APPENDIX TO
PUBLIC REPORT OF INDEPENDENT INVESTIGATION OF ALLEGED NON-ENFORCEMENT OF NATIONAL AMBIENT AIR QUALITY STANDARDS BY THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

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by

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APPENDIX A

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, AIR POLLUTION CONTROL DIVISION, TECHNICAL SERVICES PROGRAM, MODELING AND EMISSIONS INVENTORY UNIT, *DRAFT COLORADO MODELING GUIDELINE FOR AIR QUALITY PERMITS* (MAY 2018)

The Colorado Modeling Guideline for Air Quality Permits is currently undergoing a final round of internal review by Division staff. However, a draft version is available to the public during this review period to assist in the preparation of modeling analyses for permit applications. Please note that some changes might still occur in the near future.

04/24/2018

COLORADO
Department of Public Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

COLORADO MODELING GUIDELINE FOR AIR QUALITY PERMITS

MAY 2018

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
AIR POLLUTION CONTROL DIVISION, TECHNICAL SERVICES PROGRAM
MODELING AND EMISSIONS INVENTORY UNIT

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Preface

The Colorado Modeling Guideline for Air Quality Permits (Guideline) presents current Air Pollution Control Division (Division) air quality modeling guidance for estimating impacts from stationary sources of air pollution. It addresses modeling issues for source types ranging from small minor sources to major sources such as those subject to Prevention of Significant Deterioration (PSD) review. Recommendations in the Colorado Air Quality Modeling Guideline may not be applicable in all situations.

The Guideline is intended to help permit applicants, air quality specialists, and others understand the Division's expectations for the ambient air impact analysis and to prevent unnecessary delays in the permit process. It provides a starting point for modeling, but allows the use of professional judgement. To avoid misunderstandings, obtain the most recent version of Colorado's guidance documents from http://www.colorado.gov/airquality/permits.aspx. In addition, obtain current regulations and applicable U.S. Environmental Protection Agency (U.S. EPA) guidance.

This guideline is not intended to describe the implications of modeling results. Such implications are generally controlled by the permit rules or other relevant state and federal regulations, laws and guidance. Nevertheless, the Guideline contains incidental discussion of the effects of certain modeling results. Such discussion is for informational purposes only and shall not be construed to be authority defining the regulatory impact of any modeling result. For that, the reader should refer to the applicable rules and regulations.

This is a guide through modeling-related regulations and procedures. It is intended to promote technically sound and consistent modeling techniques, while encouraging the use of improved and more accurate techniques as they become available. The guideline helps permit applicants understand when modeling is warranted. It clarifies what modeling-related information and data should be included with a permit application. Supplemental guidance on specific technical issues and other modeling-related data and information, including checklists and meteorological data, are available at http://www.colorado.gov/airquality/permits.aspx. If modeling procedures other than those recommended in Colorado and U.S. EPA guidance are used, there might be delays while the procedures are reviewed. In some cases, U.S. EPA approval may be necessary.

This is only a guidance document. It has been published in accordance with §25-6.5-102, C.R.S. It is not intended to supersede statutory/regulatory requirements or recommendations of the U.S. EPA.

U.S. EPA models and guidance are available on the Internet at http://www.epa.gov/scram.

What's New in this Document

May 2018:

The following has been revised on May 17, 2018 from the April 2018 version of the Guideline.

- Ozone background criteria to use ARM2
- Figure 5 Title as the map only applies to PM_{10}
- Table 8 footnote (a) corrected to increment

April 2018:

The following has been revised on April 20, 2018 from the March 2018 version of the Guideline.

- Spelling and syntax errors were corrected throughout
- $PM_{2.5}$ SILs are now EPA approved based on recent guidance

March 2018:

The following has been revised on March 16, 2018 from the December 27, 2005, version of the Guideline.

- The overall document has been reformatted.
- The overall document has also been reorganized to improve the flow of information as well as the understanding and retention of information presented.
- Hyperlinks have been updated to obtain the correct sites.
- Duplicate tables and figures have been removed. Only one version of each table and figure is provided.
- Quotes from Regulation No. 3 and Appendix W have been updated to match the most recent versions.
- Section 2 was added to address the applicable regulations that authorize Colorado to perform modeling analyses.
- Section 3 was added to illustrate the full picture of the modeling analysis process.
- Section 4 was added to detail the different types of modeling analyses the applicant may be required to perform.
- Section 5 was added to detail the information the applicant should use when performing a modeling analysis.
- Section 6 was added to detail what information the Division is looking for when the applicant submits a modeling analysis.
- Appendix A was added which includes the description of how the modeling thresholds in Table 1 were developed.
- Section 4 Additions:
    - U.S. EPA's opinion on submitting a modeling protocol and language that a protocol is not intended to be legally binding.

- Screening-level models were added with updated guidance on when screening models cannot be used.
- Procedural steps were added to the Significant Impact Analysis
- Procedural steps were added to the NAAQS & CAAQS Analysis
- Procedural steps were added to the PSD Increment Analysis

- Section 5 Additions:
  - The Ambient Ratio Method 2 (ARM2) is now the approved Tier 2 approach replacing the Ambient Ratio Method (ARM). The approved ambient ratio for Colorado is discussed more in detail. The Ozone Limiting Method is now a regulatory option.
  - Annual PM_{10} NAAQS compliance demonstration was removed as the NAAQS was revoked.
  - 24-hour and annual $PM_{2.5}$ NAAQS compliance demonstrations were added.
  - 1-hour SO_2 compliance demonstrations as well as a discussion regarding the 24-hour and annual SO_2 NAAQS demonstrations were added.
  - PS Memo 10-01 discussion was added.
  - Nearby source emission calculations have been updated in Appendix W from allowable emissions to a subset of actual emissions. The threshold emission rates for nearby sources to include was removed.
  - Flagpole receptors guidance was added.
  - The use of Digital Elevation Model (DEM) data for sources and receptors was removed and language to use National Elevation Dataset (NED) files was added.
  - Meteorological data will be provided by the Division in an AERMOD-ready format. The applicant no longer needs to process meteorological data.
  - Precursors to ozone was added.
  - Secondary formations of $PM_{2.5}$ was added.
  - Mobile sources guidance was added.
  - Modeling scenarios guidance was added.
- Language was updated throughout discussing when source and modifications are exempt from modeling. The exemption now includes emissions below Table 1 thresholds AND not meeting the scenarios (footnotes) described below Table 1.
- References to the Modeling Submittal Completeness Checklist to verify the necessary information to submit with the modeling analysis was added.
- The sections relating to additional impacts analysis and AQRVs is currently still under review so these sections have been greyed out.

Definitions

The following explanation 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.

Air Quality Models. Computer codes for estimating ambient concentration levels (i.e., "impacts") from new and existing sources of air pollution. They allow one to forecast future air quality levels from sources that have not been constructed. They simulate in a simplified manner the complex behavior of emissions injected into the atmosphere.

Air Quality Related Value (AQRV). A feature or property of a Class I area that may be affected by air pollution. General categories of AQRV's include visibility, odor, flora, fauna, soil, water, geological features, and cultural resources. https://www.nature.nps.gov/air/Pubs/pdf/flag/FLAG_2010.pdf

Ambient Air. Defined by 40 CFR 50.1(e) as "that portion of the atmosphere, external to the source, to which the general public has access." NAAQS and PSD increments apply only in ambient air.

Appendix W, 40 CFR Part 51- Guideline on Air Quality Models. The U.S. EPA's *Guideline on Air Quality Models* recommends air quality modeling techniques that should be applied to State Implementation Plan (SIP) revisions for existing sources and to new source reviews, including prevention of significant deterioration (PSD). It is intended for use by the U.S. EPA in judging the adequacy of modeling analyses performed by U.S. EPA, state and local agencies, and industry. The *Guideline* identifies those techniques and databases U.S. EPA considers acceptable. The guide is not intended to be a compendium of modeling techniques. Rather, it serves as a basis by which air quality managers, supported by sound scientific judgment, have a common measure of acceptable technical analysis. Appendix W was updated on January 17, 2017. https://www3.epa.gov/ttn/scram/appendix_w/2016/AppendixW_2017.pdf

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.

Building Downwash. Turbulence created by the wind flowing over buildings or structures that would ordinarily not exist. This effect can alter ground-level concentration levels than would exist in the absence of the building or structure.

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.

Complex Terrain. Any terrain exceeding the height of the stack being modeled. This includes terrain commonly referred to as intermediate terrain (***receptors*** between stack height and plume height).

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

Cumulative Impact Analysis. A full modeling impact analysis that involves the facility under permit review, nearby sources, and background concentrations to compare the facility's impact to the NAAQS.

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.

Good Engineering Practice (GEP) Stack Height. From Regulation No. 3, Part D, §VIII.D.3, "The greater of 65 meters or for stacks in existence on January 12, 1979 and for which the owner or operator had obtained applicable pre-construction permits or approvals required, $H_g = 2.5*H$ (provided the owner or operator produces evidence that this equation was actually relied on in establishing an emission limitation and for all other stacks $H_g = H + 1.5*L$ where,

H_g: good engineering practice stack height measured from the ground level elevation at the base of the stack

H: height of nearby structure(s) measured from the ground level elevation at the base of the stack

L: lesser dimension (height or projected width) of nearby structure(s)."

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 Stationary Source. The term *major* may refer to the total emissions at a stationary source or to a specific facility.

- 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 Federal Clean Air Act (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. Used in the context of a PSD 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.

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 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 Source. Any stationary source that is not defined as a major stationary source in Regulation No. 3, Part D §II.A.25. The term is sometimes used rather loosely. The definition may vary based on the context in which it is used.

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.

Modeling and Emissions Inventory Unit (MEIU). This is the unit within the Technical Services Program (TSP) of the Air Pollution Control Division that is responsible for review of air dispersion modeling.

Modified Stationary Source.

- 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.

Nearby Sources. Any major source, major stationary source, or minor source that causes a significant concentration gradient in the vicinity of a new or modified source.

Nonattainment Area (NAA). 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.

Other Background Sources. All sources of air pollution other than the source under review and those identified as nearby sources. Examples include area and mobile sources, natural sources, most minor sources, distant major sources, and major stationary sources. They usually are accounted for by using an appropriate ambient background concentration as recommended in section 8 of Appendix W of 40 CFR Part 51 or by application of a model using inventory recommendations in Table 8-2 of Appendix W.

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

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

Qualitative Determination. Relies on descriptive generalized statements and made without regard to quantity.

Quantitative Determination. A numerical "estimate" of the air pollutant concentration in ambient air.

Reasonable Further Progress (RFP). From the Common Provisions Regulation, "The annual incremental reductions in emissions of the applicable air pollutant (including substantial reductions in the early years following approval or promulgation of plan provisions under the Federal Act, section 110(a)(2)(I) and regular reductions thereafter) which are sufficient in the judgment of the commission and U.S. EPA, to provide for attainment of the applicable National Ambient Air Quality Standards by the date required in section 172(a) of the Federal Act."

Receptor. As used here, a receptor is a geographic location (point) at which the model calculates the impact (i.e., air pollutant concentration) from a source of air pollution. In practice, a large number of receptors (i.e., a grid of receptors) is used to estimate air quality impacts over the probable area of impact from the source. Each receptor has a unique geographic coordinate and elevation.

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.

Requested Emission Rate. The emission rate calculated using the maximum rated (design) capacity of the source or the emission rate specified as an enforceable permit condition.

Scenic and/or Important Views. An important or sensitive panorama or long-range view anywhere in Colorado. This includes important views of landmarks or panoramas. The Division maintains a list of scenic and/or important views in Colorado (https://www.colorado.gov/airquality/permits/SCENICVW2005.pdf).

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 Impact Analysis (SIA). Modeling analysis involving only the project sources to determine whether a new and/or modified facility, or a combination of the two, could cause a significant ambient air impact.

Significant Impact. A concentration in ambient air that exceeds a modeling significance level.

Significant Impact Levels (SILs). Values established by EPA to determine whether a proposed new or modified source will cause or contribute to a violation of the NAAQS or PSD increments. When a facility impact is above the applicable SILs, a refined cumulative impact analysis is required.

Simple Terrain. Any terrain with elevations lower than the top of the stack.

Stationary Sources Program (SSP). This is the program within the Air Pollution Control Division that is responsible for air quality permitting and enforcement.

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 (UTM). A plane coordinate system that uses distances from a specified reference point as the basis for all locations. It is based on a transverse Mercator projection that divides

the Earth's surface into zones that are 6 degrees of longitude wide. Precise locations on the earth are described in terms of north-south (northing) and east-west (easting) distances, measured in meters from the origin of the appropriate UTM Zone.

Most of Colorado is zone 13, while the western seventh is in zone 12.

Section 1 – Introduction

Air quality models are used to estimate impacts (air pollutant concentration levels) in ambient air to determine if a proposed source or activity will comply with applicable ambient air standards and other applicable regulatory requirements. Federal law requires that the Division have legally enforceable procedures in place to prevent construction or modification of any source where the emissions from the projected activity would violate control strategies or interfere with attainment and maintenance of the National Ambient Air Quality Standards (NAAQS).[1]

All estimates of ambient concentrations required under Colorado Air Quality Control Commission (AQCC) Regulation No. 3 must be based on U.S. EPA-approved air quality models, data bases, and other requirements generally approved by the U.S. EPA and specifically approved by the Division. Case-by-case approval from the Division and/or U.S. EPA is required if a non-EPA model is proposed.

