency utilized for watered roads. Applied to emission factor. (1 - control efficiency) = CF. 1 - 0.70 = 0.30 per TCEQ guidance.
VMT = APxDT/VC.
$EF\ (lbs/VMT) = k(sL)^{0.91} \times (W)^{1.02}$.
E = EFxVMTx1/2000xEF CF.

APP-000308

PERFORMANCE DATA [LGK07114]

AUGUST 26, 2010

Caterpillar C-13

For Help Desk Phone Numbers Click here

Perf No: DM7687

Change Level: 06

General | Heat Rejection | Emissions | Regulatory | Altitude Derate | Cross Reference

View PDF

SALES MODEL:	C13	COMBUSTION:	DI
ENGINE POWER (BHP):	440	ENGINE SPEED (RPM):	2,100
PEAK TORQUE (FT-LB):	1,482.5	PEAK TORQUE SPEED (RPM):	1,400
COMPRESSION RATIO:	17.3	TORQUE RISE (%):	35
APPLICATION:	INDUSTRIAL	ASPIRATION:	TA
RATING LEVEL:	INDUSTRIAL C - INTERMITTENT	AFTERCOOLER TYPE:	ATAAC
PUMP QUANTITY:	1	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
FUEL TYPE:	DIESEL	INLET MANIFOLD AIR TEMP (F):	120
MANIFOLD TYPE:	DRY	JACKET WATER TEMP (F):	192.2
GOVERNOR TYPE:	ELEC	TURBO CONFIGURATION:	SINGLE
INJECTOR TYPE:	EUI	TURBO QUANTITY:	1
REF EXH STACK DIAMETER (IN):	5	TURBOCHARGER MODEL:	GTA4502BS-48T-1.33
MAX OPERATING ALTITUDE (FT):	1,201	CERTIFICATION YEAR:	2005
		PISTON SPD @ RATED ENG SPD (FT/MIN):	2,163.4

General Performance Data Top

ENGINE SPEED	ENGINE POWER	ENGINE TORQUE	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	EXH STACK TEMP
RPM	BHP	LB-FT	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
2,100	440	1,101	218	0.358	22.7	47.9	120.8	1,170.3	43.4	925.2
2,000	440	1,156	228	0.355	22.4	47.8	112.0	1,137.2	41.3	833.9
1,900	440	1,217	240	0.350	22.1	48.9	114.2	1,159.8	39.5	896.8
1,800	440	1,284	254	0.346	21.9	50.1	114.7	1,180.9	38.2	944.2
1,700	435	1,345	266	0.347	21.7	51.0	114.8	1,197.5	36.4	972.4
1,600	426	1,399	276	0.342	20.9	50.7	112.8	1,201.2	34.2	977.9
1,500	413	1,446	286	0.338	20.1	51.1	109.2	1,192.1	32.6	961.2
1,400	395	1,484	293	0.336	19.2	50.7	107.1	1,196.9	30.3	974.3
1,300	362	1,464	289	0.335	17.5	49.3	103.6	1,174.3	27.8	959.7
1,200	327	1,431	283	0.330	15.6	42.4	100.3	1,188.8	22.5	973.8
1,100	277	1,321	261	0.333	13.4	33.4	93.2	1,227.3	16.6	1,026.9
1,000	231	1,211	239	0.322	10.7	21.0	86.2	1,174.5	10.1	1,015.9
900	183	1,068	211	0.339	8.8	13.9	85.2	1,160.0	6.8	1,009.4
700	117	880	174	0.365	6.2	6.2	83.7	1,164.1	3.7	1,011.1

ENGINE	ENGINE	COMPRESSOR	COMPRESSOR	WET INLET AIR VOL	WET EXH GAS VOL	WET INLET AIR MASS	WET EXH GAS MASS	WET EXH VOL FLOW RATE (32	DRY EXH VOL FLOW RATE (32

Caterpillar C-13

SPEED	POWER	OUTLET PRES	OUTLET TEMP	FLOW RATE	FLOW RATE	FLOW RATE	FLOW RATE	DEG F AND 29.98 IN HG)	DEG F AND 29.98 IN HG)
RPM	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,100	440	52	323.5	1,028.9	2,723.2	4,434.4	4,593.3	966.8	886.2
2,000	440	51	309.2	1,004.0	2,481.1	4,323.1	4,480.2	943.0	863.1
1,900	440	52	316.1	970.4	2,514.2	4,175.0	4,329.4	911.3	833.0
1,800	440	53	322.0	942.7	2,528.9	4,054.0	4,207.8	885.7	808.8
1,700	435	54	323.5	911.3	2,490.8	3,910.7	4,062.6	855.1	779.1
1,600	426	53	322.5	858.5	2,353.2	3,676.9	3,823.8	804.8	731.9
1,500	413	53	323.3	814.1	2,205.4	3,484.6	3,625.7	763.2	693.1
1,400	395	53	325.1	763.5	2,004.5	3,261.4	3,395.5	714.7	648.3
1,300	362	51	322.0	705.2	1,900.6	3,005.6	3,128.0	658.4	597.7
1,200	327	44	305.3	600.3	1,632.3	2,550.9	2,659.9	559.9	506.2
1,100	277	34	271.1	484.5	1,366.8	2,054.0	2,147.5	452.0	406.4
1,000	231	22	212.8	349.4	981.5	1,478.5	1,553.0	327.0	291.0
900	183	14	186.1	272.6	763.1	1,152.1	1,213.4	255.4	226.2
700	117	7	151.2	167.9	473.9	709.1	752.6	150.4	138.1

Heat Rejection Data Top

ENGINE SPEED	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHUAST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
RPM	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
2,100	440	7,091	2,411	19,708	11,214	2,574	3,599	18,664	48,321	51,474
2,000	440	6,933	4,553	17,449	9,150	2,551	3,414	18,664	47,880	51,012
1,900	440	6,806	3,342	18,141	10,041	2,516	3,375	18,664	47,245	50,328
1,800	440	6,713	2,396	18,500	10,647	2,486	3,366	18,664	46,674	49,720
1,700	435	6,884	2,121	18,561	10,801	2,465	3,268	18,465	46,279	49,299
1,600	426	6,566	2,149	17,648	10,270	2,376	3,089	18,067	44,608	47,519
1,500	413	6,312	2,264	16,492	9,474	2,279	2,988	17,516	42,781	45,572
1,400	395	5,989	2,052	15,699	9,077	2,168	2,846	16,771	40,700	43,356
1,300	362	5,517	1,869	14,229	8,154	1,981	2,629	15,372	37,189	39,615
1,200	327	5,120	1,749	12,383	7,116	1,760	2,094	13,865	33,053	35,210
1,100	277	4,781	1,451	10,639	6,274	1,503	1,463	11,732	28,225	30,066

Emissions Data Top

Units Filter All Units

RATED SPEED NOT TO EXCEED DATA: 2100 RPM

ENGINE POWER		BHP	440	330	220	110	44.0
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	1,346	816	436	209	145
TOTAL CO		G/HR	1,103	913	284	208	424
TOTAL HC		G/HR	37	44	92	96	77
PART MATTER		G/HR	85.9	63.7	48.4	61.3	82.7
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	1,365.7	1,028.3	750.5	699.4	776.8
TOTAL CO	(CORR 5% O2)	MG/NM3	1,135.0	1,149.6	496.0	1,195.3	2,255.9
TOTAL HC	(CORR 5% O2)	MG/NM3	32.3	40.3	130.0	264.0	360.5
PART MATTER	(CORR 5% O2)	MG/NM3	73.7	60.3	74.3	234.5	404.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	665	501	366	341	378
TOTAL CO	(CORR 5% O2)	PPM	908	920	397	956	1,805
TOTAL HC	(CORR 5% O2)	PPM	60	90	255	494	673

Caterpillar C-13

TOTAL NOX (AS NO2)		G/HP-HR	3.08	2.40	2.00	1.91	3.32
TOTAL CO		G/HP-HR	2.53	2.79	1.30	1.90	9.67
TOTAL HC		G/HP-HR	0.08	0.13	0.42	0.07	1.76
PART MATTER		G/HP-HR	0.20	0.19	0.22	0.56	1.89
TOTAL NOX (AS NO2)		LB/HR	2.97	1.80	0.96	0.48	0.32
TOTAL CO		LB/HR	2.43	2.01	0.63	0.46	0.93
TOTAL HC		LB/HR	0.08	0.10	0.20	0.21	0.17
PART MATTER		LB/HR	0.19	0.14	0.11	0.14	0.18

RATED SPEED NOMINAL DATA: 2100 RPM

ENGINE POWER		BHP	440	330	220	110	44.0
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	1,246	756	404	193	135
TOTAL CO		G/HR	590	488	152	111	227
TOTAL HC		G/HR	20	23	40	51	41
TOTAL CO2		KG/HR	233	186	136	80	42
PART MATTER		G/HR	44.0	32.7	24.8	31.5	42.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	1,264.5	952.2	694.9	647.6	719.2
TOTAL CO	(CORR 5% O2)	MG/NM3	606.9	614.8	265.2	639.2	1,206.3
TOTAL HC	(CORR 5% O2)	MG/NM3	17.1	25.6	72.4	140.1	190.7
PART MATTER	(CORR 5% O2)	MG/NM3	37.8	36.5	38.1	120.3	207.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	616	464	338	315	350
TOTAL CO	(CORR 5% O2)	PPM	486	492	212	511	965
TOTAL HC	(CORR 5% O2)	PPM	32	48	135	262	356
TOTAL NOX (AS NO2)		G/HP-HR	2.86	2.31	1.85	1.77	3.07
TOTAL CO		G/HP-HR	1.35	1.49	0.70	1.02	5.17
TOTAL HC		G/HP-HR	0.04	0.07	0.22	0.46	0.93
PART MATTER		G/HP-HR	0.10	0.10	0.11	0.29	0.97
TOTAL NOX (AS NO2)		LB/HR	2.75	1.67	0.89	0.43	0.30
TOTAL CO		LB/HR	1.30	1.08	0.33	0.25	0.50
TOTAL HC		LB/HR	0.04	0.05	0.11	0.11	0.09
TOTAL CO2		LB/HR	513	411	300	175	93
PART MATTER		LB/HR	0.10	0.07	0.05	0.07	0.09
OXYGEN IN EXH		%	10.5	12.2	14.2	16.0	17.0
DRY SMOKE OPACITY		%	0.9	0.8	0.6	1.3	2.6
BOSCH SMOKE NUMBER			0.62	0.50	0.29	0.87	1.58

Regulatory Information Top

EPA TIER 3 2005 - 2010

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

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 3	CO: 3.5 NOx + HC: 4.0 PM: 0.20

EU STAGE IIIA 2006 - ----

GASEOUS EMISSION DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EU 97/68/EC, ECE REGULATION NO. 96 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSION VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
EUROPE	EU	NON-ROAD	STAGE IIIA	CO: 3.5 NOx + HC: 4.0 PM: 0.20

Altitude Derate Data Top

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

Caterpillar C-13

AMBIENT OPERATING TEMP (F)	50	60	70	80	90	100	110	120	130	NORMAL
ALTITUDE (FT)										
0	440	440	440	440	440	433	421	405	390	440
1,000	440	440	440	440	427	413	400	383	366	440
2,000	421	413	409	403	395	383	367	348	330	405
3,000	405	394	385	376	367	355	340	323	304	382
4,000	387	372	360	349	339	330	318	305	289	359
5,000	368	351	335	322	312	305	297	288	275	337
6,000	346	328	312	310	308	284	277	268	258	317
7,000	320	304	292	315	329	267	258	245	236	300
8,000	300	282	269	296	313	248	238	223	220	287
9,000	284	262	244	259	267	227	220	220	220	277
10,000	268	242	220	223	221	220	220	220	220	269
11,000	251	223	220	220	220	220	220	220	220	263
12,000	233	220	220	220	220	220	220	220	220	257
13,000	220	220	220	220	220	220	220	220	220	253
14,000	220	220	220	220	220	220	220	220	220	250
15,000	220	220	220	220	220	220	220	220	220	248

Cross Reference Top

Engine Arrangement

Arrangement Number	Effective Serial Number	Engineering Model	Engineering Model Version
2413804	LGK12540	E707	–

Test Specification Data

Test Spec	Setting	Effective Serial Number	Engine Arrangement	Governor Type	Default Low Idle Speed	Default High Idle Speed
0K5712		LGK12540	2413804	ELEC		

BF4M2012 Specification data

General

Cylinders	4	
Cylinder arrangement	In line	
Bore	101 mm	4.0 in.
Stroke	126 mm	5.0 in.
Cylinder Displacement	1.01 liter	61.6 in.^{3}
Total displacement	4.04 liter	246.6 in.^{3}
Compression ratio	18.4:1	
Combustion system	Direct injection	
Aspiration	Turbocharged	

Fuel system

Lift pump suction head, max	1.5 m	59.1 in.
Lift pump flow @max rpm	600 l/h	2.6 GPM
Max restriction in fuel supply line	200 mbar	80 in. H_2O
Max restriction in fuel return line	500 mbar	200 in. H_2O
Max restriction in fuel pre-filter	200 mbar	00 in. H_2O
Fuel filter type	Replaceable cartridge	
Fuel consumption @ max rating	21.6 l/h	5.7 GPH
Fuel consumption @ peak torque	15.1 l/h	4.0 GPH

Combustion air system

Combustion air flow @ max rating	439.2 m^3/h	258.5 CFM
Max allowable clean restriction	50 mbar	20 in. H_2O
Max allowable dirty restriction	60 mbar	24 in. H_2O

Exhaust system

Exhaust gas flow @ max rating	1194 m^3/h	702.7 CFM
Exhaust temp @ max rating	560 °C	1040 °F
Max allowable back pressure	75 mbar	30 in. H_2O

Cooling system

Type	External radiator	
Coolant flow rate @ max rpm	180.0 l/min	47.6 GPM
Coolant heat rejection % of gross power	73%	
Max coolant temp @ engine outlet	110 °C	230 °F
Max coolant operating pressure	1.5 bar	21.8 psi
Coolant volume in engine	5.6 liter	5.9 qt.
Coolant volume, cooler & pipes, min	0.06 l/kW, 0.05 qt/hp	
Expansion tank capacity, min	30% of circ.coolant volume	

Lubrication system

Lubrication type	Forced feed lubrication	
Oil flow at max rpm	49.5 l/min	13.1 GPM
Oil pump relief valve setting	6 bar	87 psi
Max oil temperature in oil sump	130 °C	266 °F
Filter volume	1.0 liter	1.057 qt.
Oil change interval	500 hours	

Electrical

Starter motor	12V, 3.1 kW	24V, 4.0kW
Max battery CCA	1300A	750A
Voltage drop, battery (+), max	1.0V	

Physical data

Length	775 mm	30.5 in.
Width	540 mm	21.3 in.
Height	742 mm	29.2 in.
Weight, dry	330 kg	728 lb.
Max bending @ housing:	000 Nm	589.8 lb-ft
Max force @ flywheel:		
Axial:	N	0 lb.
Radial:	5000 N	1126.1 lb.

Performance data

Peak torque	388 Nm	286.0 lb-ft
@ rpm	1500	
low idle speed	800 rpm	

Gross power

Engine RPM	1800	2100	2200	2300	2500
KW, intermittent	60.9	73.0	74.9	74.9	74.9
Hp, intermittent	81.6	97.9	100.4	100.4	100.4
KW, continuous	52.3	62.0	64.0	66.0	70.0
Hp, continuous	70.1	83.1	85.8	88.4	93.8

Fuel consumption

g/kWhr	211	225	234	239	245
lb/hphr	0.346	0.369	0.384	0.392	0.402

Combustion air @ 25 C

m^3/h	241	367	388	403	439
CFM	142	216	229	237	258

Exhaust gas @ 500 C

m^3/h	680	1004	1058	1090	1194
CFM	400	591	623	646	703

Coolant

l/min	109.0	151.0	158.0	166.0	180.0
GPM	28.8	39.9	41.7	43.9	47.6

Heat rejection to coolant

kW	41.1	49.3	51.7	53.0	55.2
BTU/min	2338	2804	2941	3015	3140

Noise, dB(A)

Avg. @ 1 meter

Certifications

U. S. EPA Non-road Tier 1
European COM 1
U. S. EPA Non-road Tier 2, effective Jan 2003
European COM 2, effective Jan 2003

Chertan 1400 ⇒ 2100 ⇒ 1700
Horizon 6203.

Engine Performance Data
Cummins Inc
Columbus, Indiana 47202-3005
http://www.cummins.com

Industrial
B3.3
FR30203

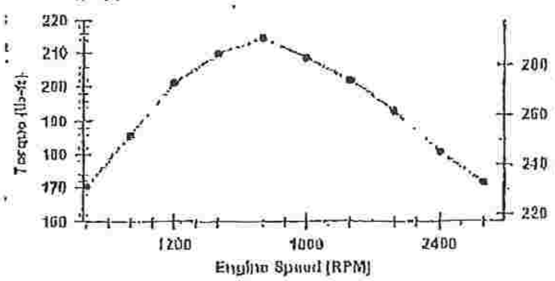
85 BHP (63 kW) @ 2600 RPM
215 lb-ft (292 N-m) @ 1600 RPM

Configuration	CPL Code	Revision
D782001CX03	Tier2B3.3T	22-Mar-2009

Compression Ratio:	18.3:1	Displacement:	199 in3 (3.3 L)
Fuel System:	Bosch Mechanical	Aspiration:	Turbocharged
Emission Certification:	U.S. EPA Tier 2, CARB Tier 2, EU Stage II		

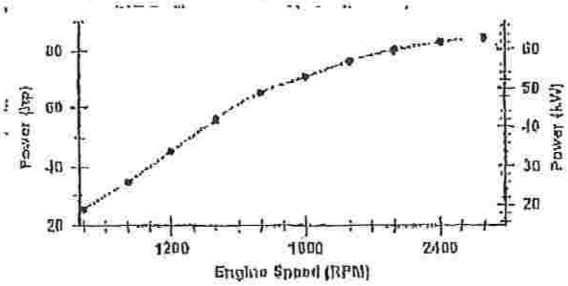
All data is based on the engine operating with fuel system, water pump, and 11.81 in H2O (2.94 kPa) inlet air restriction with 2.99 in (76 mm) inner diameter, and with 3.00 in Hg (10 kPa) exhaust restriction with 2.99 in (76 mm) inner diameter; not included are alternator, fan, optional equipment and driven components. Coolant flows and heat rejection data based on coolant as 50% ethylene glycol/50% water. All data is subject to change without notice.

Rating Type: Intermittent



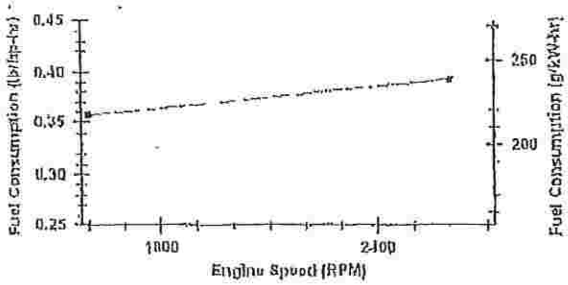
Torque Output

RPM	lb-ft	N-m
800	170	231
1,000	186	252
1,200	201	273
1,400	210	285
1,600	215	291
1,800	209	283
2,000	202	274
2,200	193	262
2,400	181	245
2,600	172	233



Power Output

RPM	hp	kW
800	25	19
1,000	35	26
1,200	46	34
1,400	56	42
1,600	66	49
1,800	71	53
2,000	76	57
2,200	80	60
2,400	83	62
2,600	84	63



Fuel Consumption

RPM	lb/hp-hr	g/kW-hr
1,600	0.357	217
2,600	0.393	239

Curves shown above represent gross engine performance capabilities obtained and corrected in accordance with SAE J1995 conditions of 29.61 in Hg (100 kPa) barometric pressure [300ft (91m) altitude] 77 deg F (25 deg C) inlet air temperature, and 0.30 in Hg (1kPa) water vapor pressure with No. 2 diesel fuel. The engine may be operated up to 7,546 ft (2,300 m) maximum altitude. Consult Cummins customer engineering for operation above this altitude.

STATUS FOR CURVES AND DATA: Final-(Estimated data)
TOLERANCE: Within +/- 5 %

CHIEF ENGINEER:
Scott F Towsley

Bold entries revised after 1-Dec-2008
Cummins Confidential

Intake Air System

Maximum allowable air temperature rise over ambient at Intake Manifold (Naturally Aspirated Engines) or Turbo Compressor Inlet (Turbo-charged Engines): (This parameter impacts emissions, LAT and/or altitude capability)	18 delta deg F	10 delta deg C

Cooling System

Maximum coolant temperature for engine protection controls	221 deg F	105 deg C
Maximum coolant operating temperature at engine outlet (max. top tank temp):	212 deg F	100 deg C

Exhaust System

Maximum exhaust back pressure:	3 in-Hg	10 kPa
Recommended exhaust piping size (inner diameter):	2.99 in	76 mm

Lubrication System

Nominal operating oil pressure		
@ minimum low idle	31.2 psi	215 kPa
@ maximum rated speed	70.2 psi	539 kPa
Minimum engine oil pressure for engine protection devices		
@ minimum low idle	7.1 psi	49 kPa

Fuel System

Fuel cooling requirements (with diesel fuel)		
Maximum heat rejection to return fuel at max. coolant and inlet fuel temperature:		
@ fuel return flow rate of:	44 lb/hr	20 kg/hr
@ fuel return temperature prior to cooler:		
Maximum supply fuel flow:	77 lb/hr	35 kg/hr
Maximum return fuel flow:	71 lb/hr	32 kg/hr
Minimum torque required to hold throttle at full travel (Mech. System)	18 lb-in	2 N-m
Engine fuel compatibility (consult Service Bulletin #3379001 for appropriate use of other fuels)	DF1, DF2	
Maximum fuel inlet pressure:	12 psi	80 kPa

Performance Data

Engine low idle speed:	800 RPM	
Maximum low idle speed:	800 RPM	
Minimum low idle speed:	800 RPM	
Minimum engine speed (for full load sustained operation):	1,000 RPM	
Nominal governor droop:	10 %	
Nominal governor regulation:	6 %	
Engine high idle speed	2,850 RPM	
Governor break speed:	2,750 RPM	
Maximum torque available at closed throttle low idle speed:	137 lb-ft	186 N-m

	Rated Power		Maximum Power	Torque Peak	
Engine Speed	2,600 RPM			1,600 RPM	
Output Power	85 hp	63 kW		65 hp	48 kW
Torque	171 lb-ft	232 N-m		215 lb-ft	291 N-m
Friction Horsepower	16 hp	12 kW		8 hp	6 kW
Intake Manifold Pressure	26 in-Hg	87 kPa		19 in-Hg	63 kPa
Turbo Comp. Outlet Pressure	26 in-Hg	87 kPa		19 in-Hg	63 kPa
Turbo Comp. Outlet Temperature	225 deg F	107 deg C		192 deg F	89 deg C
Inlet Air Flow	195 ft3/min	92 L/s		110 ft3/min	52 L/s
Exhaust Gas Flow	475 ft3/min	224 L/s		295 ft3/min	139 L/s
Exhaust Gas Temperature	970 deg F	521 deg C		972 deg F	522 deg C
Maximum Fuel Flow to Pump	77 lb/hr	35 kg/hr		49 lb/hr	22 kg/hr
Heat Rejection to Coolant	2,201 BTU/min	39 kW		1,774 BTU/min	31 kW
Heat Rejection to Fuel	20 BTU/min	0 kW		17 BTU/min	0 kW
Heat Rejection to Ambient	801 BTU/min	15 kW		597 BTU/min	10 kW
Heat Rejection to Exhaust					
**Steady State Smoke	0.7 Bosch			1.4 Bosch	

**When operating Naturally Aspirated engines above SAE J1995 conditions, it should be noted that [illegible]

Cranking System (Cold Starting Capability)

Unaided Cold Start:		
Minimum cranking speed	130 RPM	
Minimum ambient temperature for unaided cold start	12.2 deg F	-11 deg C
Breakaway torque at minimum unaided cold start temperature:	25 lb-ft	34 N-m
Aided Cold Start:		
Minimum ambient temperature with Grid Heater only	-9 deg F	-23 deg C
Minimum ambient temperature with Ether only	-9 deg F	-23 deg C
Minimum ambient temperature with coolant and lube heater only	-40 deg F	-40 deg C
Cold starting aids available	Ether, Intake Manifold Heater, Block Heater, Oil Pan Heater	
Maximum parasitic load at 10 deg F @		

Noise Emissions

Top	91.6 dBa

Estimated Free Field Sound Pressure Level at 3.28ft (1m) and Full-Load Governed Speed (Excludes Noise from Intake, Exhaust, Cooling System and Driven Components)

Change Log

Date	Author	Change Description
3/5/2009	Steven J Boem	Updated low idle speeds and minumum sp

End of Report

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

LABORATORY REPORT

Vulcan Materials Company		Report Date:	September 11, 2017
1200 Urban Center Parkway		Samples Received:	August 25, 2017
Birmingham, AL 35242		RJ Lee Group Job No.:	CUH1046566
ATTENTION:	Lori Eversull	Client Project No.:	N/A
Telephone:	205-298-3578	Purchase Order No.:	N/A

ANALYSIS: Total and Respirable Crystalline Silica
METHODS: X-Ray Diffraction (XRD) and Computer-Controlled Scanning Electron Microscopy (CCSEM)

A portion of the sample was digested with HCl. The resulting residue was mixed with calcium fluoride (CaF_2) as an internal standard, ground further, and backloaded into a standard XRD holder. The sample was scanned using standard run parameters on a PANalytical X'Pert Pro diffractometer equipped with copper radiation. The weight percentage of silica was calculated through the use of the internal standard and calibration coefficients derived from standards NBS - 1878a quartz, NBS - 1879a cristobalite, and NIOSH/IITRI TY 27 tridymite mixed with CaF_2. A portion of the unground material was examined by CCSEM to determine particle sizing. The percentage respirable quartz is determined by multiplying the appropriate size fraction by the percentage quartz determined by XRD.