Regulation No. 3, Part A, §VIII.A.1 states that *"all estimates of ambient concentrations required under this Regulation No. 3 shall be based on the applicable air quality models, data bases, and other requirements generally approved by U.S. EPA and specifically approved by the division. If a non-U.S. EPA approved model, such as a wind tunnel study, is proposed, the nature and requirements of such a model should be outlined to the division at a pre-application meeting. The application will be deemed incomplete until there has been an opportunity for a public hearing on the proposed model and written approval of the U.S. EPA has been received."*

The primary U.S. EPA modeling guideline is 40 CFR Part 51, Appendix W - Guideline on Air Quality Models (https://www3.epa.gov/ttn/scram/appendix_w/2016/AppendixW_2017.pdf). There are many other U.S. EPA guidance documents, memos, and U.S. EPA model clearinghouse decisions that explain modeling procedures. This *Guideline* is intended to help permit applicants understand federal modeling procedures. It also provides Colorado's interpretation of gray areas in federal guidance. As such, it presents procedures that are "specifically approved" by the Division.

[1] Pursuant to section 110(a)(2)(C) of the federal Clean Air Act, the State Implementation Plan (SIP) needs to regulate the "*modification and construction of any stationary source within the areas covered by the plan as necessary to assure that national ambient air quality standards are achieved*." Similarly, 40 CFR section 51.160 requires the State to have the authority to prohibit any construction or modification that would interfere with the attainment or maintenance of a national standard. This includes PSD increments as well as NAAQS. See also 40 C.F.R 51.166. There is no distinction in these provisions between major and minor sources.

The primary Colorado regulation for air quality permits is Regulation No. 3.[2] Certain new/modified air pollution sources are subject to the regulatory modeling requirements of Regulation No. 3 (authorized by §25-7-114 to 25-7-114.7, Colorado Revised Statutes (C.R.S.)).

To avoid unnecessary delays in permit processing, pre-application meetings and communications (e.g., phone, e-mail, letter) are strongly recommended, particularly for new major sources and major modifications. The Division does not routinely require or perform modeling to determine impacts from hazardous air pollutants (HAPs).

Section 2 – Authority for Air Quality Impact Analyses

The Colorado AQCC developed regulations that require the Division's preliminary analysis for construction permits to indicate the air quality impact from a proposed source or activity. In addition, the Division must determine if the proposed source or activity will comply with applicable ambient air quality standards. The recommended tools for determining *impacts* are air quality models. This section discusses the regulatory requirements for air quality impact analyses.

While modeling is not required to obtain an operating permit, it may be performed or requested if the operating permit is modified (Regulation No. 3, Part C, §X). Operating permits may also be subject to modeling if the application is for a combined construction/operating permit (Regulation No. 3, Part C, §III.C.12.d).

For both major sources and minor sources, Regulation No. 3, Part B, §III.B.5.d states, *"the preliminary analysis shall indicate what impact, if any, the new source will have (as of the projected date of commencement of operation) on all areas (attainment, attainment/maintenance, nonattainment, unclassifiable), within the probable area of influence of the proposed source…When the preliminary analysis includes modeling, the model used shall be an appropriate one given the topography, meteorology, and other characteristics of the region that the source will impact. Use of any non-guideline model required U.S. EPA approval under Section VIII.A. of Part A of this regulation."*

Regulation No. 3, Part B, §III.D.1 states that the Division or the AQCC "*shall grant the permit if it finds that…the proposed source or activity will not cause an exceedance of any National Ambient Air Quality Standards; and the source or activity will meet any applicable ambient air quality standards and all applicable regulations…"*

While Regulation No. 3 requires that the Division indicate the "impact, if any" in its preliminary analysis, it does not explicitly require modeling; however, a demonstration of compliance with all NAAQS and CAAQS is required. Thus, the impact analysis can be done using quantitative (modeling) or qualitative (non-modeling) methods, as appropriate; however, U.S. EPA approved models and/or methods must be used if a numerical estimate (i.e., pollutant concentration in ambient air) of the impact is made.

[2] Colorado air quality regulations are available on the CDPHE website (https://www.colorado.gov/pacific/cdphe/aqcc-regs) or upon request. To obtain official copies, please contact the Secretary of State's office.

The modeling thresholds and scenarios outlined in Table 1 may be used to determine when modeling is warranted. If it is unclear if modeling is warranted, please contact the Division. The thresholds are applicable for sources located in nonattainment as well as attainment areas.

The impact analysis requirement in Regulation No. 3 applies to all areas: attainment, attainment/maintenance, nonattainment, and unclassifiable.

Attainment Areas

New major sources and major modifications subject to PSD attainment area rules are required to submit various types of modeling and/or analyses along with their permit application. The application must include appropriate modeling and/or analyses to be ruled complete. Please refer to Regulation No. 3, Part D, §VI.A.2 and §VI.A.6 for source impact analysis requirements.

With respect to ambient air standards, §VI.A.2 requires that *"the owner or operator of the proposed source or modification shall demonstrate to the Division that allowable emission increases from the proposed source or modification in conjunction with all other applicable emissions increases or reductions (including secondary emissions) will not cause or contribute to concentrations of air pollutants in the ambient air in violation of either:*

> *VI.A.2.a: any state or national ambient air quality standard in any baseline area or air quality control region; or*
>
> *VI.A.2.b: any applicable maximum allowable increase over the baseline concentration in any area"*

Regulation No. 3, Part D, §VI.D.1.b requires that "*the proposed source or modification will achieve an emissions rate that will ensure that the emissions of such pollutant from the source or modification will not significantly affect ambient air quality in the nonattainment area."* That is, the modeling that is required should be used to determine if the source would have a significant impact in any nonattainment area.

Major sources and major modifications are subject to additional requirements. See section 4 for more details. The impact analysis requirement of Regulation No. 3 applies to all areas (attainment, attainment/maintenance, nonattainment, unclassifiable).

Minor sources and minor modifications are not required by regulation to submit a modeling analysis that demonstrates compliance along with their permit application; however, a demonstration of compliance (quantitative or qualitative) with all NAAQS and CAAQS is required. Nevertheless, applicants may elect to include modeling with the applications to prevent unnecessary delays.

If modeling is not submitted with the permit application, the Division will decide if modeling is warranted to complete the impact analysis and compliance demonstration required by Regulation No. 3. If modeling is warranted, the Division will perform a screening-level analysis if it is technically feasible to perform one. If the screening-level analysis shows there could be modeled violations of applicable standards, the Division will contact the applicant to discuss options. Since the Division does not usually perform refined-level modeling as part of the permitting process, the Division will typically require that the applicant perform any refined modeling that might be warranted.

If modeling is warranted, refer to sections 4, 5, and 6.

Nonattainment Areas

The impact analysis requirement of Regulation No. 3, Part B, §III.B.5.d applies in all areas *("attainment, attainment/maintenance, nonattainment, unclassifiable"*). Thus, modeling may sometimes be warranted for sources in nonattainment areas. The goals of the impact analysis vary depending on the applicable regulatory requirements. The regulations refer to the concept of reasonable further progress (RFP) for sources located in nonattainment areas. If emissions from a new source or modification would prevent a nonattainment area (NAA) from coming into compliance by the applicable date in the Federal Act or in the SIP, then the source impairs RFP.

New major sources and major modifications subject to NSR nonattainment area rules are required to submit various types of modeling and/or analyses along with their permit application. In nonattainment areas, Regulation No. 3, Part D, §V contains a number of requirements for obtaining a permit. Refer to the regulation for details. A few of the requirements follow:

- Offsets must represent reasonable further progress towards attainment of the National Ambient Air Quality Standards when considered in connection with other new and existing sources of emissions.
- In addition, offsets for PM_{10}, sulfur oxides, and carbon monoxide must show, through atmospheric modeling, a positive net air quality benefit in the area affected by the emissions.
- Provided, however, that offsets meeting the requirements of this section V.A.3 may also be obtained from existing sources outside the nonattainment area if the applicant demonstrates:
    - A greater air quality benefit may thus be achieved; or sufficient offsets are not available from sources within the nonattainment area; and
    - The other area has an equal or higher nonattainment classification than the area in which the source is located; and
    - Emissions from such other area contribute to a violation of the National Ambient Air Quality Standard in the nonattainment area in which the source is located.
    - With respect to offsets obtained from outside the non-attainment area, the division may increase the ratio of the required offsets to new emissions the greater the distance such offsets are from the new or modified source.
- Precursors to ozone must be analyzed and discussed. Please use EPA guidance regarding how to perform an analysis for precursors to ozone.

If modeling is not submitted with the permit application, the Division will decide if modeling is warranted to complete the impact analysis and compliance demonstration required by Regulation No. 3. If modeling is warranted, the Division may perform a screening-level analysis if it is technically feasible to perform one. If the screening-level analysis shows there could be modeled violations of applicable standards, the Division will contact the applicant to discuss options. Since the Division does not usually perform refined-level modeling as part of the permitting process, the Division will typically request that the applicant perform any refined modeling that might be warranted. If modeling is warranted, refer to sections 4, 5, and 6.

In the event that compliance with standards cannot be demonstrated using typical attainment area modeling procedures, a case-by-case approach should be developed in consultation with Division staff familiar with the affected nonattainment area.

Requirements Unique to Colorado

The following are additional modeling-related regulatory requirements unique to Colorado:

- A major source by itself may not consume more than 75% of any applicable PSD increment
- Class I SO_2 increments apply to some pristine Class II areas
- For major sources subject to PSD review, *water* is included as one of the required elements in the *additional impact analysis;* the requirement is intended to provide information on acid deposition in high altitude lakes
- Sulfur dioxide (SO_2) 3-hour standard of 700 µg/m^3

Section 3 – Air Quality Impact Analysis

An applicant must demonstrate that the proposed source or modification, 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. An air quality impact analysis is the means for the applicant to make the demonstration. It is an evaluation of the potential impact on the environment associated with a new and/or modified facility. Additional analyses required by federal rule would also be included in the air quality impact analysis.

The air quality impact analysis is a stand-alone report. Results from the report should be sufficient for Division staff to evaluate the impact of the proposed operation without input from other reports. Division 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 Division's Technical Services Program (TSP) modeling staff unless the items are clearly not applicable to the project. Refer to the Colorado Modeling Submittal Completeness Checklist (https://www.colorado.gov/airquality/permits/CompletenessChecklist-ModelingSubmittal14Feb.pdf) to determine what information needs to be submitted in the air quality impact analysis.

Air Dispersion Modeling

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). Division staff uses the results from these computer models in their review of air permit applications. A modeled prediction is used to demonstrate if the new or modifying source will show compliance with the NAAQS and CAAQS. If the model predicts an exceedance of the NAAQS and/or CAAQS, the applicant is given the opportunity to adjust the facility allowable emissions, operating hours, source parameters, and source configuration in order to demonstrate the predicted impact will be in compliance with all state and federal standards.

Procedures and models other than those recommended by U.S. EPA or in this guideline may be approved on a case-by-case basis if there is sufficient technical justification. U.S. EPA approval may be required in some cases. Refer to U.S. EPA guidance for use of alternative models.

If a non-EPA-approved model, such as a wind tunnel study, is proposed, the nature and requirements of such a model should be outlined to the Division at a pre-application meeting. The permit application will be deemed incomplete until there has been a public hearing on the proposed model and written approval of the U.S. EPA has been received (Regulation No. 3 Part A §VII).

The most recent version of U.S. EPA-approved models should be used. Division approval should be obtained if an older version is used.

For Class I area modeling, the Division generally supports the use of models and modeling techniques recommended by the Interagency Workgroup on Air Quality Modeling (IWAQM)[3]. Written IWAQM guidance does not always reflect their latest recommendations. In addition, recommendations for the Class I analysis may vary from one area to another. Thus, work with Division staff and affected federal land managers (FLMs) on a case-by-case basis to determine the appropriate methods to address impacts at each affected Class I area.

Air Quality Impact Analysis Process

Division staff with the appropriate expertise reviews various aspects of the impact analysis. For example, different specialists may provide comments on dispersion modeling, monitoring data, visibility modeling, and air quality related values. Internal comments by reviewers are typically sent directly to the permit engineer in the Stationary Sources Program who interprets the comments and, if necessary, brings staff together to discuss or resolve issues.

Modeling submittals that accompany permit applications should generally be sent to the Division's Stationary Sources Program where a permit engineer processes the permit application. The permit engineer forwards modeling reports, date, modeling input/output files, the permit application, and other relevant information to appropriate staff. As required by regulations, copies of the permit applications for major stationary sources are sent to federal agencies such as U.S. EPA Region VIII and affected federal land managers.

It is appropriate for applicants or their modelers to send modeling protocols directly to modeling staff in the Division's Technical Services Program. A copy should also be sent to the Stationary Sources Program permit review staff since they are responsible for the overall review of the permit.

The Division encourages phone conversations, e-mail, and other types of communication between staff and the applicant's modeler(s) and other specialists to resolve issues once the actual review process begins. It is assumed the applicant's modeler or other specialists will notify the applicant of important

[3] IWAQM was formed to provide a focus for development of technically sound, regional air quality models for regulatory assessments of pollutant source impacts on federal Class I areas. The guidance included input from the U.S. Forest Service, National Park Service, U.S. Fish and Wildlife Service, the U.S. EPA, and several states.

modeling-related issues as necessary. It is recommended that significant issues and information transfers be done in writing. Copies of any letters or e-mail messages shall be sent to the permit engineer.

When oversights, errors, or questionable assumptions and/or methods are found during the review process, Division staff will use professional judgment to decide if deficiencies are sufficient to change the outcome of the compliance demonstration. If the ramifications of a modeling-related issue are not significant, the deficiencies are noted in the comments and appropriate language is included to justify that a specific issue is minor. If it is difficult to assess the ramifications without redoing the analysis, the Division may attempt to redo the analysis, while the deficiencies will be noted in the review comments and the applicant will be asked to address the comments.