Sample Identification		Total Crystalline Silica*	Respirable Silica in Bulk	
			<10µm	<5µm
Client	RJ Lee Group	(weight %)	(weight %)	(weight %)
HWY46-COMP	10414003	0.2	0.10	0.05

*no cristobalite or tridymite detected

Authorized Signature: Heather L Adamson Date 09/11/17
Heather L. Adamson
Scientist, X-ray Diffraction Group

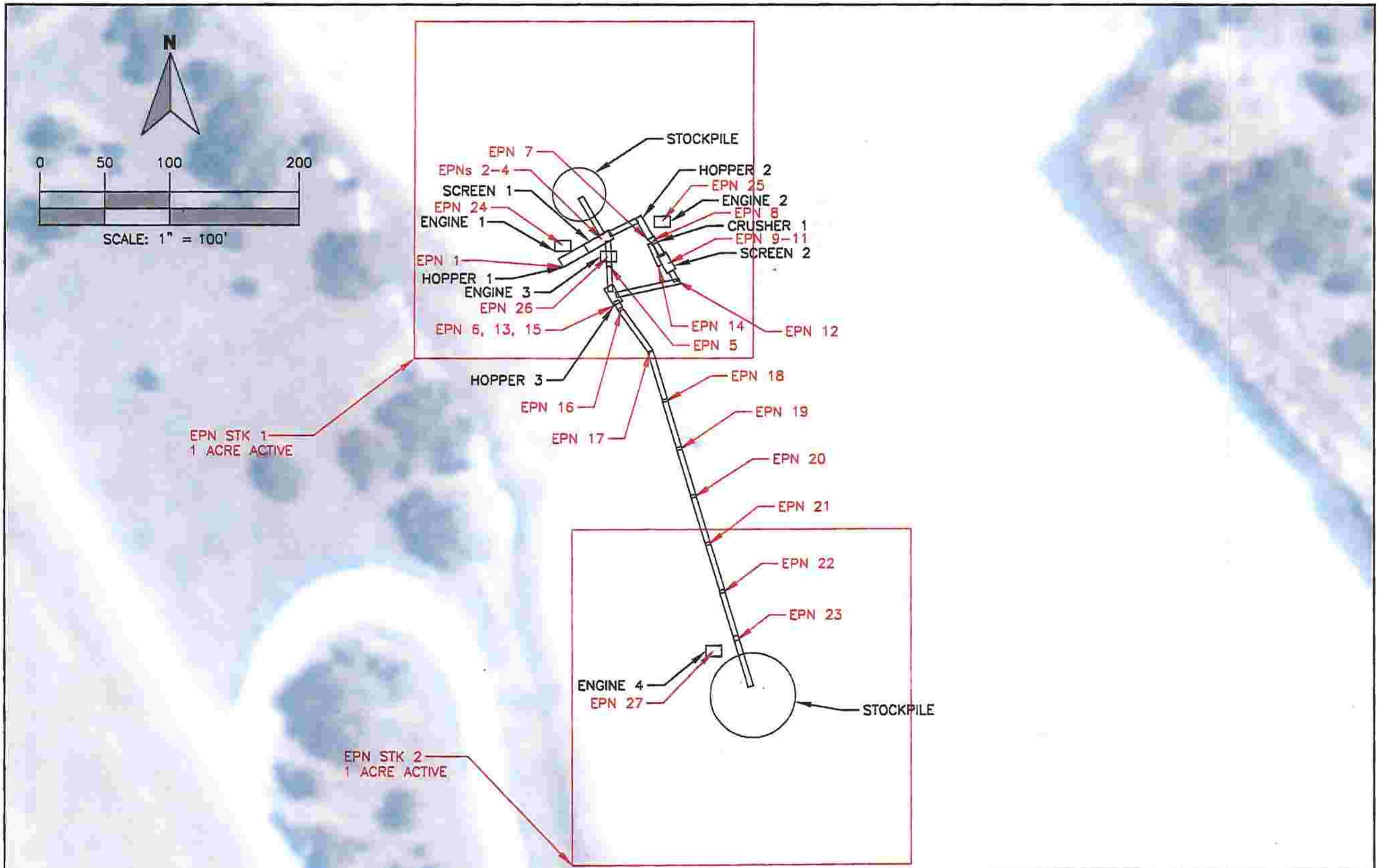
This laboratory operates in accord with ISO 17025:2005 guidelines, and holds a limited scope of accreditations under different accrediting agencies; refer to http://www.rjlg.com/about-us/accreditations/ for more information and current status.

Appendix B

Martin Marietta Materials Southwest, LLC

NSR Air Permit No. 79037L001

Rock Crushing Plant



SHEET #: 1 OF 1	IMAGE:	BULVERDE 2012 NE	
	ISSUE DATE:	11/11/2015	
	DRAWN BY:	AK	
	CHECKED BY:	GDN	
	SCALE: 1" =	100'	
	JOB #:	10278-015	

SITE-WIDE MODELING
AMEND/RENEW PERMIT NO. 79037L001
MARTIN MARIETTA MATERIALS SW, LLC
SAN ANTONIO, BEXAR COUNTY, TEXAS

REV.	DESCRIPTION	BY	DATE

WESTWARD
Environmental. Engineering. Natural Resources.
P.O. Box 2205 Boerne, Texas 78006
(830) 249-8284 Fax: (830) 249-0221
TBPE REG. NO.: F-4524
TBPG REG. NO.: 50112

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1 (a) Emission Point Summary

Permit Number:	79037L001	RN Number:	RN 101112407	Date:	November-17
Company:	Martin Marietta Materials SW LLC (formerly Olmos Contracting I, LLC)			Rock Crusher	

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Air Contaminant Name	3. Air Contaminant Emission Rate	
EPN (A)	FIN (B)	NAME (C)		Pounds / Hour	Tons / Year
8		Crusher #1	PM	0.18	0.14
			PM10	0.08	0.06
			PM2.5	0.02	0.01
3		Screen #1	PM	0.33	0.25
			PM10	0.11	0.08
			PM2.5	0.01	0.01
10		Screen #2	PM	0.33	0.25
			PM10	0.11	0.08
			PM2.5	0.01	0.01
1-2, 4-7, 9, & 11-23		Material Handling	PM	2.52	1.89
			PM10	0.83	0.62
			PM2.5	0.23	0.18
24		Engine 1	PM	0.07	0.29
			PM10	0.07	0.29
			PM2.5	0.07	0.29
			VOC	0.78	3.40
			NOx	0.78	3.40
			SO2	0.21	0.90
			CO	0.83	3.61
25		Engine 2	PM	0.14	0.63
			PM10	0.14	0.63
			PM2.5	0.14	0.63
			VOC	2.89	12.67
			NOx	2.89	12.67
			SO2	0.90	3.95
			CO	2.53	11.09
26		Engine 3	PM	0.48	2.08
			PM10	0.48	2.08
			PM2.5	0.48	2.08
			VOC	0.53	2.34
			NOx	6.70	29.33
			SO2	0.44	1.94
			CO	1.44	6.32
27		Engine 4	PM	0.27	1.19
			PM10	0.27	1.19
			PM2.5	0.27	1.19
			VOC	0.65	2.86
			NOx	4.61	20.21
			SO2	0.63	2.74
			CO	5.72	25.04
STK		Stockpiles (including loading/unloading)	PM	1.04	4.57
			PM10	0.52	2.29
			PM2.5	0.08	0.35

EPN = Emission Point Number FIN = Facility Identification Number

This form is for use by sources subject to air quality permit requirements and may be revised periodically.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Table 1(a) Emission Point Summary

Date:	11/1/2017	Permit No.:	79037L001	Regulated Entity No.:	RN101112407
Area Name:	Rock Crushing Plant - San Antonio, Bexar County, Texas			Customer Reference No.:	CN605057868

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS										
1. Emission Point			4. UTM Coordinates of Emission Point			Source							
				East	North	5. Building Heights	6. Height Above Ground	7. Stack Exit Data			8. Fugitives		
								Diameter	Velocity	Temperature	Length	Width	Axis
(A)	(B)	(C)		(Meters)	(Meters)	(m.)	(ft)	(Ft.) (A)	(FPS) (B)	(°F) (C)	(ft) (A)	(ft) (B)	Degrees (C)
1		Hopper 1 [FUGHOP1] Area Source		558457	3289302		12.00	—	—	—	18.00	6.00	30
2 + 3 + 4		Screen 1 [FUGSC1] Volume Source		558464	3289307		7.90-9.19	—	—	—	11.38	11.38	0
5		Conveyor Transfer [PP5] Psuedo Point		558465	3289302		7.00	0.003	0.003	-459.67	—	—	0
6 + 13		Hopper 3 [FUGHOP3] Area Source		558466	3289295		11.00	—	—	—	6.00	12.00	30
7		Hopper 2 [FUGHOP2] Area Source		558472	3289307		12.00	—	—	—	4.00	15.00	30
8+9+10+11		Crusher 1 + Screen 2 [FUGCR1] Volume Source		558475	3289304		11.62-12.56	—	—	—	10.47	10.47	0
12		Conveyor Transfer [PP12] Psuedo Point		558478	3289299		7.00	0.003	0.003	-459.67	—	—	0
14		Conveyor Transfer [PP14] Psuedo Point		558474	3289302		5.00	0.003	0.003	-459.67	—	—	0
15		Conveyor Transfer [PP15] Psuedo Point		558466	3289295		7.00	0.003	0.003	-459.67	—	—	0
16		Conveyor Transfer [PP16] Psuedo Point		558467	3289294		7.00	0.003	0.003	-459.67	—	—	0
17		Conveyor Transfer [PP17] Psuedo Point		558473	3289286		7.00	0.003	0.003	-459.67	—	—	0
18		Conveyor Transfer [PP18] Psuedo Point		558476	3289276		7.00	0.003	0.003	-459.67	—	—	0
19		Conveyor Transfer [PP19] Psuedo Point	14	558478	3289267	N/A	7.00	0.003	0.003	-459.67	—	—	0
20		Conveyor Transfer [PP20] Psuedo Point		558481	3289258		7.00	0.003	0.003	-459.67	—	—	0
21		Conveyor Transfer [PP21] Psuedo Point		558484	3289249		7.00	0.003	0.003	-459.67	—	—	0
22		Conveyor Transfer [PP22] Psuedo Point		558487	3289240		7.00	0.003	0.003	-459.67	—	—	0
23		Conveyor Transfer [PP23] Psuedo Point		558489	3289231		7.00	0.003	0.003	-459.67	—	—	0

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	11/1/2017	Permit No.:	79037L001	Regulated Entity No.:	RN101112407
Area Name:	Rock Crushing Plant - San Antonio, Bexar County, Texas			Customer Reference No.:	CN605057868

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS										
1. Emission Point			4. UTM Coordinates of Emission			Source							
			Point			5. Building Heights	6. Height Above Ground	7. Stack Exit Data			8. Fugitives		
				East	North			Diameter	Velocity	Temperature	Length	Width	Axis
(A)	(B)	(C)		(Meters)	(Meters)	(m.)	(ft)	(Ft.) (A)	(FPS) (B)	(°F) (C)	(ft) (A)	(ft) (B)	Degrees (C)
24		Engine 1 [ENG1] Point Source		558457	3289306		4.00	0.17	734.27	700	----	----	0
25		Engine 2 [ENG2] Point Source		558475	3289310		12.00	0.5	84.88	700	----	----	0
26		Engine 3 [ENG3] Point Source		558465	3289304		6.00	0.33	194.86	700	----	----	0
27		Engine 4 [ENG4] Point Source		558485	3289229		6.00	0.17	734.27	700	----	----	0
STK1		1 Acre Active Stockpiles [STK1] Square Area Source		558429	3289285		10.00	----	----	----	208.00	208.00	0
STK2		1 Acre Active Stockpiles [STK2] Square Area Source		558458	3289188		10.00	----	----	----	208.00	208.00	0
STK3		5 Acres Inactive Stockpiles [STK3] Square Area Source		558505	3289050		10.00	----	----	----	466.67	466.67	0
STK4		3 Acres Active Stockpiles [STK4] Square Area Source		558552	3289294		10.00	----	----	----	361.48	361.48	0

EPN = Emission Point Number

FIN = Facility Identification

Table 8. Maximum Allowable Emissions Input into Modeling

Source Group ID	EPN(s)	Source	24-hr $PM_{2.5}$ NAAQS Full Analyses	Annual $PM_{2.5}$ NAAQS Full Analyses	24-hr PM_{10} NAAQS Full Analyses	1-hr & Annual NO_2 NAAQS Full Analyses	1-hr, 3-hr, 24-hr & Annual SO_2 NAAQS Full Analyses	1-hr & 8-hr CO NAAQS Full Analyses
			Max. Hourly $PM_{2.5}$ Emission Rate (lb/hr)	Max. Annual $PM_{2.5}$ Emission Rate (TPY)	Max. Hourly PM_{10} Emission Rate (lb/hr)	Max. Hourly NO_2 Emission Rate (lb/hr)	Max. Hourly SO_2 Emission Rate (lb/hr)	Max. Hourly CO Emission Rate (lb/hr)
ENG1	24	Engine 1	0.066022	0.289176	0.066020	0.775764	0.205820	0.825281
ENG2	25	Engine 2	0.144670	0.633655	0.144670	2.893416	0.902000	2.531739
ENG3	26	Engine 3	0.475200	2.081376	0.475200	6.696000	0.442800	1.442880
ENG4	27	Engine 4	0.270765	1.185951	0.270760	4.613025	0.625250	5.716140
FUGSC1	2 - 4	Screen 1	0.033500	0.025130	0.203000			
FUGCR1	8 - 11	Crusher 1 & Screen 2	0.048500	0.036380	0.284000			
FUGHOP1	1	Hopper 1 (Conveyor Transfer)	0.013000	0.009750	0.046000			
FUGHOP3	6, 13	Hopper 3 (Conveyor Transfers)	0.026000	0.019500	0.092000			
FUGHOP2	7	Hopper 2 (Conveyor Transfer)	0.013000	0.009750	0.046000			
PP5	5	Conveyor Transfer	0.013000	0.009750	0.046000			
PP12	12	Conveyor Transfer	0.013000	0.009750	0.046000			
PP14	14	Conveyor Transfer	0.013000	0.009750	0.046000			
PP15	15	Conveyor Transfer	0.013000	0.009750	0.046000			
PP16	16	Conveyor Transfer	0.013000	0.009750	0.046000			
PP17	17	Conveyor Transfer	0.013000	0.009750	0.046000			

Table 8. Maximum Allowable Emissions Input into Modeling

Source Group ID	EPN(s)	Source	24-hr $PM_{2.5}$ NAAQS Full Analyses	Annual $PM_{2.5}$ NAAQS Full Analyses	24-hr PM_{10} NAAQS Full Analyses	1-hr & Annual NO_2 NAAQS Full Analyses	1-hr, 3-hr, 24-hr & Annual SO_2 NAAQS Full Analyses	1-hr & 8-hr CO NAAQS Full Analyses
			Max. Hourly $PM_{2.5}$ Emission Rate (lb/hr)	Max. Annual $PM_{2.5}$ Emission Rate (TPY)	Max. Hourly PM_{10} Emission Rate (lb/hr)	Max. Hourly NO_2 Emission Rate (lb/hr)	Max. Hourly SO_2 Emission Rate (lb/hr)	Max. Hourly CO Emission Rate (lb/hr)
PP18	18	Conveyor Transfer	0.013000	0.009750	0.046000			
PP19	19	Conveyor Transfer	0.013000	0.009750	0.046000			
PP20	20	Conveyor Transfer	0.013000	0.009750	0.046000			
PP21	21	Conveyor Transfer	0.013000	0.009750	0.046000			
PP22	22	Conveyor Transfer	0.013000	0.009750	0.046000			
PP23	23	Conveyor Transfer	0.013000	0.009750	0.046000			
STK1	STK	1 Acre Active Stockpile	0.01249	0.054706	0.082500			
STK2		1 Acre Active Stockpile	0.01249	0.054706	0.082500			
STK3		5 Acres Inactive Stockpiles	0.01656	0.072533	0.109380			
STK4		3 Acres Active Stockpiles	0.03748	0.164162	0.247500			

Emission Sources - Maximum Allowable Emission Rates

Permit Number 79037L001

This table lists the maximum allowable emission rates and all sources of air contaminants on the applicant's property covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities, sources, and related activities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

Air Contaminants Data

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates (6)	
			lbs/hour	TPY (4)
8	Crusher #1	PM	0.18	0.14
		PM_{10}	0.08	0.06
		$PM_{2.5}$	0.02	0.01
3	Screen #1	PM	0.33	0.25
		PM_{10}	0.11	0.08
		$PM_{2.5}$	0.01	0.01
10	Screen #2	PM	0.33	0.25
		PM_{10}	0.11	0.08
		$PM_{2.5}$	0.01	0.01
1-2, 4-7, 9, & 11-23	Material Handling	PM	2.52	1.89
		PM_{10}	0.83	0.62
		$PM_{2.5}$	0.23	0.18
24	Engine 1	PM	0.07	0.29
		PM_{10}	0.07	0.29
		$PM_{2.5}$	0.07	0.29
		VOC	0.78	3.40
		NO_x	0.78	3.40
		SO_2	0.21	0.90
		CO	0.83	3.61
25	Engine 2	PM	0.14	0.63
		PM_{10}	0.14	0.63
		$PM_{2.5}$	0.14	0.63
		VOC.	2.89	12.67

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates (6)	
			lbs/hour	TPY (4)
		NO_x	2.89	12.67
		SO_2	0.90	3.95
		CO	2.53	11.09
26	Engine 3	PM	0.48	2.08
		PM_{10}	0.48	2.08
		$PM_{2.5}$	0.48	2.08
		VOC	0.53	2.34
		NO_x	6.70	29.33
		SO_2	0.44	1.94
		CO	1.44	6.32
27	Engine 4	PM	0.27	1.19
		PM_{10}	0.27	1.19
		$PM_{2.5}$	0.27	1.19
		VOC	0.65	2.86
		NO_x	4.61	20.21
		SO_2	0.63	2.74
		CO	5.72	25.04
STK	Stockpiles (including loading/unloading)	PM	--	4.57
		PM_{10}	--	2.29
		$PM_{2.5}$	--	0.35

(1) Emission point identification - either specific equipment designation or emission point number from plot plan.
(2) Specific point source name. For fugitive sources, use area name or fugitive source name.
(3) Exempt Solvent - Those carbon compounds or mixtures of carbon compounds used as solvents which have been excluded from the definition of volatile organic compound.
VOC - volatile organic compounds as defined in Title 30 Texas Administrative Code § 101.1
NO_x - total oxides of nitrogen
SO_2 - sulfur dioxide
PM - total particulate matter, suspended in the atmosphere, including PM_{10} and $PM_{2.5}$, as represented

Emission Sources - Maximum Allowable Emission Rates

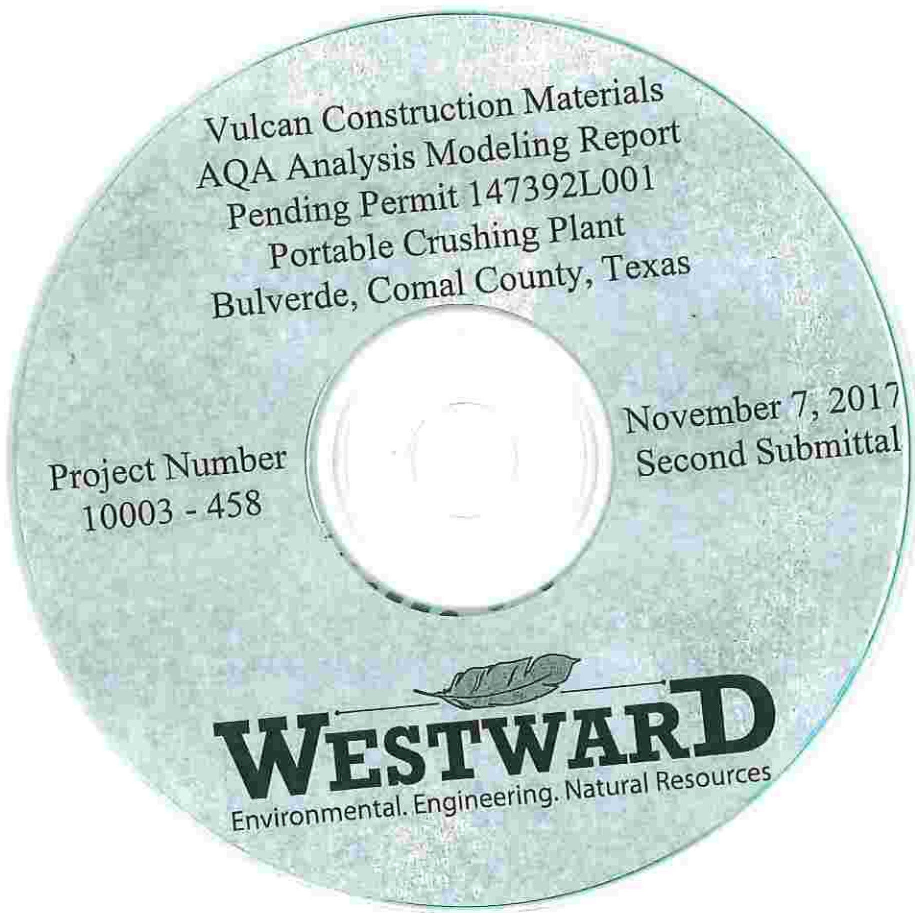
PM_{10} - total particulate matter equal to or less than 10 microns in diameter, including $PM_{2.5}$, as represented
$PM_{2.5}$ - particulate matter equal to or less than 2.5 microns in diameter
CO - carbon monoxide

(4) Compliance with annual emission limits (tons per year) is based on a 12 month rolling period.
(5) Emission rate is an estimate and is enforceable through compliance with the applicable special condition(s) and permit application representations.
(6) Planned startup and shutdown emissions are included. Maintenance activities are not authorized by this permit.

Date: July 21, 2016

Appendix C

*** See DVD: November 7, 2017**
Second Submittal



APPENDIX H

Air Permit Reviewer Reference Guide

APDG 5874

Modeling and Effects Review Applicability:

How to Determine the Scope of Modeling and Effects Review for Air Permits

Air Permits Division
Texas Commission on Environmental Quality
July 2009

Table of Contents

How to Determine the Scope of Modeling and Effects Review for Air Permits

Introduction

The Texas Commission on Environmental Quality (TCEQ) regulates air quality in the state of Texas through the Texas Clean Air Act (TCAA), located in Chapter 382 of the Texas Health and Safety Code and rules, including those in Title 30 Texas Administrative Code (TAC) Chapter 116.

The TCEQ staff conducts a preconstruction technical review during the air permitting process. This review ensures that the operation of a proposed facility will comply with all the rules of the TCEQ and intent of the TCAA, and not cause or contribute to a condition of air pollution. A review of an air permit application involves an assessment of best available control technology (BACT) and human health and welfare effects related to emissions from production and planned maintenance, startup, and shutdown (MSS) activities.

This document provides a process to protect public health and welfare and effectively manage permitting and agency support staff resources. Applications for projects subject to this process are those with new and modified sources of emissions from contaminants for which there are no state or federal ambient air quality standards. In addition, this document establishes a process to determine if refined air dispersion modeling or effects review is required for a permit project, and if required, the scope of the modeling and effects review, and the steps during the process when the Toxicology Division (TD) participates.

While this document defines the minimum level of modeling and effects review required for a project it is not regulatory and does not limit the permit reviewer's ability to require a sitewide modeling and effects review. Permit reviewers may deviate from this guidance with the approval of supervisors or the Air Permits Division (APD) director.

The initial steps of the document have been designed to be conservative and to provide limited flexibility; however, applicants may not be able to meet guidance thresholds contained in the document. In those situations, the applicant can work with the permit reviewer on a case-by-case basis. In addition, a permit reviewer may advise the applicant that the document cannot be used for a particular project, or request additional information related to the project and other authorized emissions at a site, based on available technical information outside of the permit application. This technical information could come from permit reviewers, toxicologists, regional investigators, agency management, or the public.

This document was originally published as interim policy Modeling and Effects Review Applicability Guidance Document for Noncriteria Pollutants dated July 12, 1993, and revised October 16, 1993; January 25, 1994; August 1998; and October 2001. In addition, this document supersedes the Modeling and Effects Review Applicability technical guidance package dated August 2008.

Summary of Significant Changes

July 2009 changes

- Step 3. Clarified the language relating to special permit conditions and removed emissions cap language.
- Step 4. Clarified that unevaluated emissions should either be planned MSS or production. Revised flowchart (Figure 1).

- Step 5. Clarified emission rates for multiple emission points.

- Step 9. Moved constituents that cannot be used in Step 9C or Step 9D from Appendix B to Step 9.
- Appendix A. Added two new terms, Reference Level (ReV) and No Observed Adverse Effects Level (NOAEL).
- Appendix D. Added Toxicology Effects Evaluation Procedure.

Using the Modeling and Effects Review Flowchart

Figure 1, Modeling and Effects Review Flowchart, is used to determine the scope of modeling and effects review:

- for permit projects that are new construction permits or amendments (renewals will be considered separately from this guidance);
- on a project-by-project basis;
- for allowable emissions;
- on a constituent-by-constituent basis (the term constituent will be used for consistency throughout the document, see the definition in Appendix A); only for the noncriteria or nonregulated constituents where a federal ambient air standard or TCEQ standard does not exist; and
- for constituents with a vapor pressure greater than 0.0002 psia (0.01 mmHg) at maximum operating temperature.

If an ESL is not published, one can be obtained from the TD. If no ESL is readily available, a default ESL of 2 micrograms per cubic meter (μg/m3) can be used.

The term modeling used in this document includes 1) screening modeling done in accordance with U.S. Environmental Protection Agency screening procedures and 2) refined dispersion modeling conducted per APD Air Dispersion Modeling Team (ADMT) guidance.

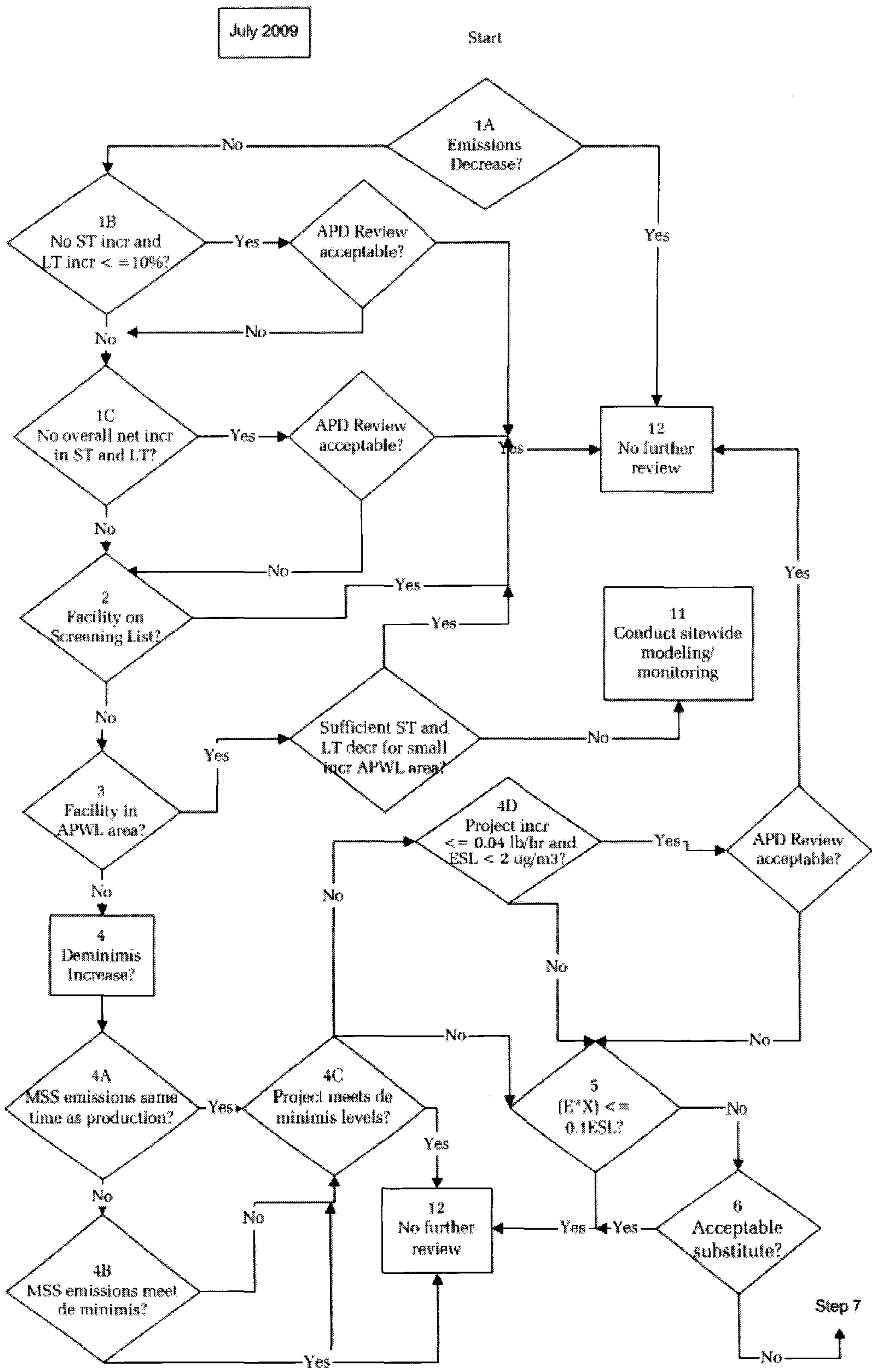
For any step which involves annual values for constituents with long-term ESLs that are $<$ 10% of their corresponding short-term ESLs, use either the maximum hourly emission rate or the hourly emission rate based on annual emissions.