Any responses to comments may be sent directly to Technical Services Program modeling staff, but it is recommended that a copy also be sent to the permit engineer. In cases where there are no modeling issues, the Division's modeling comments are not usually forwarded to the applicant. Instead, the written comments are added to the permit file.

Figure 1 graphically depicts the permit review process as it relates to air quality modeling. While the flowchart is applicable to all permit applications for major stationary sources where modeling is required, only certain portions of the flowchart are applicable for minor sources. For example, the loop involving U.S. EPA Region VIII and the federal land manager (FLM) is not an integral part of the review process for minor sources.

Figure 2 graphically shows the roles and responsibilities for the modeling review process within the Division for air quality construction permits.

Figure 3 illustrates key aspects of the regulatory decision process for major stationary sources and major modifications seeking construction permits. *This figure is currently under review within the Division. Please contact Division staff to confirm the review process for an AQRV and Visibility analysis in Class I areas.*

Figure 1. Permit Review Process

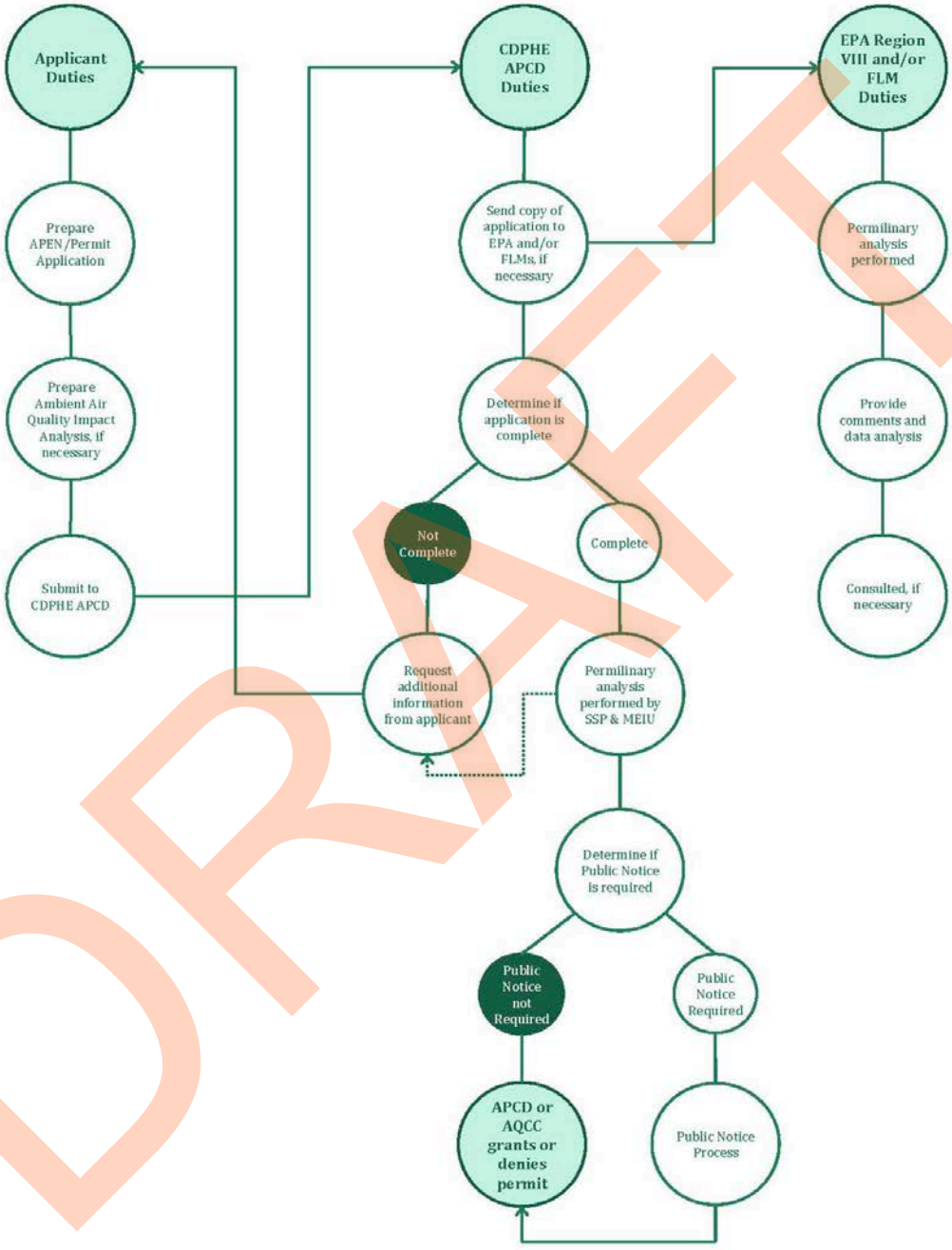


Figure 2. Roles & Responsibilities within CDPHE

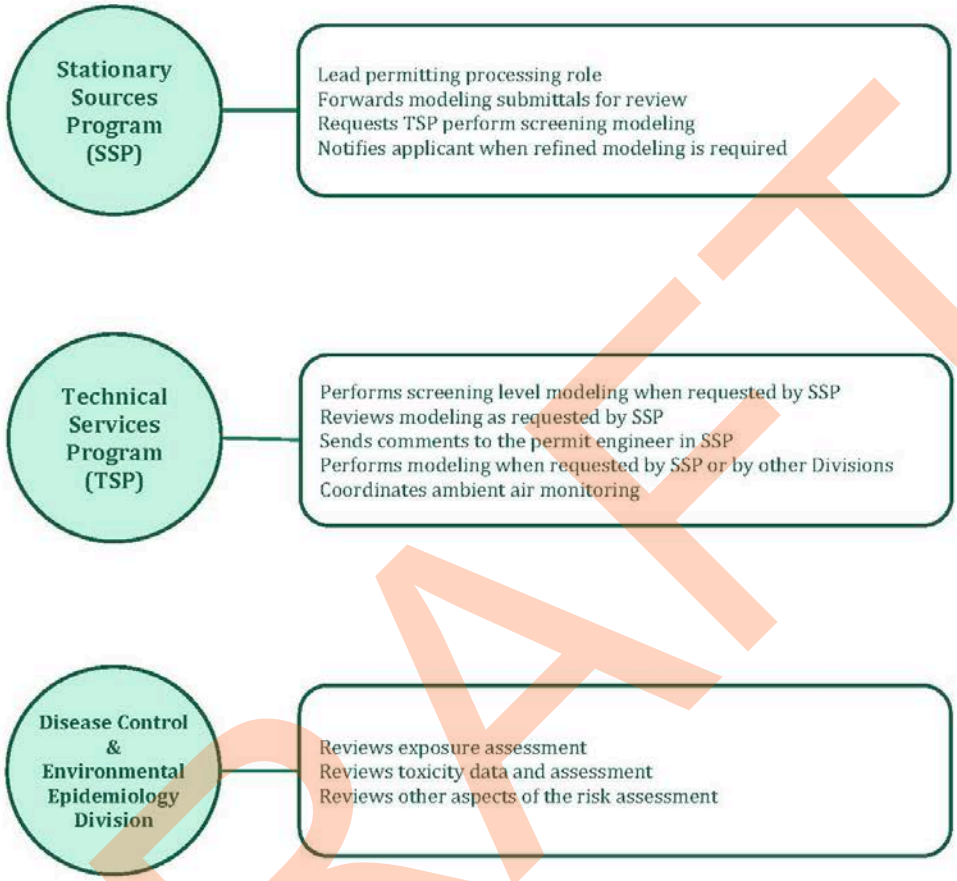
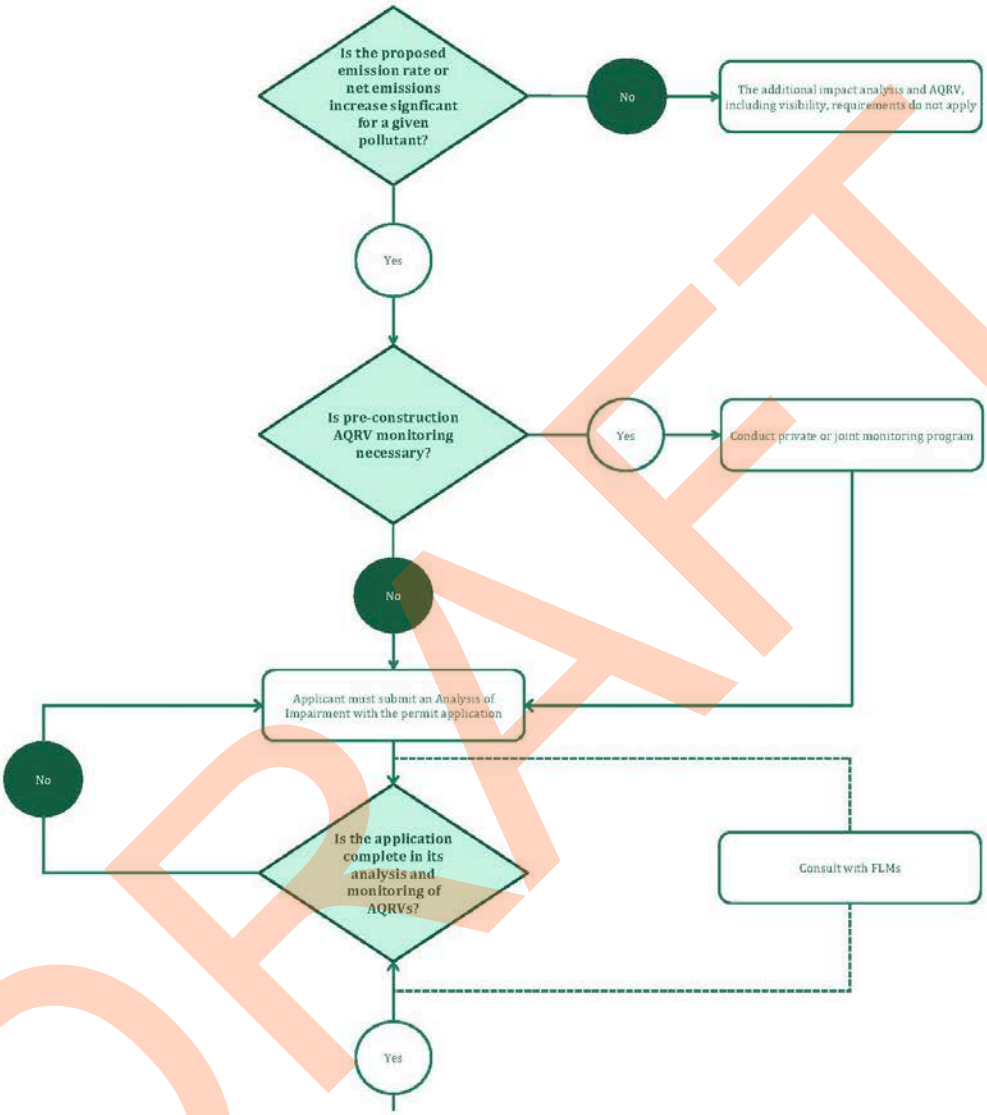
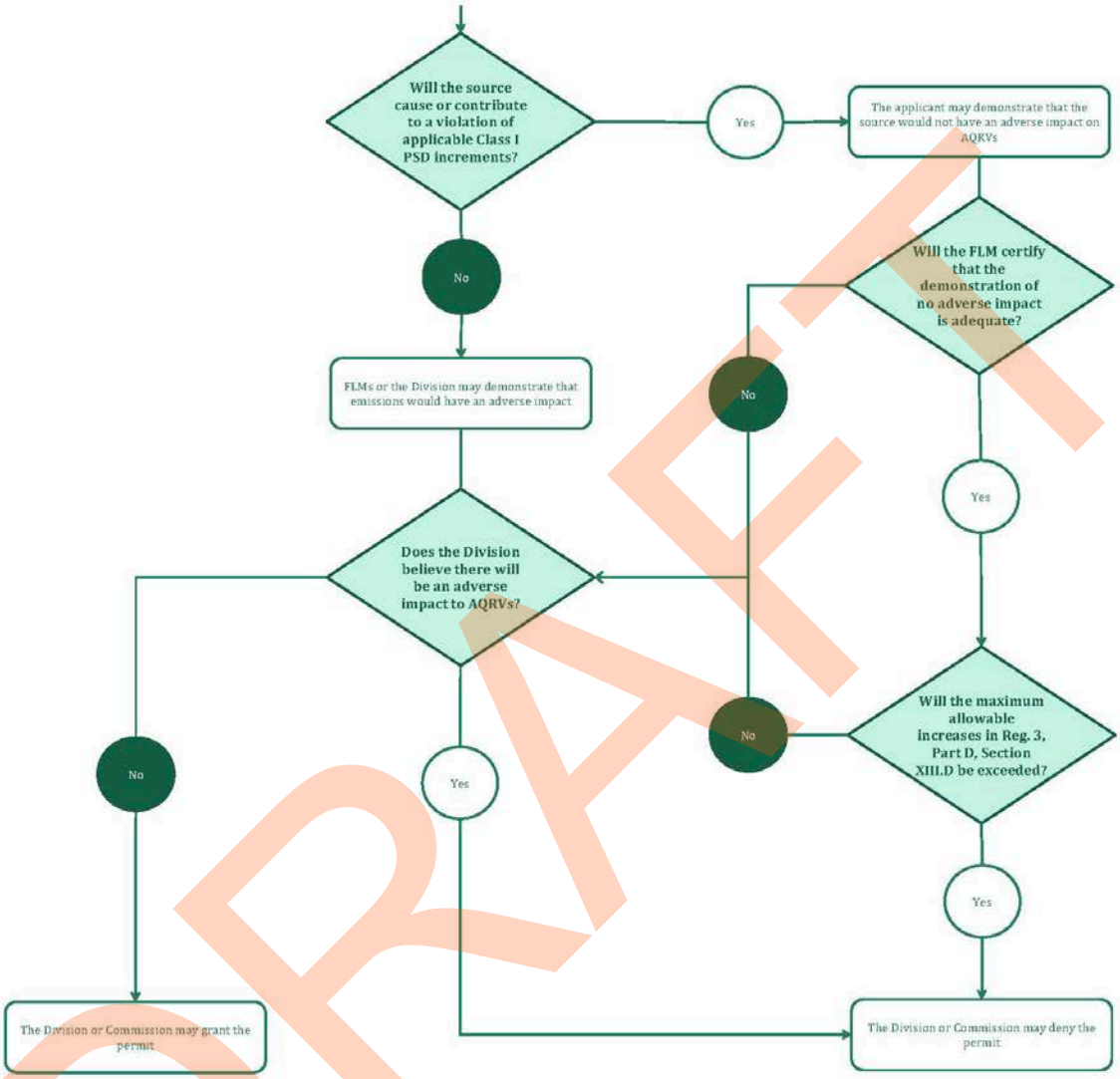


Figure 3. Regulatory Decision Process for AQRVs




Will the source cause or contribute to a violation of applicable Class I PSD increments?
Yes
The applicant may demonstrate that the source would not have an adverse impact on AQRVs
No
Will the FLM certify that the demonstration of no adverse impact is adequate?
FLMs or the Division may demonstrate that emissions would have an adverse impact
No
Yes
Does the Division believe there will be an adverse impact to AQRVs?
No
Will the maximum allowable increases in Reg. 3, Part D, Section XIII.D be exceeded?
No
Yes
Yes
The Division or Commission may grant the permit
The Division or Commission may deny the permit

Section 4 – Performing the Air Quality Impact Analysis

As discussed in Section 2, the Colorado AQCC developed regulations that require the Division's preliminary analysis for construction permits to indicate the air quality impact from a proposed source or activity. In addition, the Division must determine if the proposed source or activity will comply with applicable ambient air quality standards. The recommended tools for determining *impacts* are air quality models.