The percentages and hours of exceedance in the following steps are guidelines. As an option, permit reviewers may discuss projects with exceedances of the thresholds with APD management before proceeding to the next step in the flowchart.

The remainder of this section provides a step-by-step explanation and supplemental guidance for each block in the flowchart.

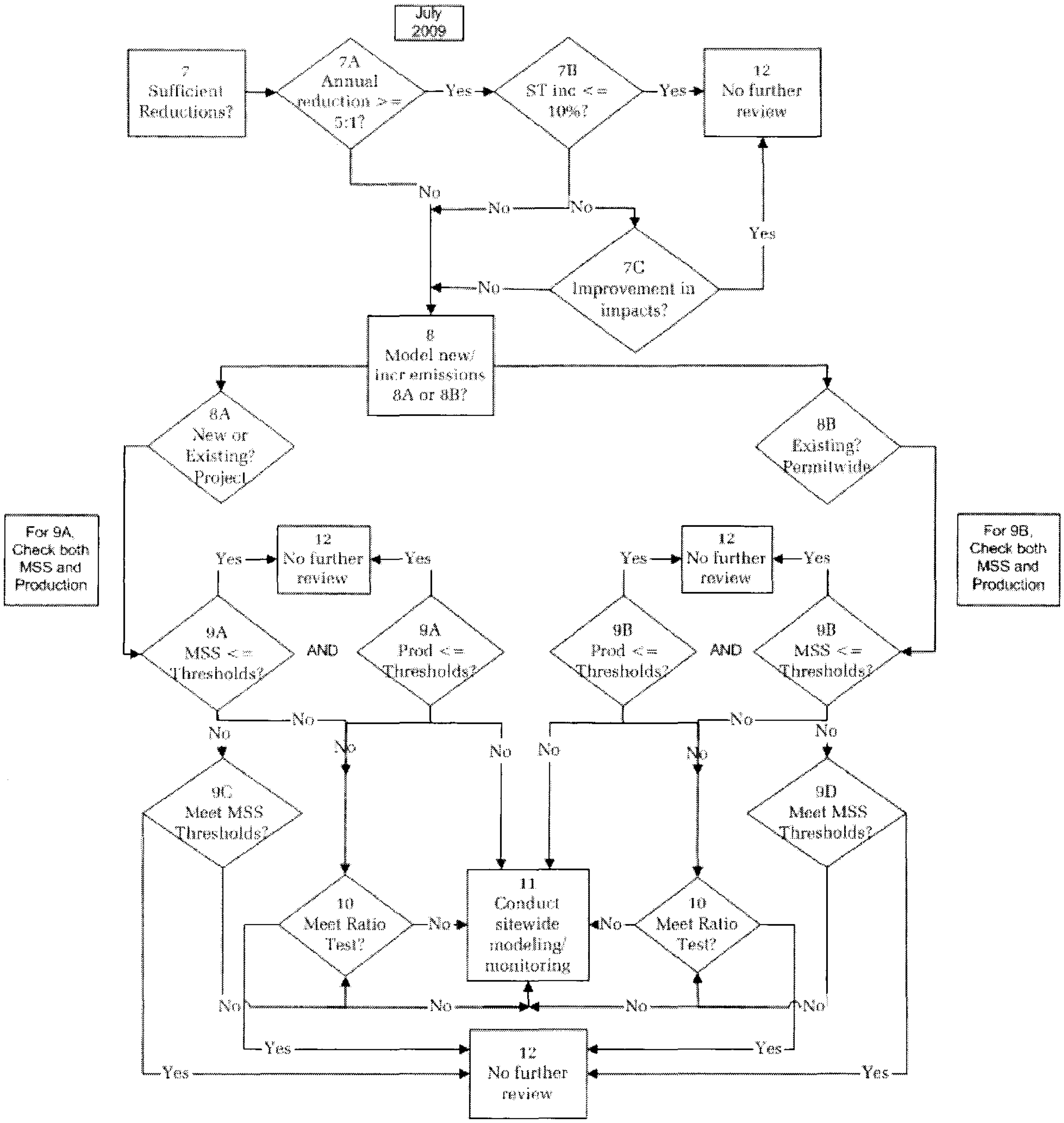
Note: The MERA flowchart applies on a constituent by constituent basis. The flowchart is a tool to evaluate health and welfare impacts. For any step, consultation with APD may be used in lieu of the flowchart on a case-by-case basis. Not all permitting actions will follow all flowchart steps. Best Available Control Technology (BACT) must be applied prior to using this flowchart.

Figure 1. How to Determine the Scope of Modeling and Effects Review Flowchart



This flowchart is a summary of the Modeling and Effects Review Applicability technical guidance and is not intended to be a substitute for this guidance.

Figure 1. How to Determine the Scope of Modeling and Effects Review Flowchart



This flowchart is a summary of the Modeling and Effects Review Applicability technical guidance and is not intended to be a substitute for this guidance.

Step 1: This step is used for constituents not identified in an Air Pollutant Watch List (APWL) area, and when there is no increase in short-term emissions but there may be limited increases in annual emissions per constituent.

Step 1A: Does the project decrease annual emissions with no increase in short-term emissions from any project emission point (EPN)? This means the project does not affect any short-term emission limits or results only in a reduction in emissions; for example, when the project consists only of adding controls.

If "Yes" → Step 12.

If "No" → Step 1B.

Step 1B: Are the total requested annual emission increases ≤ 10 percent of the current authorized annual emissions for the EPNs with the annual emission rate increases? *This substep only considers annual emission rate increases, and there can be no increases for short-term emission rates per EPN.* Annual emission decreases should not be considered at this point in the process; however, annual emission rate increases can vary among EPNs with annual increases as long as the total annual emissions do not increase > 10 percent.

For example:

Constituent A, Emission Point Number	Current Short-term Emissions (lb/hr)	Proposed Short-term Emissions (lb/hr)	Current Annual Emissions (tpy)	Proposed Annual (tpy) Emissions	Annual Change %
EPN 1	5.0	5.0	10.0	10.5	5%
EPN 2	3.0	3.0	5.0	6.0	20%
EPN 3	***1.0***	***1.0***	***3.0***	***2.0***	***-33%***
Project Total	8.0	8.0	15.0	16.5	10%

In this example, the proposed annual emissions decrease from EPN 3 does not apply and therefore is not included in the project total. The maximum annual emissions increase for the project is limited to a total of 1.5 tpy based on the current annual emissions from EPNs 1 and 2.

If "Yes" → APD Review. APD Review is a technical evaluation of each authorized air constituent to ensure that human health and welfare are protected. This review may include but not be limited to the following: previous modeling results, representative ambient air monitoring data, pollution controls, best management practice (BMP), location of previous and proposed sources, compliance history, comments from the public, governmental agencies, headquarters and regional staff, etc.

If "No" → Step 1C.

Step 1C: Is there no overall net increase in both short-term and annual emissions? The short-term and annual emission rates can vary by emission point as long as the overall emission rates do not increase for the project.

For example:

Emission Point Number	Current Short-term Emissions (lb/hr)	Proposed Short-term Emissions (lb/hr)	Current Annual Emissions (tpy)	Proposed Annual Emissions (tpy)
EPN 1	5.0	4.5	10.0	9.0
EPN 2	3.0	3.5	5.0	6.0
Project Total	**8.0**	**8.0**	**15.0**	**15.0**

In this example, the short-term and annual emission rates vary by emission point, but the overall emission rates remain the same.

If "Yes" → APD Review.

If "No" → Step 2.

Step 2: Is the proposed facility on the Toxicology Emissions Screening List?

The Toxicology Emissions Screening List (see Appendix B) identifies certain types of projects and emissions for which the TD has determined, based on many past case-by-case reviews, that no further effects review is necessary. Submit requests to add or remove a type of project or emissions from the Emissions Screening List to the TD along with supporting documentation.

Please note that if no further modeling is required for effects evaluation, modeling may be needed to demonstrate compliance with other rules, for example, Title 30 TAC § 116.112 or the National Ambient Air Quality Standards (NAAQS).

If "Yes" → Step 12.

If "No" → Step 3.

Step 3: This step applies to sites that have project increases of APWL constituents and applies only to the review of proposed increases of those APWL constituents. If the project is not within an APWL area proceed to Step 4.

Have there been sitewide decreases ≥ 30 percent within the last 5 years from the date the application of this project was received by APD? If so, the project can have an increase in emissions ≤ 1 percent of the reduction. The increases/decreases must be met for both short-term and annual time periods. This provision gives credit to applicants who have reduced emissions of APWL constituents but it cannot be used if the emission reductions were the result of enforcement actions.

For example:

Current authorized emissions for constituent A

Short-term Emissions (lb/hr)	Annual Emissions (tpy)
50.0	20.0

There must be a decrease in both short-term and annual authorized emissions of ≥ 30 percent within the last 5 years.

Highest Authorized Emissions within Previous 5 Years		Current Authorized Emissions		Reduction %	
Short-term	Annual	Short-term	Annual	Short-term	Annual
100.0 lb/hr	50.0 tpy	50.0 lb/hr	20.0 tpy	50%	60%

In this example, because the percent reduction (≥ 30%) is met, this step can be used only if the proposed authorized emissions for constituent A are no greater than 50.5 lb/hr and 20.3 tpy, based on reductions of 50 lb/hr and 30 tpy, respectively.

Short-term Reductions (lb/hr)	Annual Reductions (tpy)	≤ 1% Short-term Emissions Increase (lb/hr)	≤ 1% Annual Emissions Increase (tpy)
50	30	50.5	20.3

Once a reduction has been used, it cannot be used for subsequent projects. Special conditions may be added to the permit to ensure future increases of APWL constituents are minimized.

If "Yes" → Step 12. Review complete for APWL constituent. Continue through the flowchart for other constituents.

If "No" → Step 11.

Step 4: This step applies for projects with a de minimis increase in emissions. Determine the emission rate increase for each facility (emission point) involved in the project. Sum the individual lb/hr increases to obtain the project total. If the project includes more than one emission point, do not exclude any emission increases. Do not consider emission rate decreases; that is, do not use the net increase.

Unevaluated emissions should be considered as part of the project as either production or planned MSS. Any existing emissions that have not been reviewed per the MERA process such as emissions from Permit By Rules (PBRs), Standard Permits (SPs) or any other authorization are considered to be unevaluated.

Step 4A: Will planned MSS activities emissions occur at the same time as production emissions for this project?

If "Yes" → Step 4C.

If "No" → Step 4B.

Step 4B: Are planned MSS emissions ≤ 0.1 lb/hr and ESL ≥ 2 $\mu g/m^3$ for each constituent?

If "Yes" and no production increase → Step 12.

If "Yes" and project has production increase → Step 4C.

If "No" → Step 4C.

Step 4C: Are short-term emissions increases (total for a constituent from all EPNs) within one of the three following de minimis levels, and the annual ESL is ≥ 10 percent of the short-term ESL?

Short-term ESL ($\mu g/m^3$)	Short-term Emissions Increase (lb/hr)
≥ 2 < 500	≤ 0.04
≥ 500 < 3500	≤ 0.1
≥ 3500	≤ 0.4

If "Yes" → Step 12.

If "No" → APD Review, then proceed to Step 4D, Step 5, or Step 12.

Step 4D: Is the project increase ≤ 0.04 lb/hr and the constituent's ESL < 2 $\mu g/m3$?

If "Yes" → APD Review.

If "No" → Step 5.

Step 5: Is the total concentration due to the emission increases ≤0.1 ESL? Only increases in emissions are considered for this step.

The purpose of this step is to allow small emission increases without requiring full modeling and effects review. This step uses an equation that restricts an emission increase impact to ≤ 10 percent of an ESL. Only increases in emissions are considered for this step. Comparisons are made to the short-term ESL except for constituents with long-term ESLs that are < 10 percent of their corresponding short-term ESLs. For these constituents, compare concentrations obtained from this step to both the short- and long-term ESL.

The concentration is usually obtained from quick look tables which were developed by using conservative screening modeling techniques based on emissions from a source with no plume rise (see Appendix C). As an option, the permit reviewer or applicant may conduct modeling using an approved EPA model with actual building and stack parameters in lieu of using the quick look tables. If this option is selected, include enough receptors in the model to locate the maximum off-property concentration, which then should be used in this step.

Note that this step may not be appropriate for all facility types; for example, bulk terminals which have extensive constituent lists. If this step is skipped, go to the next applicable step in the flowchart.

If the maximum predicted concentration occurs at the property line, the permit reviewer may consider the surrounding land use to decide if a concentration at a distance other than the property line may be used for this step. The applicant must demonstrate to the permit reviewer that the area from the property line to the closest receptor or 500 feet—whichever is closer—will not be used for any public purpose and is not productive for agricultural or wildlife use.

Use the following equations to predict impacts from single or multiple emission points, respectively:

For a single emission point:

$$(X)\ (E) \leq 0.1(ESL) \text{ or, } E \leq 0.1\frac{ESL}{X}$$

For multiple emission points (weighted average):

$$E_{i\text{-}n} = 0.1\left[\frac{E_1}{E_{total}}\left(\frac{ESL}{X_1}\right)+\frac{E_2}{E_{total}}\left(\frac{ESL}{X_2}\right)+\frac{E_n}{E_{total}}\left(\frac{ESL}{X_n}\right)\right]$$

where:

E_i = emission rate increase in lb/hr for the constituent emitted from emission point i

n = total number of emission points

E_{Total} = sum of the emission rate increase in lb/hr for the constituent emitted from multiple emission points emitting simultaneously

ESL = the effects screening level (ESL) in μg/m3 for the constituent being evaluated (published in the most recent edition of the list of ESLs by the TD)

X_i = the appropriate X-value in μg/m3 per lb/hr for the emission point i at the applicable distance D, taken from either Table 1, 2, 3 or Table 4, as applicable (see Appendix C)

D = the downwind distance to the nearest property line from the emission point that relates to the facility

$E_{i\text{-}n}$ = maximum emission rate increase in lb/hr allowed for the constituent

Example, Constituent A:

EPN	ESL (μg/m3)	Distance (feet)	Height (feet)	X Value (μg/m3 / lb/hr)	E_i/E_{total}
1	100	1000	10	200	0.3
2	100	4000	20	50	0.7

$E_{i\text{-}n} = 0.1[((E_1/E_{total})(ESL/X_1)) + ((E_2/E_{total})(ESL/ X_2))]$

$E_{i\text{-}n} = 0.1[((0.3)(100\ \mu g/m3 / 200\ \mu g/m3 / lb/hr)) + ((0.7)(100\ \mu g/m3 / 50\ \mu g/m3 / lb/hr))]$

$E_{i-n} = 0.1[0.15 \text{ lb/hr } (EPN_1) + 1.4 \text{ lb/hr } (EPN_2)]$

$E_{i-n} = 0.1[1.55 \text{ lb/hr } (EPN_1 + EPN_2)] = 0.155 \text{ lb/hr}$

The maximum allowable emission rate increase for constituent A is 0.155 lb/hr.