Figure 4 depicts the air quality impact analysis.

Modeling Thresholds

Modeling thresholds were developed to identify new sources and modifications that would have relatively small impacts and do not warrant further analysis with respect to applicable air quality standards. The development of these thresholds is intended to assist the Division staff, permit applicants, air quality consultants, and others decide when modeling is warranted and to determine the impact from a source. This section introduces *de minimis* emissions, which have low probability of causing or contributing to an exceedance of an air quality standard. By using this approach, permitting costs associated with the impact analysis required by Regulation No. 3 can be minimized.

Air quality modelers developed the modeling thresholds in Table 1 during a technical peer review of the Division's modeling practices. The Division performed dispersion modeling to help demonstrate that the thresholds in Table 1 are appropriate. This analysis can be seen in Appendix A at the end of this document. Permit applicants and the Division should try to avoid situations where the decision to perform modeling takes longer than actually performing a screening-level modeling analysis (screening-level models can often be run quickly with minimal cost).

For a given pollutant, modeling is usually warranted if the long-term (tons per year) or short-term (pounds per hour, etc.) requested emission rate for a new source or the facility-wide net emissions increase for a modification is above the applicable emission threshold in Table 1. If the requested emission rate and/or the facility-wide net emissions increase is below both of the thresholds, modeling is usually not warranted ***unless one of the situations outlined in the footnotes of Table 1 applies***. If there is doubt regarding the need for modeling, the applicant should consult the Division.

The thresholds in Table 1 were not developed to address compliance with minor modifications to major sources located within 10km of a Class I area. Thus, modeling decisions related to Regulation No. 3, Part D, §II.A.44.c are made on a case-by-case basis. According to §II.A.44.c, any net emissions increase of a regulated pollutant at a major stationary source located within 10 kilometers (6.2 miles) of a federal Class I area should perform modeling to determine if the maximum 24-hour average impact in the Class I area exceeds 1.0 $\mu g/m^3$ on a 24-hour basis. If it does, the emissions increase is significant and the modification constitutes a major modification subject to PSD review.

The Class I significance level of 1.0 $\mu g/m^3$ on a 24-hour basis is only intended to determine if a modification is major. It should not be used to determine if the impact in a Class I area is significant.

Table 1. Modeling Thresholds

If emission rate is less than threshold, a qualitative description of impact may be adequate unless a situation warrants modeling.[1]		
Pollutant	Requested Emission Rate from New Source or Facility-Wide Net Emissions Increase from a Modification	
	Long Term (tons per year)	Short Term (pounds per hour)
Carbon Monoxide (CO)	23 pounds per hour	
Nitrogen Oxides (NO_x)	40	0.46
Sulfur Dioxide (SO_2)	40	0.46
Particulate Matter < 10 µm (PM_{10})	82 pounds per day	
Particulate Matter < 2.5 µm ($PM_{2.5}$)	5	11 pounds per day
Lead (Pb)	25 pounds per 3-months	

[1]Circumstances where source may cause or contribute to a violation of applicable ambient air quality standards despite being below the thresholds:

(a) Sources of SO_2, NO_2, PM_{10}, $PM_{2.5}$, CO, or Pb where a substantial portion of the new or modified emissions have poor dispersion characteristics (e.g., rain caps, horizontal stacks, fugitive releases, or building downwash) in close proximity to ambient air at the site boundary

(b) Sources located in complex terrain (e.g., terrain above stack heights in close proximity to the source)

(c) Sources located in areas with poor existing air quality

(d) *Modification at existing major sources, including grandfathered sources that have never been modeled before*

Modeling Protocol

The protocol is the primary mechanism by which all affected parties such as the applicant, the Division, U.S. EPA, and federal land managers reach agreement on a modeling approach. The protocol development process is intended to minimize the chances of misunderstandings and to avoid delays in the permit process. It explains in detail how a modeling analysis will be performed, how the results will be presented, and how compliance with applicable requirements will be demonstrated. The protocol is not intended to be a binding, legal document as changes or deviations are often necessary as the data collection and analysis progresses.

Submission of a modeling protocol is strongly recommended for all air quality impact analyses.

Screening Modeling

The U.S. EPA developed screening-level modeling techniques to determine quickly whether a facility should perform in-depth refined modeling analyses. Screening-level models produce estimates of worst-case impacts from a single source without the need for hourly metrological data. Most applicants are recommended to perform a screening-level analysis to show the facility is in compliance with the applicable NAAQS and CAAQS. If there is doubt regarding the need for modeling, the applicant is recommended to perform a screening-level analysis. If the screening-level analysis does not show compliance with the NAAQS and CAAQS, then refined modeling is required.

The U.S. EPA has regulatory screening models that should be used for this analysis. These models can be found on the U.S. EPA Support Center for Regulatory Atmospheric Modeling (SCRAM) website.

Screening models are designed to evaluate a single source. Most facilities, however, do not consist of a single source, but screening models can still be used by summing the emissions from all sources at the facility and model them as if they are being emitted from a single source. This method is only acceptable when all sources are stacks and being emitted from the shortest stack, to represent worst-case.

When facilities consist mostly of fugitive emissions, screening models are not acceptable. When summing these types of emissions together and modeling as a single source, the accuracy of the model is reduced substantially and the results not credible. Therefore, the Division does not accept screening models from the following source categories:

- Gravel Pits
- Quarries
- Landfills
- Mining Operations
- Any type of facility not mentioned above that involves multiple sources of fugitive emissions

Refined Modeling

Refined modeling requires detailed and precise input data along with more complex models in order to provide refined impact estimates. If refined modeling is warranted, it should be performed in two distinct phases.

The first phase is the significant impact analysis (SIA), which determines if the applicant can forego further air quality analysis for a particular pollutant with respect to Colorado and National Ambient Air Quality Standards and, for new major sources and major modifications, Prevention of Significant Deterioration increments. The second phase is the cumulative impact analysis for the CAAQS, NAAQS, or applicable PSD increments; it is sometimes referred to as the *full impact analysis*[4].

[4] U.S. EPA sometimes uses the phrase “full impact analysis” to refer to the National Ambient Air Quality Standards (NAAQS) analysis and the Prevention of Significant Deterioration (PSD) increment analysis.

Significant Impact Analysis

Individual facilities may be subject to different requirements depending on the 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.

Technically, all Colorado APCD permits are federal in that the state must implement a minor NSR permitting program to ensure the NAAQS and increments are attained. The air quality impact analyses for major NSR and minor NSR permits begin with a significant impact analysis (SIA). The purpose of a SIA is to determine whether a new and/or modified facility, or a combination of the two, could cause a significant ambient air impact. Below are general steps for identifying emissions to include in the SIA.

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

SIA 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 engineer. 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 pollutant.

SIA 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 SIA 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.

SIA Step 4: Develop the Emission Inventory for the Site. In general, the requested allowable emission rate, requested operating rate or maximum design rate should be modeled; however, the applicant should consult with the permit engineer to verify that the appropriate emission rates were developed. If the requested emission or operating rate used in the modeling is less than the maximum design rate, it may become a permit condition. For modifications, the facility-wide net emissions increase for the modification should be modeled in the SIA.

Major stationary sources do not need to include emissions from the commercial, residential, and industrial growth analysis in the SIA. The growth analysis required by the PSD rules is only recommended if a CAAQS and NAAQS analysis, a PSD increment analysis, or a similar air quality impact analysis is triggered.

Carry out the SIA modeling.

For a given pollutant and averaging period, the highest estimated concentration at each receptor in ambient air is compared to the modeling significance levels in Table 2 and Table 3. Impacts from nearby and other background sources, including background concentrations, are not considered in the SIA. If the estimated concentration levels are below the applicable modeling significance level, no further analysis is recommended. The source is considered to have an insignificant impact. For example, if impacts are below the significance levels in Table 3, a compliance demonstration for Colorado and National Ambient

Air Quality Standards (CAAQS and NAAQS analysis) is not triggered. For major stationary sources subject to PSD rules, a Class I or Class II PSD increment analysis is not triggered if the impacts are below the significance levels in Table 2; however, other analysis requirements of the PSD rules must nevertheless be addressed. If the impact exceeds the modeling significance levels, the source or modification has a significant impact in ambient air and the next phase of analysis is triggered, as discussed below.

The SIA also provides a convenient way to define the "probable area of influence" of a source's emissions (see Regulation No. 3, Part B, §III.B.5.d). In practice, it is sometimes useful to define the significant impact radius or area for the source or activity of interest.

If modeling shows that no violation of a standard (or, for major stationary sources, an applicable PSD increment) will occur within the significant impact area of a proposed source, as determined by a comparison with the applicable modeling significance levels, no cumulative air quality impact analysis is warranted.

Significant Impact Level (SIL)

PSD increment *modeling significance levels* (Table 2) are only used for major stationary sources subject to PSD rules. The Class I PSD increment significance levels are based on U.S. EPA proposals from 1996.[5] For minor sources and minor modifications, the Division does not consider compliance with PSD increments as a criterion in determining if a permit should be issued for a minor source or minor modification.

The modeling significance levels in Table 2 are only intended for the PSD increment analysis. Table 2 does not include values for Class III areas as there are no Class III areas in Colorado. The modeling significance levels were not developed to determine if there would be significant impacts to air quality related values (AQRVs).

[5] Federal Register: July 23, 1996 (Volume 61, Number 142), Proposed Rules, Page 38249-38344.

Table 2. Significant Levels for PSD Increments (µg/m^3)

Pollutant	Class I	Class II
Carbon Monoxide (CO)		
8 hour	(a)	500
1 hour	(a)	2000
Nitrogen Dioxide (NO_2)		
Annual	0.1	1
1 hour	(a)	7.5
Sulfur Dioxide (SO_2)		
Annual	0.1	1
24 hour	0.2	5
3 hour	1.0	25
1 hour	(a)	4
Particulate Matter < 10 µm (PM_{10})		
Annual	0.2	1
24 hour	0.3	5
Particulate Matter < 2.5 µm ($PM_{2.5}$)		
Annual	0.05	0.2
24 hour	0.27	1.2

(a) Modeling significant level has not been defined

For minor and major stationary sources, the modeling significance levels in Table 3 are used to determine if a CAAQS and NAAQS analysis is triggered (see Figure 4). The significance levels in Table 3 are listed in Regulation No. 3, Part D, §VI.D.2.

Table 3. Significant Levels for NAAQS & CAAQS (µg/m^3)

Pollutant	SIL
Carbon Monoxide (CO)	
8 hour	500
1 hour	2000
Nitrogen Dioxide (NO_2)	
Annual	1
1 hour	7.5
Sulfur Dioxide (SO_2)	
Annual	1
24 hour	5
3 hour	25
1 hour	4[a]
Particulate Matter < 10 µm (PM_{10})	
Annual	1
24 hour	5
Particulate Matter < 2.5 µm ($PM_{2.5}$)	
Annual	0.2
24 hour	1.2

[a]Interim modeling significance level developed by the Division: https://www.colorado.gov/airquality/permits/Interim1-hrSO2SIL.pdf

Cumulative Impact Analysis

The components of the cumulative impact analysis vary depending on the applicable regulatory requirements. For minor sources and minor modifications, a compliance demonstration with Colorado Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS) is usually the only type of impact analysis that is requested. Refer to Table 1 to determine if modeling is warranted.

Table 4 summarizes the typical types of air quality analysis for new minor sources or minor modifications that might be applicable. In attainment areas, all new sources and modifications with a significant impact in ambient air should perform a cumulative CAAQS and NAAQS analysis. For nonattainment area requirements, please refer to the Nonattainment Areas portion of Section 2.

Impact analysis requirements are stated in applicable regulations. Regulation No. 3, Part B, §III.D presents the general requirements for all construction permit applications, including minor sources.

For minor sources and minor modifications, a compliance demonstration with the Prevention of Significant Deterioration (PSD) increments is not required to obtain a construction permit. A preliminary opinion in June 1998 from the Colorado Attorney General's office suggests that rulemaking would be necessary before compliance with PSD increments could be a permit issuance criterion for minor sources and minor modifications. Therefore, increment consumption from minor source growth is assessed only during the modeling process for new sources and modifications subject to PSD rules and during periodic increment studies. Nevertheless, since all sources, including minor sources, can consume PSD increment in areas where the PSD minor source baseline date has been triggered, new minor sources and minor modifications are encouraged to voluntarily demonstrate compliance with applicable increments.

Table 4. Ambient Air Impact Analyses Applicable for New Minor Source & Minor Modifications

Area Classification	Ambient Air Impact Analysis
Attainment, Unclassifiable	NAAQS & CAAQS
Nonattainment	NAAQS & CAAQS
	Reasonable Further Progress (RFP)

The components of the major stationary source or major modification air quality impact analysis vary depending on the applicable regulatory requirements. Permit applicants are encouraged to contact the Division as early as possible to discuss permitting requirements. The Division and U.S. EPA encourages applicants to submit modeling protocols.

All areas of Colorado are classified as Class II with the exception of the twelve federal Class I areas, which are shown in Figures 6 and 7. Class I areas have the greatest protection from air quality deterioration; Class III areas have the least protection; however, there are no Class III areas in Colorado. In addition to demonstrating compliance with ambient air quality standards, major stationary source permit applicants must demonstrate that they will not cause or contribute to violations of PSD increments. Major stationary sources located within nonattainment areas are subject to additional requirements as discussed in the Nonattainment Areas portion of Section 2.

Table 5 summarizes the typical types of air quality analysis for new major sources or major modifications that might be applicable. The significant impact analysis must be performed if there is a possibility the proposed source will impact a nonattainment area.

Table 5. Ambient Air Impact Analyses Applicable for New Major Source & Major Modifications

Area Classification	Ambient Air Impact Analysis
Attainment, Unclassifiable	NAAQS & CAAQS
	PSD Increment
	Additional Impacts Analysis in any area (Visibility, Water, Soils, Vegetation, Growth)
	AQRV Analysis in Class I Areas
	Pre- and Post-Construction Monitoring
Nonattainment	NAAQS & CAAQS
	Reasonable Further Progress (RFP)
	Net Air Quality Benefit
	AQRV Analysis in Class I Areas

Major stationary sources are required by regulation to submit an additional impacts analysis to address potential impairment to soils, vegetation, water, visibility, and growth, if applicable; it applies in all areas, including Class I and Class II areas. In addition, regulations require that applicants submit an analysis of impairment to Air Quality Related Values (AQRVs) in affected Class I areas.

PSD applicants should also consult with the Division to determine if there will be any pre-construction ambient monitoring requirements. Refer to Regulation No. 3, Part D, §VI to understand how the Division decides if pre- or post-construction monitoring is required.

There are other regulatory requirements in addition to those required by PSD rules. For example, Regulation No. 3, Part B, §III.D.1 subparts a through g list general requirements for obtaining a permit. While subpart e applies to major PSD sources, subparts c and d provide requirements that are more general. Thus, the PSD modeling requirements of subpart e are only one of many requirements that may be applicable.

Regulation No. 3, Part D, §VI.B states, *"the [PSD] requirements of section VI.A do not apply to a major stationary source or major modification with respect to a particular pollutant if the owner or operator demonstrates that...the emissions from the source or modification would not be significant."* Thus, the impact analysis and monitoring requirements of the PSD rules are not applicable for a given pollutant if the emission rate is not significant, as defined in Regulation No. 3, Part D, §II.A.44. In situations where the requirements of §VI are waived, modeling for compliance with ambient air standards may nevertheless be warranted under the requirements of Regulation No.,3, Part B, §III.

NAAQS & CAAQS Analysis

The federal Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of sensitive populations such as people with asthma,

children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. Colorado and National Ambient Air Standards (CAAQS and NAAQS) are listed in Tables 6 and 7, respectively. Units of measure for the standards are parts per million (ppm) by volume, parts per billion by volume (ppb), and micrograms per cubic meter of air (µg/m^3).

The ambient air quality standards in Tables 6 and 7 are based on a reference temperature and pressure of 25 degrees Celsius and 760 millimeters of mercury (1,013.2 millibars or 1 atmosphere), respectively. Correction of modeled concentration estimates to reference conditions (i.e., standard temperature and pressure, STP) before comparison with ambient air quality standards is not required for air quality permit modeling in Colorado. If it is necessary to perform unit conversions, the following formula may be used:

$$X_{ppm} = \frac{X_{\mu g m^{-3}}}{(40.9 \times MW)} ; MW = Molecular\ weight\ of\ pollutant\ in \frac{g}{mole}\ and\ X\ is\ concentration^{6}$$

If the impact is significant and a CAAQS and NAAQS modeling analysis is warranted, the modeling should account for the source under review plus existing air pollution levels at the locations (receptors) where the source has a significant impact. The purpose of the NAAQS/CAAQS 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 increment review will not cause or contribute to an exceedance of the NAAQS and CAAQS.

This can be done in several ways. In general, the compliance demonstration for standards should include:

NAAQS/CAAQS Step 1: Conduct a SIA. Perform a significant impact analysis 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 significant impact level (SIL).

- 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 SIL.
- 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 a significant impact area and a full NAAQS analysis is required. Go to Step 2.

NAAQS/CAAQS Step 2: Determine Significant Impact Area. Each criteria pollutant and averaging period subject to the NAAQS/CAAQS analysis may have a different significant impact area.

- The significant impact area is the set of receptors that have predicted concentrations at or greater than the SIL for each applicable averaging time and criteria pollutant.

[6] $1\,ppm_v = \frac{1 L_{\text{pollutant}}}{10^6\ L_{air}} = \frac{0.0409\,\text{moles} \cdot L^{-1} \times 1000\,L \cdot \text{m}^{-3} \times MW \times 10^6\ \mu g \cdot g^{-1}}{10^6\ L_{air}} = (40.9 \times MW)\,\mu g \cdot m^{-3}$

where $n/V = P/RT = 0.0409\ \text{moles} \cdot \text{L}^{-1}$, where P =1 atm, T =298 K, R =0.08206 L·atm·K^{-1}·$mole^{-1}$, L = liters

- The full NAAQS analysis is carried out for each criteria pollutant and averaging time separately and need only include the significant impact area for the associated criteria pollutant and averaging time combination.
- Refinement of the significant impact area may be necessary as is discussed in Section 5, Receptor Network.

NAAQS/CAAQS Step 3: Evaluate Nearby Sources. The applicant needs to request a nearby source inventory from the Division. It is the responsibility of the applicant to obtain the data and ensure the accuracy. Any changed made to the data must be documented and justified.

The nearby source inventory for major source and major modifications (e.g., sources subject to PSD rules) should expand to 50km of the significant impact area of the new source or modification under review. Identify nearby sources to explicitly model. Select additional background sources as appropriate to account for impacts not reflected in the background concentration. Sources beyond 50 kilometers should be considered if long-range transport modeling is being performed for a federal Class I area. Estimated impacts from growth in residential, commercial, and industrial sources associated with, but not part of, the proposed source should be included in the analysis for major sources and major modifications.

NAAQS/CAAQS Step 4: Conduct a CIA. Perform a cumulative impact analysis. Model all facility sources with the nearby sources obtained from the Division. Model allowable emission rates for all sources that emit the criteria pollutant.

NAAQS/CAAQS Step 5: Add Background concentration to CIA modeled result. The applicant needs to request a representative background concentration from the Division. This background concentration should be added to the modeled result from the CIA.

NAAQS/CAAQS Step 6: Compare to NAAQS/CAAQS. Compare the modeled CIA concentration plus representative background concentration for each criteria pollutant and averaging time to the appropriate NAAQS. Use the correct design value that follows the form of the applicable NAAQS or the highest first high depending on the meteorological determination (discussed in Section 5, Criteria Pollutants Recommendations).

If the maximum concentrations are at or below the NAAQS/CAAQS, the demonstration is complete. If the concentration is above the NAAQS/CAAQS, perform a contribution analysis to demonstrate that the proposed source will not exceed the applicable significant impact levels in Table 3 at the point (receptor) and time of the modeled violation. If the proposed source will not exceed the applicable SIL at the point and time of the modeled violation, the demonstration is complete. No further air quality impact analysis is warranted for the new source or modification, even when a new violation would result from its insignificant impact. If the proposed source has a significant impact at the point and time of the modeled violations, review the demonstration and determine if any refinements can be made or demonstrate that the project's impact will not be significant. The following options can be considered to further refine the model to show compliance with the NAAQS/CAAQS:

- Emission Limits;
- Operating schedule restrictions;

- Physical changes at the facility to improve dispersion characteristics;
- The use of fences or physical barriers to preclude public access from contiguous land owned or controlled by the operator (i.e., standards and increments only apply in ambient air);
- Additional pollution control equipment;
- The use of more refined modeling techniques, including nonguideline models (e.g., non-EPA dispersion models, physical models, and monitoring-based methods)

The Common Provisions Regulation, §II.A states that if emissions generated from sources in Colorado cross the state line, such emissions shall not cause the air quality standards of the receiving state to be exceeded, provided reciprocal action is taken by the receiving state. The Division is not aware of any formal written agreements regarding reciprocal action. Nevertheless, if the impact from a new or modified source will have a significant impact in another state as defined in section 5, or if it will likely affect another state, the Division recommends contacting the appropriate agency in the affected state to determine if there are any applicable state standards. If so, consult with the Division to determine what if any analysis is recommended.

The Division may recommend that additional analysis be performed to show compliance with applicable standards of that state. If modeling appears to be warranted, staff from the Division and the affected state should discuss the situation to determine an acceptable modeling approach.

Table 6. Colorado Ambient Air Quality Standards (CAAQS)

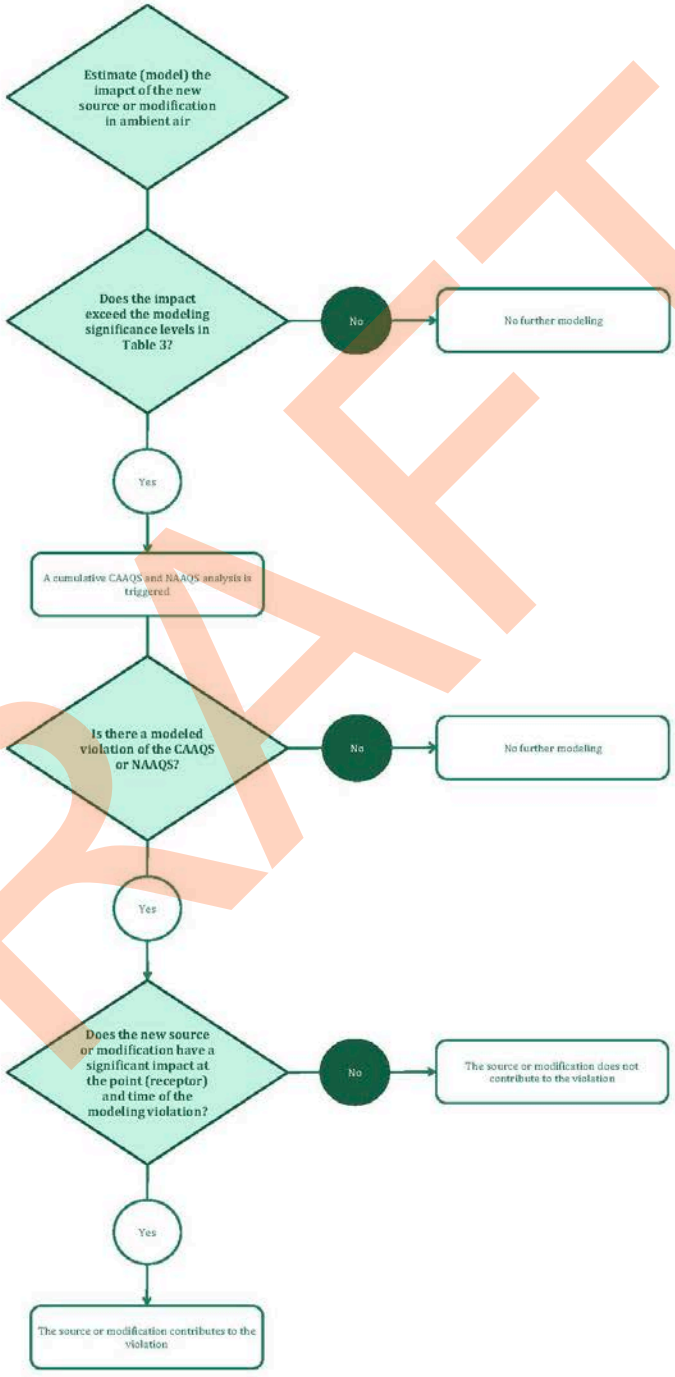
Pollutant & Averaging Period	Level	Form
Carbon Monoxide (CO)		
1 hour	40,000 µg/m^3	Not to be exceeded more than once per year
Nitrogen Dioxide (NO_2)		
Annual	100 µg/m^3	Annual Mean
Ozone (O_3)		
1 hour	235 µg/m^3	Expected number of days per calendar year, with maximum hourly average concentration greater than 0.12 ppm, is equal to or less than 1
Sulfur Dioxide (SO_2)		
3 hour	700 µg/m^3	Not to be exceeded more than once per year

Table 7. National Ambient Air Quality Standards (NAAQS)

Pollutant & Averaging Period	Primary/Secondary	Level	Form
Carbon Monoxide (CO)			
8 hour	Primary	9 ppm	Not to be exceeded more than once per year
1 hour	Primary	35 ppm	Not to be exceeded more than once per year
Lead (Pb)			
Rolling 3 month	Primary & Secondary	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide (NO_2)			
Annual	Primary & Secondary	53 ppb	Annual Mean
1 hour	Primary	100 ppb	98th percentile of 1-hour daily maximum concentrations, average over 3 years
Ozone (O_3)			
8 hour	Primary & Secondary	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Sulfur Dioxide (SO_2)			
Annual[1]	Primary	0.03 ppm	Annual mean
24 hour[1]	Primary	0.14 ppm	Not to be exceeded more than once per year
3 hour	Secondary	0.5 ppm	Not to be exceeded more than once per year
1 hour	Primary	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
Particulate Matter < 10 µm (PM_{10})			
Annual	Revoked in 2006		
24 hour	Primary & Secondary	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Particulate Matter < 2.5 µm ($PM_{2.5}$)			
Annual	Primary	12.0 µg/m^3	Annual mean, averaged over 3 years
Annual	Secondary	15.0 µg/m^3	Annual mean, averaged over 3 years
24 hour	Primary & Secondary	35 µg/m^3	98th percentile, averaged over 3 years

[1]The 24-hour and Annual SO_2 standards were revoked in 2010; however, they remain in effect in Colorado until December 21, 2018. Please contact the Division if you have questions regarding SO_2.