If "Yes" → Step 12. This means the emission rate increase multiplied by the value in Tables 1 through 4 or modeling results in an impact that is ≤ 10 percent of the ESL (both the short-term and long-term ESL for constituents with long-term ESLs that are < 10 percent of their corresponding short-term ESLs) and no further modeling or effects review is required.

If "No" → Step 6.

Step 6: Acceptable constituent substitution?

This step allows for limited constituent substitutions. A substitution is defined as a proposal to eliminate one constituent—for example, xylene—and then emit a different constituent—for example, toluene—from an emission point that has previously been through permit and effects review.

Note this step applies only:

- to constituents previously approved by the TD or that were reviewed using the flowchart, and
- to replace constituents at the currently authorized individual EPN for each constituent.

To be acceptable, the applicant must show that the substitution—which must be made at the same EPN currently authorized—will not result in adverse impacts. This demonstration is accomplished by satisfying either Test A (where there is a direct substitution of one constituent for another) or Test B (where the replacement has different constituents), as applicable. Note that the use of Test B might not be appropriate for some facilities, such as specialty chemical facilities.

Both short and long-term impacts must be evaluated for constituents with long-term ESLs that are < 10 percent of their corresponding short-term ESLs, or for any other constituent requested by APD or TD staff. The request could be made based on such factors as the impacts from previous evaluations, comments by regional staff, ambient monitoring concentrations, or compliance history. Currently authorized emission limits could change based on the value of the replacement ESL.

- Replacement constituent has lower ESL. If the replacement constituent has a lower ESL, the emission rate must be decreased to meet Test A. If not, additional TD review, which may include modeling, would be required to keep the same emission limits as currently authorized.
- Replacement constituent has higher ESL. If an applicant wants to replace the currently authorized constituent with one that has a higher ESL, with no increase in throughput, the applicant would be bound by the currently authorized rate. On the other hand, if an applicant wants to replace one constituent for another with a higher ESL, and requests an increase in throughput, the applicant could exceed the previously authorized emission rate up to the amount derived by using Test A. The proposed increase in throughput would require an amendment to the permit.

Test A: $\frac{ER_2}{ESL_2} \leq \frac{ER_1}{ESL_1}$

where:

ER_2 = emission rate of the replacement constituent;

ESL_2 = effects screening level of the replacement constituent;

ER_1 = emission rate of the currently authorized constituent; and

ESL_1 = effects screening level of the currently authorized constituent.

Test B: $\frac{ER_{2a}}{ESL_{2a}} + \frac{ER_{2b}}{ESL_{2b}} + \ldots + \frac{ER_{2n}}{ESL_{2n}} \leq \frac{ER_{1a}}{ESL_{1a}} + \frac{ER_{1b}}{ESL_{1b}} + \ldots + \frac{ER_{1n}}{ESL_{1n}}$

where:

$ER_{2a \ldots n}$ = emission rate of the replacement constituent, from a through n constituents;

$ESL_{2a \ldots n}$ = ESL of the replacement constituent, from a through n constituents;

$ER_{1a \ldots n}$ = emission rate of the currently authorized constituent, from a through n constituents; and

$ESL_{1a \ldots n}$ = ESL of the currently authorized constituent, from a through n constituents.

If "Yes" → Step 12. One of the tests is satisfied; no further modeling or effects review is required.

If "No" → Step 7. Neither test is satisfied.

Step 7: Does this project involve annual emission reductions with minimal short-term emission increases of the same constituent, and are reductions sufficient?

Step 7A: Are the total annual project reductions to increases ≥ 5:1?

For example:

Emission Point Number (EPN)	Current Short-term Emissions (lb/hr)	Proposed Short-term Emissions (lb/hr)	Current Annual Emissions (tpy)	Proposed Annual Emissions (tpy)
EPN 1	100	100	50	50
EPN 2	100	0	100	0
EPN 3	500	500	200	200
EPN 4	0	70	0	20

In this example, EPN 2 is being removed and EPN 4 is being added. The ratio of total annual reductions to project increases meets the 5:1 ratio (100 tpy reduction/ 20 tpy increase).

If "Yes" → Step 7B.

If "No" → Step 8.

Step 7B: Are the total short-term increases ≤ 10 percent of the current permitted short-term emissions?

In the example above, the ratio of total annual reductions to project increases meets the 5:1 ratio, and the maximum hourly emission rate for EPN 4 is 70 lb/hr (10 % of 700 lb/hr).

If "Yes" → Step 12. The total short-term increase is minimal and no further modeling or effects review is required.

If "No" → Step 7C or Step 8.

Step 7C: Is there an improvement in impact as determined by APD Review? This means that on a qualitative or quantitative basis, it is expected that short- and long-term impacts will be improved by the reduction, the reduction is considered sufficient, and no further modeling or effects review is required.

If "Yes" → Step 12.

If "No" → Step 8.

Step 8: Model all new emissions, including those previously unevaluated, and increased emissions; or proposed permit allowable emissions.

New constituent → **Step 8A**. Applies to the project only. Use the modeling results in Step 9A.

Existing constituent → **Step 8A or 8B**. Applies to the project or permitwide.

If the constituent is new, the applicant must use Step 8A. Step 8A applies to a project and Step 8B applies to the entire permit. The applicant can choose 8A or 8B, for existing constituents that have undergone effects review and have been specified in a permit condition or appear on the Maximum Allowable Emission Rate Table (MAERT) for this permit. Remember, BACT must be applied prior to conducting modeling.

Unless otherwise specified, all modeling shall be performed to obtain applicable maximum, off-property short-term concentrations (usually one hour for the majority of constituents), and be based on the emission rates for the sources related to the permit application. This guidance does not apply to constituents with long-term ESLs that are < 10 percent of their corresponding short-term ESLs, or for any other constituent requested by APD or TD staff. For these constituents both short-term and annual concentrations are required.

At this step, applicants that claim a single property-line designation (SPLD) with another company model only emissions from the applicant's site (see 30 TAC § 101.2). For subsequent steps that involve the use of sitewide emissions or require an evaluation of sitewide impacts, the applicant may need to include all emissions from all sites that comprise the single property. This determination will be made on a case-by-case basis by APD and TD staff.

Step 8A: This step must be used if the constituent is new or may be used for an existing constituent that has undergone effects review and has been specified in a permit condition or appears on the MAERT for this permit. Model the new and increased emissions for planned MSS and Production scenarios separately. Perform modeling in accordance with guidance from the ADMT. Use the modeling results in Step 9A.

Step 8B: This step may be used for an existing constituent that has undergone effects review and has been specified in a permit condition or appears on the MAERT for this permit. The applicant must model the permitwide proposed emissions (existing emissions plus project emissions) for planned MSS and Production scenarios separately. Perform modeling in accordance with guidance from the ADMT. Use the modeling results in Step 9B.

Example:

Short-term emissions for Constituent A are proposed to be increased for EPN 2 and EPN 3 in Permit xyz. There are no proposed changes to annual emissions for this constituent.

Emission Point Number (EPN)	Current Short-term Emissions (lb/hr)	Proposed Short-term Emissions (lb/hr)
EPN 1	5.0	5.0
EPN 2	7.0	**7.5**
EPN 3	10.0	**12.0**
EPN 4	5.0	5.0
EPN 5	8.0	8.0

In this example, if modeling is performed only for EPN 2 and EPN 3 (project increases only), use thresholds in Step 9A. If modeling is performed for EPN 1 through EPN 5 (permitwide emissions), use thresholds in Step 9B.

Step 9: Results from Step 8A are used in Step 9A and results from Step 8B are used in Step 9B to determine if further evaluation is needed.

To make this determination, the criteria in Steps 9A **or** 9B must be met. In addition, both short-term and long-term thresholds in the following tables must be met for constituents with long-term ESLs that are < 10 percent of their corresponding short-term ESLs, or for any other constituent requested by APD or TD staff.

Step 9A: This step must be used if the constituent is new or may be used for an existing constituent that has undergone effects review and has been specified in a permit condition or appears on the MAERT for this permit. The applicant must have modeled the new and increased emissions for planned MSS and Production scenarios separately. If the project includes both planned MSS and Production, the modeling results should be evaluated individually against the following table.

Will the following thresholds be met at the location of the GLC_{max}?

Planned MSS Only	Production Only
≤25% ESL **AND** ≤50% ESL from all new and increased planned MSS emissions since the most recent sitewide modeling	≤10% ESL per project **AND** ≤25% ESL from all new and increased production emissions since the most recent sitewide modeling

If "Yes" → Step 12.

If "No" for planned MSS → Step 9C, Step 10, or Step 11.

If "No" for Production → Step 10 or Step 11.

Step 9B: The step may be used for an existing constituent that has undergone effects review and has been specified in a permit condition or appears on the MAERT for this permit. The applicant must have modeled the permitwide proposed emissions (existing emissions plus project emissions) for planned MSS and Production scenarios separately. If the project includes both planned MSS and Production, the modeling results should be evaluated individually against the following table.

Will the following thresholds be met at the location of the GLC_{max}?

Planned MSS Only	Production Only
≤50% ESL **AND** ≤ ESL from all new and increased planned MSS emissions since the most recent sitewide modeling	≤20% ESL for the permit **AND** ≤ 50% ESL from all new and increased production emissions since the most recent sitewide modeling

If "Yes" → Step 12.

If "No" for planned MSS → Step 9D, Step 10, or Step 11.

If "No" for Production → Step 10 or Step 11.

Note: The following constituents cannot be used in Step 9C or Step 9D.

- **Acroelein**
- **Acrylonitrile**
- **Benzene**
- **Bromine**
- **1, 3-butadiene**
- **Carbon disulfide**
- **Chlorine**
- **Chloroform**
- **Chloroprene**
- **Epichlorohydrin**
- **Fluorine**
- **Formaldehyde**
- **HCI**
- **HF**
- **Hydrazine**
- **Mercaptans**
- **Methyl bromide**
- **MDI**
- **Phosgene**
- **Phosphine**
- **Styrene (odor)**
- **TDI**

The applicant should continue to Step 10 or Step 11.

Step 9C: Will the planned MSS emissions from the project meet the following thresholds?

Planned MSS Only
≤ 24 hours > 1 X ESL **AND**
≤ 12 hours ≥ 2 X ESL **AND**
≤ 6 hours ≥ 4 X ESL **AND**
1 hour ≥ 10 X ESL

If "Yes" → Step 12.

If "No" → Step 10 or Step 11.

Step 9D: Will the planned MSS emissions from the permit meet the following thresholds?

Planned MSS Only
≤ 48 hours > 1 X ESL **AND**
≤ 24 hours ≥ 2 X ESL **AND**
≤ 12 hours ≥ 4 X ESL **AND**
≤ 2 hours ≥ 10 X ESL

If "Yes" → Step 12.

If "No" → Step 10 or Step 11.

Step 10: Will increased emissions pass the ratio test for combined planned MSS and Production?

The purpose of this step is to determine if the total impacts could potentially be acceptable by assuming that the existing emissions disperse in a similar manner as the new emissions.

The applicant can demonstrate that sitewide modeling would not be required for each constituent based on the following ratio test:

$$\frac{GLC_{max}}{ESL} \leq \frac{E_n}{E_t}$$ where:

- GLC_{max} is the predicted maximum ground-level concentration of the new and increased emissions from planned MSS and Production combined (from Step 8A or Step 8B; see note below);
- ESL is the effects screening level of the particular constituent in question;
- E_n represents the new and increased emissions in lb/hr of the constituent in question; and

- E_t represents the total sitewide emissions in lb/hr of the constituent in question at the property; for example, existing emissions, plus new and increased emissions.

Use the lb/hr rate based on annual emissions for comparison with the long-term ESL for constituents with long-term ESLs that are < 10 percent of their corresponding short-term ESLs. Applicants must provide sitewide emissions including all previously unevaluated emissions of the constituent in question, and should certify that the represented emissions are complete and accurate to the best of their knowledge.

Note: There may be cases where the entire site consists of only a few sources. The results from screening modeling could then be used in this step. For example, if there is only one source (the one undergoing effects review), and the ratio of the GLC_{max} to the ESL is one or less, the demonstration is complete. Additionally, if there are only two sources (the one undergoing effects review and a previously permitted source), and the GLC_{max} for both sources combined is equal to or less than the ESL, the demonstration is complete.

If "Yes" →Step 12. This means that the ratio GLC_{max} /ESL is less than the ratio E_n/E_t.

If "No" →Step 11 and either provide sitewide modeling or representative ambient monitoring data. This means that the ratio GLC_{max} /ESL is greater than the ratio E_n/E_t.

Step 11: Conduct sitewide modeling.

Reaching this step means that either the permit reviewer or the TD requires sitewide modeling. The applicant must either:

- conduct sitewide modeling;
- submit sitewide modeling from a recently approved project; or
- submit monitoring data and demonstrate that monitoring data are representative of near worst-case impacts and should be used instead of sitewide modeling.