Figure 4. Flowchart of the Air Quality Impact Analysis Process for CAAQS and NAAQS



PSD Increment Analysis

The air quality analysis for new/modified sources subject to Prevention of Significant Deterioration (PSD) rules must demonstrate compliance with PSD increments if the impact from the new source or modification is significant. This section is not intended to provide a complete overview of PSD increment consumption; for that, refer to EPA guidance documents.

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 following discussion explains PSD increment analyses followed by the basic procedure for conducting the analyses.

Refer to Section 5, Criteria Pollutants Recommendations, for more information about the design value that should be used to determine compliance with applicable PSD increments. Increment consumption is a receptor-by-receptor concept. That is, the consumption of PSD increment by one particular source does not necessarily preclude similar increment consumption by another nearby source if the consumption occurs on a different day (i.e., under different meteorological conditions) and/or at a different location (e.g., receptor).

All changes in emissions and related parameters[7] after the minor source baseline date may affect PSD increment consumption or expansion. This includes both stationary sources and mobile sources. In addition, modifications at major stationary sources after the major source baseline date also may affect increment consumption. Refer to U.S. EPA guidance and Division guidance[8] for procedures.

Area and mobile sources may be important increment consuming sources. In most situations, the Division can provide at least a county-level inventory of increment consuming area and mobile emissions; however, because of the amount of time required by the Division to develop such inventories, the Division will typically not develop increment inventories for an individual permit application until the permit applicant and the Division agree that an area and mobile source inventory is actually warranted. If the Division does not have the resources necessary to develop the inventory in the time frame needed by the applicant, the burden of doing the area and mobile analysis may fall on the applicant.

All areas of Colorado are Class II areas except for the Class I areas shown in Figures 6 and 7. PSD baseline areas for PM_{10} are based on the Colorado Air Quality Control Regions (AQCRs) shown in Figure 5. It is worth noting that there are both Colorado AQCRs (planning areas) and federal AQCRs. They are comprised of different counties. While the Colorado AQCRs are used as PSD baseline areas for PM_{10}, the federal AQCRs are used in U.S. EPA's Air Quality System (AQS). The entire state serves as the baseline

[7] "The creditable increase of an existing stack height or the application of any other creditable dispersion technique may effect increment consumption or expansion in the same manner as an actual emissions increase or decrease. That is, the effects that a change in the effective stack height would have on ground level pollutant concentrations generally should be factored into the increment analysis." (USEPA, 1990)

[8] Refer to the *Technical Guidance Series: PSD Increment Tracking System* document for a detailed discussion about the PSD increment tracking in Colorado.

area for SO_2 and NO_2. Figure 5 and Table 9 show the minor source baseline areas and trigger dates in Colorado.

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 applicant should follow the basic procedure described in the following paragraphs.

PSD Increment Step 1: Determine whether the modeled high concentration (excluding background concentration) obtained in the PSD cumulative 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. This does not apply for criteria pollutants with NAAQS that are statistically-based (i.e., multi-year average).

PSD Increment Step 2: Determine the significant impact area for each criteria pollutant and averaging period subject to the PSD increment analysis. The significant impact area 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 significant impact analysis following the convention of exceedance-based NAAQS (i.e., maximum predicted concentration).

PSD Increment Step 3: Obtain a listing of applicable increment-affecting sources and associated parameters within 50km of the significant impact area from the Division to evaluate in the air quality impact analysis. Sources beyond 50km should be considered if a long-range transport increment analysis is being performed for a federal Class I area. It is the responsibility of the applicant to obtain

these data and ensure their accuracy. Any changes made to the data must be documented and justified.

PSD Increment Step 4: Adjust the emission inventory using professional judgment.

- 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 significant impact area 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 modeled high 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 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.

Unique Colorado PSD Increment Requirement

As required by Regulation No. 3, Part D, §X.A.5.a, new sources and modifications subject to PSD rules should demonstrate that the source by itself will not consume more than 75% of any applicable PSD increment. The 75% rule does not apply to minor sources.

Along with the 75% increment consumption requirement, there are also Class II areas in Colorado that have the same protections as Class I areas for SO_2. Refer to Regulation No. 3, Part D, §VIII.B for more information. Modeling is recommended for SO_2 sources that could impact these areas, based on boundaries that existed on August 7, 1977:

a) Florissant Fossil Beds National Monument;

b) Colorado National Monument;

c) Dinosaur National Monument;

d) Black Canyon of the Gunnison National Park (areas that are not already Class I);

e) Great Sand Dunes National Park and Preserve (areas that are not already Class I);

f) Uncompahgre Mountain Primitive Area;

g) Wilson Mountain Primitive Area;

h) BLM lands in the Gunnison Gorge Recreation Area.

Figure 6 depicts these Class II areas.

Table 8. PSD Increments (µg/m^3)

Pollutant	Class I	Class II
Nitrogen Dioxide (NO_2)		
Annual	2.5	25
1 hour	(a)	(a)
Sulfur Dioxide (SO_2)		
Annual	2	20
24 hour	5	91
3 hour	25	512
1 hour	(a)	(a)
Particulate Matter < 10 µm (PM_{10})		
Annual	4	17
24 hour	8	30
Particulate Matter < 2.5 µm ($PM_{2.5}$)		
Annual	1	4
24 hour	2	9

(a) PSD increment level has not been defined

Class III increment values have been removed as there are no Class III areas in Colorado

Table 9. PSD Baseline Dates in Colorado

As of March 2018[1]

Pollutant	Major Source Baseline Date	Trigger Date	Minor Source Baseline Date	Air Quality Control Region (AQCR)	Triggering Application
Sulfur Dioxide (SO_2)	01/06/1975	08/07/1977	10/12/1977	Entire State	Rio Blanco Oil Shale – Tract C-a
Nitrogen Dioxide (NO_2)	02/08/1988	02/08/1988	03/30/1989	Entire State	Amoco Production – Wattenberg
Particulate Matter < 10 µm (PM_{10})	01/06/1975	08/07/1977	11/01/1988	AQCR 1	Colorado Power Partners – Brush
			01/17/1980	AQCR 2	Platte River Power Authority – Rawhide
			11/14/2000	AQCR 3	North American Power Group – Kiowa Creek
			11/22/1994	AQCR 4	Colorado Springs Utilities – Nixon
			11/09/2000	AQCR 5	Tri-State – Limon
			06/19/1989	AQCR 6	Cimarron Chemical – Vilas
			04/04/1995	AQCR 7	Westplains Energy - Pueblo
			Not Triggered	AQCR 8	NA
			Not Triggered	AQCR 9	NA
			08/20/1984	AQCR 10	Colorado Ute – Nucla
			10/12/1977	AQCR 11	Rio Blanco Oil Shale – Tract C-a
			07/01/1983	AQCR 12	Louisiana Pacific – Kremmling
			Not Triggered	AQCR 13	NA
Particulate Matter < 2.5 µm ($PM_{2.5}$)	10/20/2010	10/20/2011	09/10/2013	--	Black Hills – Pueblo Airport Generating Station Unit 6

[1]Contact the Division for the latest information

$PM_{2.5}$ increment is currently being reviewed within the Division. This table will be updated once the Division makes a final decision regarding the AQCRs for $PM_{2.5}$. Please contact the Division for more information.

Figure 5. Colorado PM_{10} PSD Baseline Areas

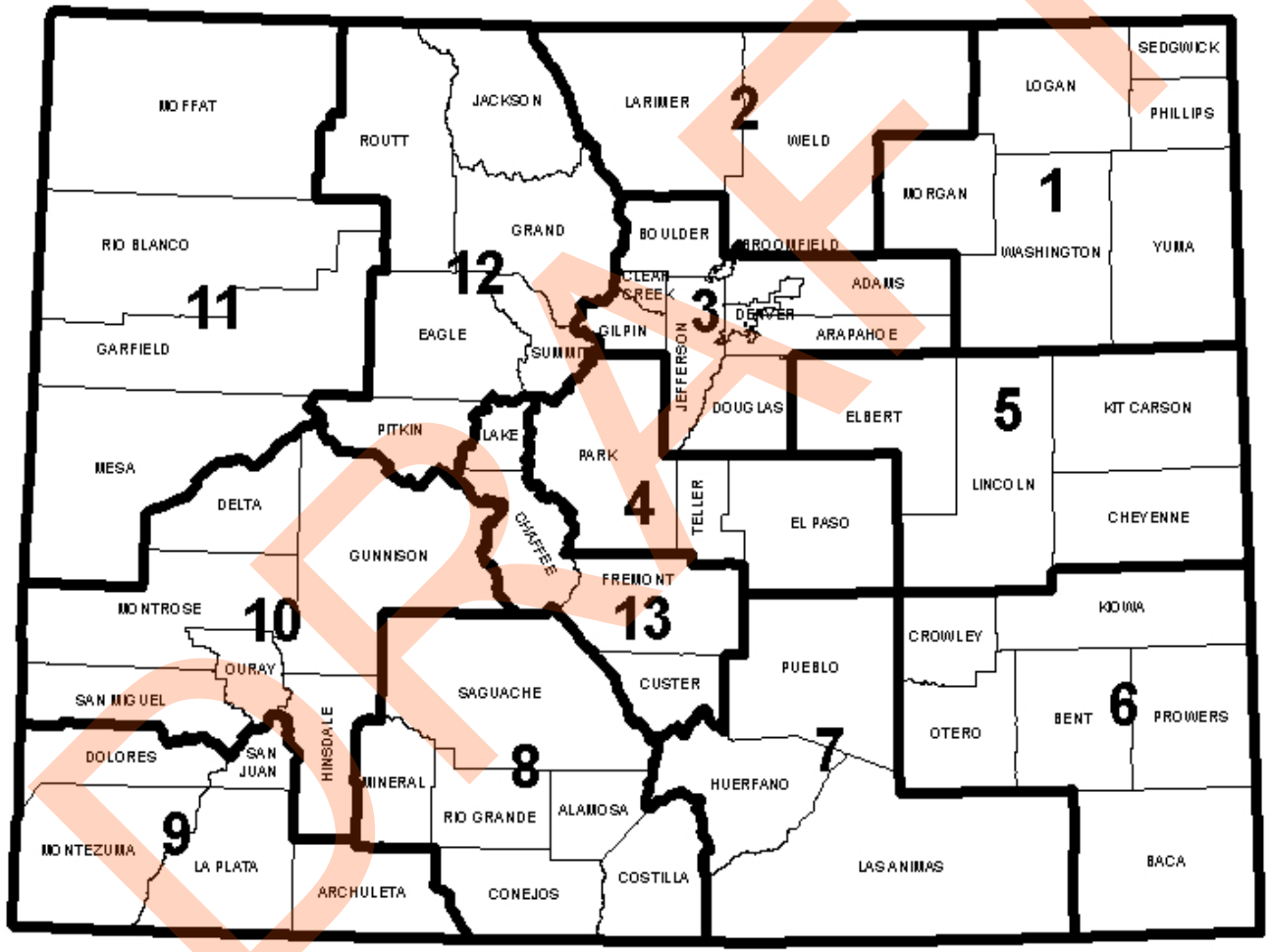


Figure 6. Class II Areas with "Class I Protection" for SO_2 Increment

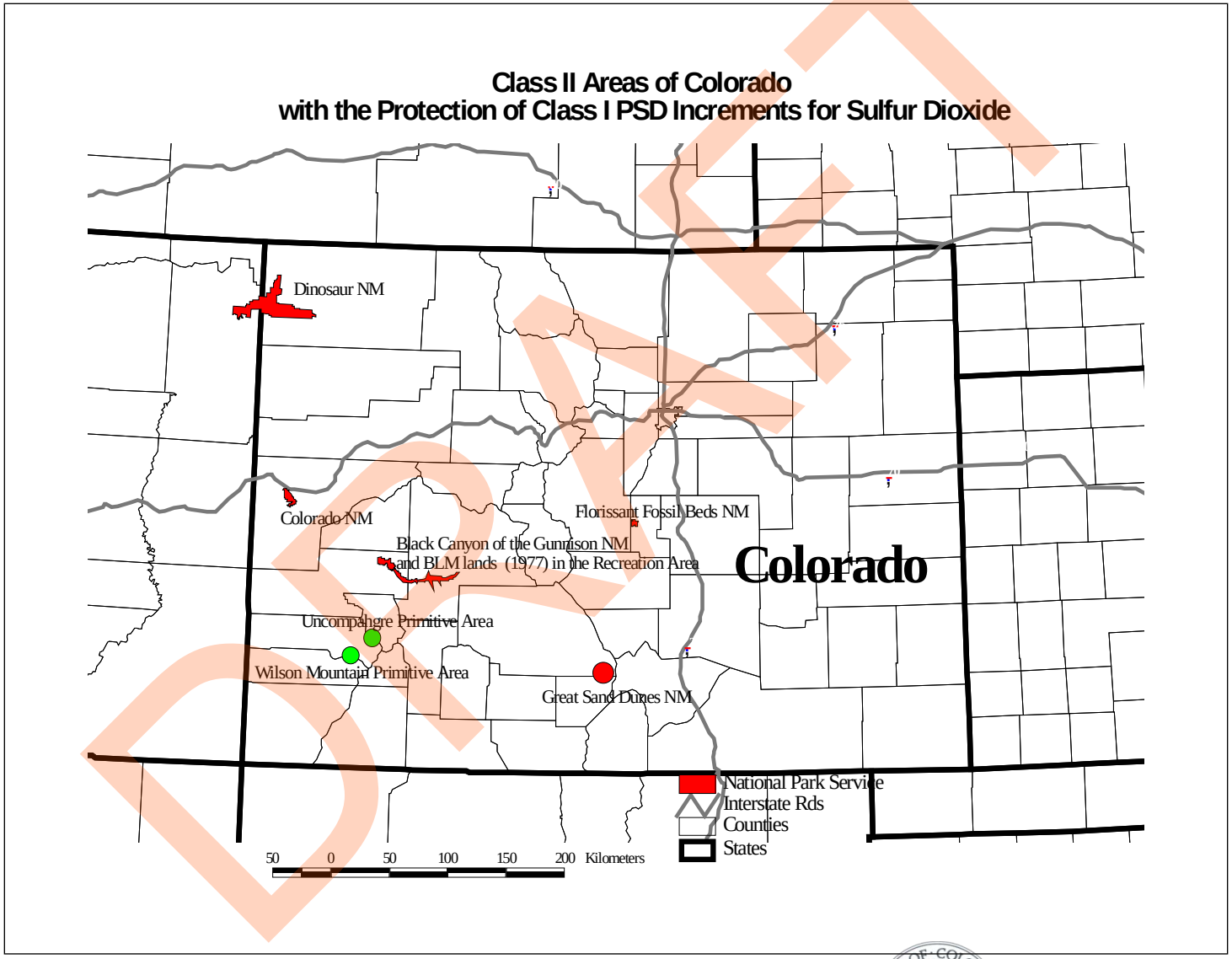
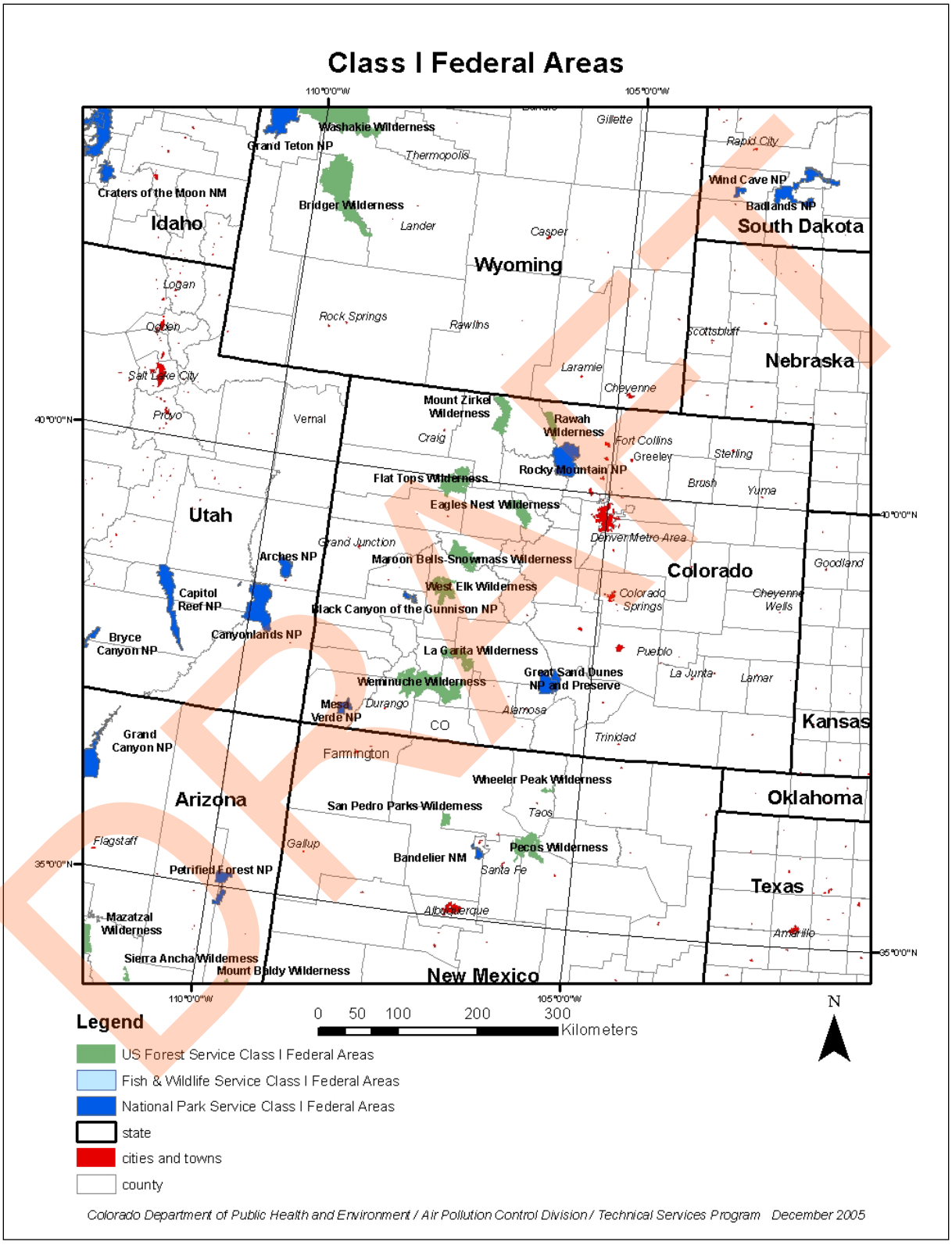


Figure 7. Federal Class I Areas



Additional Impacts Analysis

This section is currently under review within the Division. Please contact Division staff to confirm the procedure for an additional impacts analysis.

Regulation No. 3, Part D, §VI.A.6 requires an *additional impact analysis* for ***major stationary sources*** and major modifications. The additional impact analysis applies in all areas, including Class I and Class II areas. The regulation specifically requires an "analysis of the impairment to visibility, water, soils, and vegetation." In some instances, a growth analysis is also required. The growth analysis is recommended only if the new source or modification will have a ***significant impact***; that is, it is only required if an air quality impact analysis (e.g., CAAQS and NAAQS analysis, PSD increment analysis) is triggered.

The *additional impact analysis* can be done using ***qualitative*** or ***quantitative*** methods. The Division generally views the *analysis of impairment* as a disclosure type of requirement. The level of analysis depends on the situation and the likelihood that there could be some type of impairment.

In general, if the additional impact analysis suggests there might be adverse impacts to soils, vegetation, or visibility, the information may be used in the BACT review process. This does not mean that the BACT determination must fix the problem; it means that all the issues associated with BACT, including economics and environmental impacts should be balanced and considered.

Impact Analysis for Water

The inclusion of water in the additional impact analysis is a Colorado requirement. By regulation, the water analysis in Class II areas does not affect permit approval or denial or control technology selection. The water impact analysis is intended to serve as a data-gathering and analysis mechanism to allow the Division and others to further investigate problems such as acid deposition in high altitude lakes. Refer to the "Additional Impact Analysis" discussion in the "Statement of Basis and Purpose for the Prevention of Significant Deterioration Program Regulations" (adopted March 10, 1983) of the Common Provisions Regulation for more information about the intent of this requirement.

Visibility Analysis

In addition to the Class I visibility analysis discussed in section 7.5, an analysis of impairment to visibility in Class II areas should also be addressed in the permit application (see Regulation No. 3, Part D, §VI.A.6).

According to U.S. EPA guidance (USEPA 1990), "*in the visibility impairment analysis, the applicant is especially concerned with impacts that occur within the impact area of the proposed new source or modification. Note that the visibility analysis required here is distinct from the Class I area visibility analysis requirement. The suggested components of a good visibility impairment analysis are:*

- *a determination of the visual quality of the area,*
- *an initial screening of emission sources to assess the possibility of visibility impairment, and*
- *if warranted, a more in-depth analysis involving computer models*."

Refer to U.S. EPA guidance for more specific recommendations. The focus of Class I visibility analysis is on assessing visibility impacts within a Class I areas. The focus of the Class II visibility analysis is on sensitive

views outside of Class I areas. The Division has developed a database of sensitive views to assess impacts in Class II areas. These are called *scenic and/or important views*. They are not integral vistas.[9] The Class II scenic and/or important views do not have the force and effect of the visibility rules in Class I areas. The information regarding levels of change in visibility is used to track changes in visibility that might be important to the public. A list of these views is available from the Division.

The Division does not appear to have the authority to deny a permit if adverse visibility impacts occur outside a Class I area. Instead, the information may be used to consider the need for additional emission controls. Therefore, it is important to keep the Class I visibility analysis distinct from the Class II visibility analysis in the modeling report.

In practice, when PSD applicants contact the Division, the Division will determine if there are any Class II scenic views within the probable area of influence of the proposed source. If there are, the analysis approach should be determined on a case-by-case basis in consultation with the Division. If modeling is warranted, the modeling procedures for the scenic and/or important views are usually based on techniques similar to those used for Class I visibility assessments.

The Division does not have specific thresholds or criteria for determining when there is *impairment* to a Class II view. Impairment determinations are made on a case-by-case basis considering a number of factors including the geographic extent, intensity, duration, frequency, and time of modeled visibility impairment. Other factors such as interference with a visitor's visual experience, correlations between time of impairment with natural conditions that reduce visibility, and other criteria might be considered. Finally, limitations of the modeling system are considered. For example, results from a screening-level model do not carry as much weight as results from a refined model. The ability of the modeling system to properly account for relevant atmospheric chemistry and meteorology is also considered. If, after considering all appropriate criteria, it is believed that Class II visibility may be impaired, the Division may request that the "environmental impact analysis" portion of the "best available control technology" (BACT) determination be revisited.

A compliance demonstration with Colorado's visibility standard, which is applicable in the AIR Program[10] area, is not required to obtain a permit.

[9] An integral vista adopted into regulation can be afforded the same level of protection from visibility impairment as the Class I area itself or any lesser level or protection, as determined by a state on a case-by-case basis. Because views in the Western U.S. commonly extend for great distances, integral vistas are a controversial aspect of the Visibility SIP package. The Department of the Interior (DOI) preliminarily identified integral vistas associated with Class I areas on January 15, 1981. However, both the DOI (speaking for the National Park Service) and the Department of Agriculture (speaking for the U.S. Forest Service) later declined to officially list any vistas. One reason given by the DOI was that states already had sufficient opportunity through existing authority to protect integral vistas. Thus, the naming of integral vistas and incorporation into SIPs was left to individual states (CDPHE, 1992).

[10] The AIR program area is defined in 42-4-304, C.R.S. It generally includes all or part of the following counties: Adams, Arapahoe, Boulder, Denver, Douglas, El Paso, Jefferson, Larimer, and Weld.

Soils and Vegetation Analysis

Regulation No. 3 states that the owner or operator should provide an analysis of impairment to soils and vegetation for each regulated pollutant emitted in a significant quantity. Only vegetation with commercial or recreational value should be addressed. U.S. EPA's guidance states that, for most soils and vegetation, ambient concentrations of criteria pollutants below the secondary National Ambient Air Quality Standards (NAAQS) will not result in harmful effects. Nevertheless, the secondary NAAQS may not adequately protect certain sensitive vegetation and soils, particularly for regulated non-criteria pollutants (USEPA 1990), see section 7.3. As recommended in U.S. EPA guidance, new sources or modifications subject to PSD rules should:

a) provide an inventory of soils and vegetation with commercial or recreational value in the vicinity of the facility (e.g., crops);

b) review peer-reviewed scientific literature to determine the concentration level (for appropriate averaging times) of regulated pollutants that would be harmful to vegetation; if no information is available in the literature, assume the secondary NAAQS is protective if one exists for the regulated pollutant under review; if modeling has been done, compare modeled impacts to the secondary NAAQS and to other levels of concern identified through a literature search; if the potential impact is determined to be harmful, discuss the nature of the harm and its spatial extent in the modeling report.

AQRV and Visibility Analysis in Federal Class I Areas

This section is currently under review within the Division. Please contact Division staff to confirm the procedure for an AQRV and Visibility analysis in Class I areas.

The Air Quality Related Values (AQRV), analysis is required as part of a PSD permit to estimate potential changes in visibility, deposition, soils and water in Class I areas. The goal of the Class I impact analysis is to determine if the projected changes to AQRVs, as a result of the installation of a new source or the modification of an existing source under the PSD regulations, are acceptable for a given Class I area (See Regulation No. 3, Part D, §XIII and XIV for regulatory requirements). The decision to issue a permit is the responsibility of the Division. A permit application can be denied if a proposed source would impair visibility or other AQRVs in a Class I area. It is important to note that the determination of impairment is done on a case-by-case basis. In the case of visibility, this determination will be made based on the magnitude, number of occurrences, time of year and if such changes would affect a visitor's experience in the area. For more on the regulatory framework, refer to applicable regulations and section 10.1.