Modeling must be done in accordance with the ADMT's guidance. Applicants that claim a SPLD should model emissions from all sources on the combined areas covered in the SPLD (see 30 TAC § 101.2). The permit reviewer should submit modeling results (including previous modeling results, if applicable) in a Request for Comments (RFC) to the TD.
If monitoring data is to be used, the applicant must contact the permit reviewer to arrange a meeting with TD, ADMT, and Monitoring Operations staff to discuss monitoring data already available or to receive guidance for (and approval of) a strategy to collect monitoring data. Technical feasibility of monitoring for the constituent of concern will be a key criterion for whether ambient monitoring data will be an acceptable substitute for sitewide modeling. Several months of data may be sufficient for evaluating the impact of short-term emissions of an acute toxicant, but up to a year of data may be necessary for evaluating long-term exposure levels of a chronic toxicant.

Generally, at a minimum, the following issues should be addressed in developing a monitoring strategy:

- Siting of monitors;
- Monitoring method;
- Amount and type of monitoring. This would have to be decided on a case-by-case basis and would depend on such factors as:

- the air constituent,
- types and locations of sources,
- source parameters and operating hours,
- meteorology,
- location of nonindustrial receptors, and
- location of other sources of the constituent

- Quality assurance procedures.

Step 12: Documentation

The flowchart process is complete. For every project, the permit reviewer must complete and profile a MERA flowchart summary form or discuss the impacts review in a technical review. This requirement applies when any step leads to this step. For example, if a project "falls off the flowchart" at Step 1, the user is directed to Step 12.

Appendix A

Glossary of Terms

air contaminant—Particulate matter, radioactive materials, dust fumes, gas, mist, smoke, vapor, or odor, including any combination of those items, produced by processes other than natural (Texas Health and Safety Code (THSC) § 382.003). May also be referred to as constituent, chemical, pollutant, or toxicant.

ADMT—Air Dispersion Modeling Team

air pollution—The presence in the atmosphere of one or more air contaminants in such concentration and of such duration that are or tend to be injurious to or to adversely affect human health or welfare, animal life, vegetation, or property; or interfere with the normal use and enjoyment of animal life, vegetation, or property (THSC § 382.003).

ambient air—That portion of the atmosphere, external to buildings, to which the general public has access (30 Texas Administrative Code (TAC) § 101.1). For purposes of the MERA, ambient air starts at the property line.

APD—Air Permits Division

APD Review—A technical evaluation of proposed increases in authorized emission rates of each non-criteria air constituent to ensure that human health and welfare are protected. This review may include but not be limited to the following: previous modeling results, representative ambient air monitoring data, pollution controls, best management practice (BMP), location of previous and proposed sources, compliance history, comments from the public, governmental agencies, headquarters and regional staff, etc.

authorization—A mechanism to allow the release of emissions of constituents into ambient air. Typical authorizations are PBRs, SPs, and case-by-case NSR Permits.

BACT—Best available control technology with consideration given to the technical practicability and the economic reasonableness of reducing or eliminating emissions from the facility (30 TAC § 116.10).

BMP—Best management practices are operating techniques and good housekeeping principles for reducing and preventing pollution before it occurs.

CAS Number—These are assigned by the Chemical Abstracts Service (CAS) of the American Chemical Society. CAS registry numbers are unique numerical identifiers for chemical constituents, polymers, biological sequences, mixtures and alloys.

constituent—A general term that refers to an individual contaminant, chemical, chemical constituent, pollutant, or particulate matter.

emission point—Point of constituent emissions release into the air.

EPN—Emission point number. A unique identifier for an emission point at a site.

ESL—Effects screening level as derived by the Toxicology Division. Guideline concentrations used to evaluate ambient air concentrations of constituents. Based on a constituent's potential to cause adverse health effects, odor nuisances, vegetation effects, or materials damage. Health-based screening levels are set at levels lower than levels reported to produce adverse health effects, and are set to protect the general public, including sensitive subgroups such as children, the elderly, or people with existing respiratory conditions. If an air concentration of a constituent is below the screening level, adverse effects are not expected. If an air concentration of a constituent is above the screening level, it is not indicative that an adverse effect will occur, but rather that further evaluation is warranted.

exceedance—In excess of a pre-established comparison level.

facility—A discrete or identifiable structure, device, item, equipment, or enclosure that constitutes or contains a stationary source, including appurtenances other than emission control equipment. A mine, quarry, well test, or road is not considered to be a facility (THSC § 382.003 and 30 TAC § 116.10).

GLC—Ground-level concentration in micrograms per cubic meter (μg/m3) as predicted by modeling. May also be observed by long-term monitoring.

GLC_{max} —Maximum off-property ground-level concentration at any receptor.

GLC_{ni} —Ground-level concentration at the maximally affected, off-property nonindustrial receptor, ni.

industrial receptor—A receptor relating to the manufacturing of products or handling of raw materials or finished products without any associated retail product sales on property.

MAERT—Maximum Allowable Emission Rate Table.

mmHg—Millimeters of mercury (a measure of gas pressure).

MSS—Maintenance, Startup, and Shutdown. For the purposes of authorizations, only emissions from planned maintenance, startup, and shutdown activities may be included.

NAAQS—National Ambient Air Quality Standards (40 Code of Federal Regulations (CFR) § 50.2)

NOAEL—No Observed Adverse Effects Level. The highest exposure level at which there are no biologically significant increases in the frequency or severity of adverse effect between the exposed population and its appropriate control.

nonindustrial receptor—A receptor type such as residential, recreational, commercial, business, agricultural, or a school, hospital, day-care center, or church. Other types include rights-of-way, waterways, or the like. In addition, receptors in unzoned or undeveloped areas are treated as nonindustrial. Nonindustrial receptors may also be referred to as sensitive.

NSR—New Source Review

PBR—Permit by Rule (formerly Standard Exemption)

permitwide—All allowable emissions associated with an individual permit.

project—An operational and/or physical change that may affect air emission rates at a site including unevaluated emissions from activities and/or facilities.

property—All land under common control or ownership coupled with all improvements on such land, and all fixed or movable objects on such land, or any vessel on the waters of this state (30 TAC § 101.1).

psia—Pounds per square inch absolute (a measure of gas pressure).

receptor—A location where the public could be exposed to an air constituent in the ambient air. For the effects evaluation process, receptors are classified as industrial or nonindustrial.

ReV—Reference Level. An estimation of an exposure for a given duration to the human population (including susceptible subgroups) that is likely to be without an appreciable risk of adverse effects over a lifetime.

single-property line designation (SPLD)—As defined by 30 TAC § 101.2 and approved by the Executive Director of the TCEQ or his designee.

site—The total of all stationary sources located on one or more contiguous or adjacent properties, which are under common control of the same person (or persons under common control) (30 TAC § 122.10).

sitewide modeling—Modeling (refined or screening) of emissions from all emission points and areas on a contiguous property or at a site. Synonymous with plantwide modeling. Includes all sources authorized under 30 TAC Chapters 106 and 116. Note that de minimis emissions under 30 TAC § 116.119 are not included for sitewide modeling demonstrations. May apply to emissions from all emission points on land identified in single property-line designations between multiple owners.

source—A point of origin of air contaminants, whether privately or publicly owned or operated (THSC § 382.003 and 30 TAC § 116.10). Upon request of a source owner, the executive director shall determine whether multiple processes emitting air contaminants from a single point of emission will be treated as a single source or as multiple sources (30 TAC § 101.1).

SP—Standard Permit

TCEQ—Texas Commission on Environmental Quality

TD—Toxicology Division

unevaluated emissions—Any existing emissions that have not been reviewed per the MERA process such as emissions from PBRs, SPs or any other authorization.

Appendix B

Toxicology Emissions Screening List

Projects with the following types of emissions do not require effects review:

- Emissions of constituents that must meet either NAAQS or state rules and regulations. *This paragraph does not apply to speciated particulate emissions. For example, the portion of total particulate matter that is silica would be evaluated.*
- Odor and particulate emissions from agricultural, food processing, or animal feeding or handling facilities.
- Emissions of particulates from abrasive blast cleaning provided they do not contain:
  - asbestos;
  - metals with an ESL of less than 50 μg/m3; or
  - crystalline silica greater than or equal to 1 percent (weight) of the total particulate weight.
- Emissions of particulate matter, except for metals and silica, from controlled surface coating operations. Controlled surface coating operations mean particulate matter shall be captured and abated with a water wash or dry filter system (at least 95% removal efficiency) and exhausted through elevated stack with no obstruction to vertical flow.
- Emissions of particulate matter from rock crushers, concrete batch plants and soil stabilization plants.
- Emissions from boilers, engines, or other combustion units fueled only by pipeline-quality natural gas.
- Emissions from flares, heaters, thermal oxidizers, and other combustion devices burning gases only from onshore crude oil and natural gas processing plants. *However, glycol dehydrators or amine units do require effects review.*
- Emissions of freons that have ESLs greater than15,000 μg/m3.
- Emissions of the following 10 gases, which have been classified as simple asphyxiants:
  - argon
  - carbon dioxide
  - ethane
  - helium
  - hydrogen
  - methane
  - neon
  - nitrogen
  - propane
  - propylene

Appendix C

Step 5 Screening Tables

The following notes apply to the selection and use of Tables 1 through 4:

- How do I determine if an emission point is downwashed? Is there a building or structure such as a storage tank within 5L (L is lesser of the building height or projected width) and is the building or structure ≥ 40% of stack height? If yes, use Table 1 or 3. If no, use Table 2 or 4.
- How do I determine which distance to use? Distance is determined to the nearest property line from the emission point that relates to the facility. If there is more than one emission point, determine the distance to the nearest property line for each emission point.
- Can I interpolate between heights and distances in the tables? Yes. Linear interpolation is allowed between height and distance points.
- How do I determine annual values? To obtain an annual value, multiply the hourly value in Table 1 through Table 4 by 0.08. The lb/hr rate based on annual emissions can be used in lieu of the maximum hourly emissions. Annual values must be determined for constituents with long-term ESLs that are <10 percent of their corresponding short-term ESLs.
- Can I adjust the results in the tables to account for low-level fugitive emissions? No. The tables are designed to be conservative and it is not appropriate at this stage to refine predicted concentrations.
- What are daytime hours? For the purpose of these tables, day time hours are 6 a.m. to 6 p.m.

Table 1. Downwash for All Hours (μg/m^3 per 1 lb/hr)

	Stack Height (feet)																				
Distance (feet)	3	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
50	2965	2363	2260	1005	596	362	251	185	141	112	90	75	63	54	46	40	35	31	28	25	23
100	2024	1719	1003	708	596	362	251	185	141	112	90	75	63	54	46	40	35	31	28	25	23
150	1338	1195	822	708	596	342	251	185	141	112	90	75	63	54	46	40	35	31	28	25	23
200	950	873	708	708	559	342	218	185	141	112	90	75	63	54	46	40	35	31	28	25	23
250	800	743	617	617	512	321	213	149	112	112	90	75	63	54	46	40	35	31	28	25	23
300	720	670	550	550	454	300	205	145	107	80	75	75	63	54	46	40	35	31	28	25	23
400	593	557	460	460	354	246	184	133	100	77	61	48	46	46	46	40	35	31	28	25	23
500	502	473	397	397	292	203	151	118	92	72	58	47	38	32	31	31	31	31	28	25	23
600	430	408	350	350	248	173	129	101	81	67	54	44	37	31	26	22	19	17	14	13	11
700	373	357	313	313	216	151	112	88	71	59	50	41	35	29	25	22	19	16	14	13	11
800	330	315	282	282	192	134	100	78	63	52	44	38	33	28	24	21	18	16	14	12	11
900	293	280	255	255	173	121	90	70	57	47	40	34	30	26	23	20	17	15	14	12	11
1000	262	252	233	233	157	110	82	64	52	43	36	31	27	24	21	19	17	15	13	12	11
1500	172	167	157	157	107	77	58	45	36	30	25	22	19	17	15	12	12	11	9.9	9.3	8.7
2000	122	120	117	117	80	58	44	35	28	23	20	17	15	13	11	10	9.2	8.4	7.8	7.3	6.8
2500	93	92	90	90	64	47	36	28	23	19	16	14	12	11	9.4	8.4	7.6	6.9	6.4	6	5.6
3000	75	73	72	72	52	39	30	24	20	16	14	12	10	9	8	7.1	6.4	5.8	5.5	5.1	4.8
4000	50	50	50	50	37	29	23	18	15	13	11	9.1	7.9	7	6.2	5.5	5	4.5	4.2	4	3.7
5000	37	37	37	37	29	23	18	15	12	10	8.7	7.5	6.5	5.7	5.1	4.5	4.1	3.7	3.4	3.2	3

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Table 2. No Downwash for All Hours (μg/m³ per 1 lb/hr)

	Stack Height (feet)																				
Distance (feet)	3	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
50	23773	2787	725	323	175	107	72	51	38	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
100	19785	2233	697	323	175	107	72	51	38	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
150	12608	1942	550	310	175	107	72	51	38	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
200	8458	1942	482	275	166	107	72	51	38	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
250	6040	1837	482	243	155	100	72	51	38	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
300	4531	1837	453	243	132	96	67	48	38	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
400	2838	1613	448	203	128	76	60	46	35	30	24	19	16	13	11	9.8	8.8	7.5	6.6	5.9	5.2
500	1958	1322	422	195	114	76	49	40	33	27	21	17	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
600	1440	1075	417	188	105	70	49	36	28	24	20	17	14	12	11	9.8	8.5	7.5	6.6	5.9	5.2
700	1110	885	417	188	105	64	48	36	27	21	18	16	14	12	9.9	8.7	7.9	7.5	6.6	5.9	5.2
800	888	738	402	180	100	64	44	36	27	21	17	14	13	11	9.8	8.5	7.4	6.6	6.1	5.6	5.2
900	728	625	377	170	95	64	43	33	27	21	17	14	12	10	9.3	8.3	7.3	6.5	5.7	5.2	4.8
1000	610	535	348	170	95	62	43	30	25	21	17	14	11	9.7	8.6	7.8	7	6.3	5.7	5	4.6
1500	308	287	228	157	83	52	36	29	22	17	17	14	11	9.6	8.3	7.1	6.1	5.5	5	4.6	4.2
2000	188	182	157	123	79	45	32	23	20	16	13	11	8.9	8.2	7.4	6.8	6.1	5.5	4.9	4.4	3.9
2500	130	127	113	97	68	44	27	21	16	14	12	10	8.8	7.3	6.2	5.7	5.3	4.9	4.6	4.2	3.9
3000	98	95	88	77	57	40	27	19	15	12	11	10	8.3	7.2	6.2	5.3	4.4	4.2	3.9	3.7	3.5
4000	62	62	58	53	42	31	23	17	12	10	8.4	7.4	6.7	6.1	5.5	4.9	4.4	3.8	3.4	2.9	2.6
5000	45	43	42	38	32	25	19	15	11	8.3	7.2	6.2	5.4	5	4.6	4.2	3.8	3.5	3.2	2.8	2.6

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Table 3. Downwash for Daytime ($\mu g/m^3$ per 1 lb/hr)

Distance (feet)	3	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
50	2965	2363	2260	1005	565	362	251	185	141	112	90	75	63	54	46	40	35	31	28	25	23
100	2024	1719	1003	565	565	362	251	185	141	112	90	75	63	54	46	40	35	31	28	25	23
150	1338	1195	822	353	320	251	251	185	141	112	90	75	63	54	46	40	35	31	28	25	23
200	950	873	665	352	300	201	185	185	141	112	90	75	63	54	46	40	35	31	28	25	23
250	700	655	532	335	275	189	135	112	112	112	90	75	63	54	46	40	35	31	28	25	23
300	563	532	437	312	247	176	129	97	76	75	75	75	63	54	46	40	35	31	28	25	23
400	392	373	322	263	195	147	116	90	71	57	48	46	46	46	46	40	35	31	28	25	23
500	290	280	247	220	160	122	97	80	65	54	45	38	32	31	31	31	31	31	28	25	23
600	225	218	197	183	134	104	84	69	58	50	42	36	31	27	23	20	18	16	14	13	11
700	185	180	165	155	115	91	73	61	52	44	39	33	29	25	22	20	17	16	14	13	11
800	152	148	138	133	100	80	65	54	46	40	35	31	28	24	21	19	17	15	14	12	11
900	128	125	117	117	88	71	58	49	42	36	32	28	25	23	20	18	16	15	13	12	11
1000	110	108	102	102	77	63	53	44	38	33	29	26	23	21	19	17	16	14	13	12	11
1500	58	58	57	57	47	40	34	30	26	23	20	18	16	15	14	12	11	11	9.9	9.3	8.7
2000	37	37	37	37	31	27	24	21	19	17	15	14	13	12	11	9.7	9	8.3	7.8	7.3	6.8
2500	27	27	27	27	23	20	19	17	15	14	12	11	10	9.4	8.6	8	7.4	6.9	6.4	6	5.6
3000	20	20	20	20	18	16	15	14	12	11	10	9.3	8.6	7.9	7.3	6.7	6.3	5.8	5.5	5.1	4.8
4000	13	13	13	13	12	11	10	9.4	8.7	8	7.4	6.8	6.3	5.9	5.5	5.1	4.8	4.5	4.2	4	3.7
5000	9.3	9.3	9.3	9.3	8.6	8	7.5	7	6.5	6.1	5.7	5.3	4.9	4.6	4.3	4.1	3.8	3.6	3.4	3.2	3

Table 4. No Downwash for Daytime ($\mu g/m^3$ per 1 lb/hr)

	Stack Height (feet)																				
Distance (feet)	3	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
50	18738	2787	725	323	175	107	72	51	38	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
100	7657	1902	697	323	175	107	72	51	38	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
150	3983	1542	550	310	175	107	72	51	38	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
200	2445	1542	478	275	166	107	72	51	38	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
250	1662	1215	453	217	155	100	72	51	38	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
300	1207	962	453	212	132	96	67	48	38	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
400	727	633	402	195	116	75	60	46	35	30	24	19	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
500	488	445	327	195	105	73	49	40	33	27	21	17	16	13	11	9.8	8.5	7.5	6.6	5.9	5.2
600	353	330	263	182	105	68	49	36	28	24	20	17	14	12	11	9.8	8.5	7.5	6.6	5.9	5.2
700	268	255	215	162	105	64	48	36	27	21	18	16	14	12	9.9	8.7	7.9	7.5	6.6	5.9	5.2
800	212	203	177	142	100	64	44	36	27	21	17	14	13	11	9.8	8.5	7.4	6.6	6.1	5.6	5.2
900	172	167	148	123	92	64	43	33	27	21	17	14	12	10	9.3	8.3	7.3	6.5	5.7	5.2	4.8
1000	142	138	127	108	84	62	43	30	25	21	17	14	11	9.7	8.6	7.8	7.0	6.3	5.7	5.0	4.6
1500	70	70	67	62	53	45	36	29	22	17	17	14	11	9.6	8.3	7.1	6.1	5.5	5.0	4.6	4.2
2000	43	43	42	40	36	31	27	23	20	16	13	11	8.9	8.2	7.4	6.8	6.1	5.5	4.9	4.4	3.9
2500	30	28	28	28	25	23	21	19	16	14	12	10	8.8	7.3	6.2	5.7	5.3	4.9	4.6	4.2	3.9
3000	22	22	22	20	19	18	16	15	13	12	11	10	8.3	7.2	6.2	5.3	4.4	4.2	3.9	3.7	3.5
4000	14	14	13	13	12	12	11	10	9.4	8.7	8.0	7.4	6.7	6.1	5.5	4.9	4.4	3.8	3.4	2.9	2.6
5000	9.5	9.5	9.3	9.3	8.9	8.4	7.9	7.5	7.1	6.6	6.2	5.8	5.4	5.0	4.6	4.2	3.8	3.5	3.2	2.8	2.6

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Appendix D

Toxicology Effects Evaluation Procedure

I. Introduction

The purpose of this document is to describe how the effects evaluation portion of the technical review of an air permit application is conducted. This process is authorized under Section 382.0518 (b)(2) of the Texas Health and Safety Code, which states that the Texas Commission on Environmental Quality (TCEQ) may not grant a permit to a facility unless it is demonstrated that emissions will not have an adverse impact on public health and welfare. The objective of an effects evaluation is twofold:

A. To establish off-property ground-level air concentrations (GLCs) of constituents resulting from the proposed emissions
B. To evaluate these GLCs for the potential to cause adverse health or welfare effects

II. Data Used

The data used in an effects evaluation include the results of air dispersion modeling of the project emissions, existing exposure levels, toxicity factors, including health-based short-term and long-term effects screening levels (ESLs), odor- and vegetation-based ESLs, Reference Values (ReVs), and air pollutant watch list (APWL) areas.

A. Air Dispersion Modeling Data: Because new and modified sources are not in operation at the time of the permit review process, actual air samples cannot be collected to evaluate the likelihood that the new emissions may cause adverse public health and welfare effects. As a result, computerized air dispersion modeling is used to predict the GLCs from the potential emissions. Modeling can predict the maximum off-property ground-level concentration (GLCmax) of a constituent that could occur during an one-hour period due to short-term emissions (lbs/hr) or the annual average GLCmax due to annual emissions (ton/yr). Typically, worst-case scenario emissions are modeled in order to predict maximum potential exposure levels. The GLCmax is evaluated first, and, if needed, the GLC at the maximally affected non-industrial receptor (GLCni) is evaluated.

B. Existing Exposure Level Data: In many cases, the potential of proposed emissions to cause adverse health or welfare effects should be assessed in the context of existing levels of the same constituents. Sitewide refined modeling may be requested from facilities for this purpose. The Modeling and Effects Review Applicability (MERA) guidance package defines the projects for which sitewide refined modeling would normally be needed as well as projects which would not be considered to significantly contribute to existing levels. If the applicant desires, ambient monitoring conducted prior to the effects evaluation can be used in place of sitewide refined modeling to provide information on existing constituent concentrations.

C. Toxicity Factors: The TCEQ's mandate requires that emissions of any emitted constituent be evaluated. Modeled impacts and/or ambient monitoring data are compared to existing interim or newly derived (final) health-based ESLs to evaluate potential health effects. These data are also compared to odor- and health-based ESLs if available to evaluate potential welfare effects.

Modeled impacts and/or ambient monitoring data may be compared to the ReV if the applicant can prove they are the only source in the area and that they have modeled all of their sources. The ReV cannot be used for chemicals listed on the APWL in APWL areas.

Currently, there are ESLs for approximately 4,700 constituents, and new toxicity factors are derived as needed. The procedure used to derive ESLs and ReVs is described in the Guidelines for Developing ESLs, ReVs, and URFs (RG-442) which is available to the public at:
www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/rg/rg-442.html.

ReVs and ESLs are used as screening tools to separate constituent concentrations which would not be expected to cause adverse health and welfare effects from those requiring a more detailed review. A list of ESLs is published semiannually and is available to the public at:
www.tceq.state.tx.us/implementation/tox/esl/list_main.html.

D. Air Pollutant Watch List: The APWL serves to alert technical staff to areas in Texas where the Toxicology Division (TD) is encouraging efforts to reduce emissions of specific pollutants based on ambient monitoring data. Requests to emit chemicals on the APWL must be reviewed more carefully and should be discussed with the TD Director before recommendations are made regarding their acceptability.

III. Effects Evaluation Methodology

A three-tiered approach is used to evaluate the health and welfare effects of emissions on a constituent-by-constituent basis. Tiers I-III represent progressively more complex levels of review. In describing the results of an effects evaluation, the terms acceptable, unacceptable, and allowable are used:

Acceptable-denotes that adverse health or welfare effects would not be expected as a result of exposure to a given constituent concentration

Unacceptable-denotes that there may be a potential for adverse effects to occur as a result of exposure to a given constituent concentration

Allowable-denotes that the predicted GLCs are not "acceptable" but the permit engineer has provided justification to the TD that the predicted GLCs are not likely to occur or that they occur in a location where public access is limited

A. Tier I: Are off-property short- and long-term GLCs max below the ESLs for the constituents under review?
   1. If "Yes," then GLCs are acceptable
   2. If "No," then proceed to Tier II

B. Tier II: For constituents whose GLCs exceed either a health- or odor-based ESL, are the following conditions met?

1. The GLCmax occurs on industrial use property and does not exceed the ESL by more than 2 fold
2. The GLCni < ESL
   a. If "Yes" to both i and ii, then GLC is acceptable
   b. If "No" to either or both i and ii, then proceed to Tier III

C. Tier III: While Tiers I and II are cursory reviews based solely on predicted concentrations, Tier III incorporates additional case-specific factors that have a bearing on exposure. The factors the TD considers in a Tier III case-by-case review include:

1. Surrounding land use: Can non-industrial receptors (residences, recreational areas (land or water), day care centers, hospitals, schools, etc.) be exposed?
2. Magnitude of the concentration exceeding the ESL: What is the GLCmax? What is the GLCni? Concentrations more than 2 fold greater than the ESL are not approved without evaluating all of the following:
   a. The potential for public exposure is almost nonexistent
   b. Air dispersion modeling predicts a low frequency of high concentrations
   c. Predicted concentrations are quantifiable overestimated and not likely to occur

3. Frequency of exceedance: How often (hrs/yr) does the GLCmax exceed 2 fold the ESL? How often (hrs/yr) does the GLCni exceed the ESL?

4. Existing levels of the same constituent: Does sitewide modeling predict (or ambient monitoring indicate) the presence of significant concentrations of the constituent, due to existing sources? If so, additional emissions from the new project may result in a condition of air pollution.

5. Type of toxic effect caused by the constituent: Is a constituent an acute or chronic toxicant? If a constituent is primarily an acute toxicant, is the interim or short-term ESL exceeded? Conversely, if a constituent is primarily a chronic toxicant, is the interim or long-term ESL exceeded?

6. Margin of safety between the toxicity value and know effects levels: For odorous constituents, the ESL is the odor threshold, and concentrations higher than the ESL may cause nuisance odors especially for pungent odorous constituents. For these constituents, there may be very little flexibility in approving GLCs above the ESL. For constituents with health-based ESLs, there is more flexibility in approving GLCs, due to the wide difference between the value and the published No Observed Adverse Effects Level (NOAEL).

7. Degree of confidence in the toxicity database: For constituents with many reliable toxicity and/or epidemiological studies, there is a higher degree of confidence regarding what levels are harmful and what levels are unlikely to cause adverse effects. For constituents for which adequate information does not exist, exceedances are addressed more stringently due to the uncertainty about levels at which an adverse effect may occur.

8. Acceptable reductions from existing GLCs: In the case of some existing sources, the predicted short-term or annual GLCs due to proposed modifications may not meet the standard criteria for acceptability. If these GLCs represent a significant improvement in existing ambient exposure levels, however, they could be deemed allowable.

Consideration of all these factors together provides additional information about the potential for exposure and occurrence of adverse health and welfare effects. This information is summarized by the toxicologist to develop a final opinion about the likelihood that emissions will increase the risk of adverse health or welfare effects.

Although there is flexibility in approving GLCs exceeding ESLs, concentrations that are two- to threefold greater than the ESL are not approved without evaluating all of the following considerations as they relate to the specific project:

- The potential for public exposure is almost nonexistent.
- The air dispersion model predicts a low frequency of high concentrations.
- The predicted concentrations are overestimated and not likely to occur and the overestimation can be quantified.
- The predicted concentrations represent a vast improvement in exposure levels.

This practice allows for an adequate margin of safety between estimated exposure concentrations and concentrations at which adverse effects are known to occur.

APPENDIX I

Total Emissions

Emission Calculations Prepared By Westward Environmental, Inc.

The total emissions from the proposed rock crushing plant (including equipment, stockpiles, tank, & engines) are tabulated below.

	lb/hr	TPY
PM	5.84	8.77
PM10	2.33	4.07
PM2.5	0.42	1.07
VOC	2.11	6.23
NOx	4.51	19.76
SO2	1.28	5.58
CO	1.93	8.45

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Associated Case Party: Texas Commission on Environmental Quality

Name	BarNumber	Email	TimestampSubmitted	Status
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