In general, the elements of the federal Class I AQRV, including visibility, analysis are determined on a case-by-case basis.

Regulation No. 3, Part D, §XIII.A states that "Within twenty days of receipt of a permit application for a new major stationary source or major modification that may affect visibility or air quality related values in any Federal Class I area, the division shall transmit a copy of the application to all affected Federal Land Managers and consult with them as to its completeness in its analysis and monitoring (if required) of air quality related values. If the division receives advance notification of a permit application of a source that may affect visibility or air quality related values, it will notify all affected Federal Land Managers

within thirty days of such notification. The division will consider any analysis performed by a Federal Land Manager that indicates there will be an adverse impact on visibility or air quality related values if such analysis is received within thirty days after the Federal Land Manager receives a copy of the complete application. If the division disagrees with the Federal Land Manager, any notices for public comment or of a public hearing on the application will explain the disagreement or state where the explanation can be obtained."

If a protocol is submitted to the Division, as recommended in section 8.1, a copy should be provided for each affected federal land manager.

As stated in Regulation No. 3, Part D, §XIII, the Division sends affected FLMs a copy of the permit application for proposed new sources or modifications that may affect *air quality related values* (AQRVs) in any federal Class I area. For relatively small and/or distant major stationary sources, the FLM may not take an active role in the review or modeling process. In other cases where a significant impact may occur or where there may be unacceptable levels of change to AQRVs, including visibility, the FLM usually takes an active role.

While the Division's Stationary Sources Program is responsible for forwarding the permit application to the appropriate FLMs, Technical Services Program staff typically contact affected FLMs to obtain Class I significance levels and other recommendations for the analysis required by Regulation No. 3.

The initial contact with FLMs should occur early in the process. If there is a PSD pre-application meeting, FLMs should be invited. Regulations require that the Division consult with the FLMs as to the completeness of the permit application. If the applicant decides to directly contact affected FLMs for recommendations, the Division should be kept in the loop.

Air Quality Related Values Analysis for Major Stationary Sources

For proposed major stationary sources and major modifications located in attainment areas, visibility requirements for new sources and modifications subject to PSD rules are found in various sections of Regulation No. 3, Part D including: §VI.A.6, §XIII, and §XIV.E

For proposed major stationary sources and major modifications located in nonattainment areas, refer to Regulation No. 3, Part D, §V.

Figure 3 illustrates key aspects of the regulatory decision process for major stationary sources and major modifications seeking construction permits:

- The first step in the process is to determine those pollutants for which there will be a *significant* emission rate increase for a new source or a significant net emissions increase for a major modification.
- If the proposed emission rate is not significant, the additional impact analysis (Regulation No. 3, Part D, §VI.A.6) and the AQRV reguirements (§XIII and §XIV.E) do not apply. In practice, new sources are major for some pollutants and minor for others. In some cases, the modification may not be major for all pollutants that would affect AQRVs.

- If the Division concludes that an "analysis of impairment" (§VI.A.6) is necessary, there are several key decisions that must be made. For example, the applicant should discuss the project with the Division to decide if any AQRV monitoring is warranted (§XIII.B). The Division will make this decision after consultation with the FLM. If monitoring is required, a monitoring plan should be prepared and submitted for Division approval. If monitoring is not warranted, which is usually the case, then the applicant can move on to the next step in the flowchart.
- The applicant should consult with the Division to determine the extent of the "analysis of impairment." The regulations do not clearly define what constitutes an "analysis of impairment." Thus, the extent of the analysis is decided on a case-by-case basis. The Division and U.S. EPA strongly recommend that the applicant submit a protocol.
- When the permit application is submitted to the Division, it must include the "analysis of impairment" to be ruled complete.
- Aplicants should be aware of Regulation No. 3, Part D, §XIII.A – Federal Class I Areas; it states, *"Within twenty days of receipt of a permit application for a new major stationary source or major modification that may affect visibility or air quality related values in any Federal Class I area, the Division shall transmit a copy of the application to all affected Federal Land Managers and consult with them as to its completeness in its analysis and monitoring (if required) of air quality related values. If the Division receives advance notification of a permit application of a source that may affect visibility or air quality related values, it will notify all affected Federal Land Managers within thirty days of such notification."*
    - The next step is to determine if the source will cause or contribute to a violation of applicable Class I PSD increments.
    - If the source does not cause or contribute to a Class I increment violation §XIII.A states, *"The Division will consider any analysis performed by a Federal Land Manager that indicates there will be an adverse impact on visibility or air quality related values if such analysis is received within thirty days after the Federal Land Manager receives a copy of the complete application"*

But if the FLM fails to determine if there will be an adverse impact, the Division may perform the analysis, as explained in Regulation No. 3, Part B §XIII.C.

- If it is determined, through modeling provided by the applicant, that the source will cause or contribute to a violation of applicable Class I PSD increments, then the Division may still issue the permit if the requirements of §XIII.D are met. Regulation No. 3, Part B, §XIII.D states, *"The owner or operator of a proposed major stationary source or major modification may demonstrate to the satisfaction of the Federal Land Manager that the emissions from such source or modification would not*

have an adverse impact on the air quality related values (including visibility) of Class I lands under the Federal Land Manager's jurisdiction, notwithstanding that the change in air quality resulting from emissions from such source or modification would cause or contribute to concentrations that would exceed the maximum allowable increases for Class I area. If the Federal Land Manager concurs with such demonstration and so certifies to the Division, the Division or the Commission may, provided that applicable requirements are otherwise met, issue the permit with such emission limitations as may be necessary to assure that emissions of sulfur dioxide, and PM10, PM2.5 and nitrogen oxides would not exceed the following maximum allowable increases over the minor source baseline concentration for such pollutants..."

- *PM2.5*
  - *Annual arithmetic mean 4 µg/m^3*
  - *Twenty-four hour maximum 9 µg/m^3*
- *PM10*
  - *Annual arithmetic mean 17 µg/m^3*
  - *Twenty-four hour maximum 30 µg/m^3*
- *Sulfur Dioxide*
  - *Annual arithmetic mean 20 µg/m^3*
  - *Twenty-four hour maximum 91 µg/m^3*
  - *Three-hour maximum 325 µg/m^3*
- *Nitrogen Dioxide*
  - *Annual arithmetic mean 25 µg/m^3*

- Although the FLMs have an affirmative responsibility to protect AQRVs they have no permitting authority under the federal Clean Air Act (CAA). They also have no authority under the CAA to establish air quality-related rules or standards. The FLM role consists of considering whether emissions from a new source may have an adverse impact on AQRVs and providing comments to permitting authorities. Thus, the final decision to grant or deny a permit is made by the Division or AQCC. Regulation No. 3, Par B, §XIII.A states, *"If the Division disagrees with the Federal Land Manager, any notices for public comment or of a public hearing on the application will explain the disagreement or state where the explanation can be obtained."*
- If the FLMs disagree with the Division's decision to grant a permit, they may request a hearing, see Regulation No. 3, Part D, §IV.A.6.

Pre- and Post-Construction Monitoring Analysis

Division modeling and monitoring staff should be contacted as early as possible to discuss the need to conduct pre-construction monitoring. If monitoring is proposed or required, a monitoring plan consistent with applicable U.S. EPA and Division monitoring guidance (e.g., "Ambient Air Pollution and Meteorological Monitoring Guidance") should be submitted for approval.

If the proposed emission rate from a new source or the net emissions increase from a modification is significant for a given pollutant, as defined by Regulation No. 3, the estimated impact from the new source or modification should be compared to the significant monitoring concentration (see Table 10 or Regulation No. 3, Part D, §VI.D.2). In addition, if possible, existing air quality levels should be compared to the significant monitoring concentration.

Pre-Construction Monitoring Analysis

Refer to Regulation No. 3, Part D, §VI.A.3 for details about how pre-construction monitoring requirements are determined.

If existing air quality levels or the estimated impacts from the proposed source or modification are below the applicable monitoring de minimis level, Regulation No. 3 states that the monitoring requirements may not apply. If the levels are above the de minimis levels, pre-construction monitoring may be required if the Division believes it is necessary.

Permit applicants should be aware that the time-line for submitting a PSD application could be affected by the requirement to collect ambient data. For example, if the collection of site-specific meteorological data is required, at least a full year of data must be collected. For air quality data, at least a full year of data is typically required, although as little as four months of data may be allowed in some circumstances. The Division must approve ambient data for use before the permit application can be ruled *complete*.

Post-Construction Monitoring Analysis

The modeling report submitted with the permit application should address the need for post-construction monitoring (see Regulation No. 3, Part D, §VI.A.4).[11] As part of the permit review process, the Division will, based on the language in the regulation, determine if post-construction monitoring is necessary.

[11] 40 CFR Part 51.166(v)(2) states that the source "shall...conduct ambient air monitoring as the reviewing authority determines is necessary...."

Table 10. PSD Significant Monitoring Concentration[1]

Pollutant & Averaging Period	Level
Carbon Monoxide (CO)	
8 hour	575 µg/m^3
Nitrogen Dioxide (NO_2)	
Annual	14 µg/m^3
Ozone (O_3)	
8 hour	100 tpy VOCs
1 hour	100 tpy VOCs
Sulfur Dioxide (SO_2)	
24 hour	13 µg/m^3
Particulate Matter < 10 µm (PM_{10})	
24 hour	10 µg/m^3
Particulate Matter < 2.5 µm ($PM_{2.5}$)	
24 hour	4 µg/m^3
Fluorides	
24 hour	0.25 µg/m^3
Total Reduced Sulfur	
1 hour	10 µg/m^3
Hydrogen Sulfide	
1 hour	0.2 µg/m^3
Reduced Sulfur Compounds	
1 hour	10 µg/m^3

[1]The significant monitoring concentrations (de minimis levels) apply only to new sources and modifications subject to PSD review (see Regulation No. 3, Part D, §VI).

Regulated, Non-Criteria Pollutant Analysis

For regulated, non-criteria pollutants (i.e., fluorides, total reduced sulfur, hydrogen sulfide, and reduced sulfur compounds), a separate air quality analysis should be submitted if the applicant proposes to emit the pollutant in a significant amount from a new source or proposes to cause a significant net emissions increase from a modification. The PSD significant emission rates for these pollutants are as follows:

- Fluorides, 3 tons per year;
- Sulfuric Acid Mist, 7 tons per year;
- Hydrogen Sulfide, 10 tons per year;
- Total Reduced Sulfur (including hydrogen sulfide: 10 tons per year);
- Reduced Sulfur Compounds (including hydrogen sulfide: 10 tons per year);

Estimated impacts from regulated non-criteria pollutants should be presented and compared to the significant monitoring concentrations (see Table 10 or Regulation No. 3, Part D, §VI.B.3). Existing background concentration estimates should be determined in consultation with the Division. If ambient measurements are available, they should be presented and compared to the significant monitoring concentrations.

Section 5 – Preferred Air Dispersion Models & Associated Inputs

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.

Criteria Pollutant Recommendations

While this section is intended for sources located in attainment or unclassified areas of Colorado, it may, in some cases, be used by sources located in nonattainment areas; however, sources in nonattainment areas should read Section 2, Nonattainment Areas, first.

In a compliance demonstration, the applicable design concentration must be calculated. This is usually done within the model or by using a post-processor. The design concentrations vary depending on the available meteorological data. If there is not a meteorological dataset that is adequately representative of the facility, then the design concentration needs to be the highest concentration for all pollutants and averaging periods. This allows the worst-case impacts to be captured in the modeling analysis.

The design concentrations also vary depending on the impact analysis being performed. For a NAAQS/CAAQS analysis Appendix W states, *"the design concentration is the combination of the appropriate background concentration with the estimated modeled impact of the proposed source…The specific form of the NAAQS for the pollutant(s) of concern will also influence how the background and modeled data should be combined for appropriate comparison with respective NAAQS in such a modeling demonstration. Given the potential for revision of the form of the NAAQS and the complexities of*

combining background and modeled data, specific details on this process can be found in the applicable modeling guidance available on the EPA's SCRAM Web site." For a PSD increment analysis Appendix W states, *"the design concentration includes impacts occurring after the appropriate baseline data from all increment-consuming and increment-expanding sources."* For short-term increments, the maximum allowable increases may be exceeded once per year at each site. For annual increments, the maximum allowable increases may not be exceeded.

The facility should contact the Division's Stationary Sources Program (SSP) to determine what pollutants need to be included in the air quality impact analysis.

Carbon Monoxide

Compliance demonstrations should address both the 1-hour and 8-hour NAAQS. The maximum highest first high (H1H) modeled concentration from all receptors should be the design value from the SIA to compare to the SILs. When using representative meteorological data, the maximum high second high (H2H) modeled concentration from all receptors should be the design value for both 1-hour and 8-hour averaging periods.

Lead

Compliance demonstrations should address the 3-month NAAQS. The NAAQS is significantly more stringent than the CAAQS monthly value; therefore, the monthly CAAQS was revoked from Colorado Regulation 8 Part C II.B in March 2010.

Nitrogen Dioxide

Compliance demonstrations should address both the 1-hour and annual NAAQS; however, the Division's Stationary Sources Program (SSP) published a memo (PS Memo 10-01) that exempts facilities from showing compliance with the 1-hour NO_2 NAAQS if the long-term modeling threshold is not exceeded. Please be aware that the Division's TSP modeling staff will model the 1-hour averaging period if the facility emissions are above the short-term threshold regardless of their long-term emissions rate. The Division's TSP modeling staff will perform this analysis in support of Regulation No. 3 to demonstrate the facility's impact will not cause or contribute to a violation of the NAAQS. The outcome of the analysis will be included in the public final modeling report.

Both averaging periods are best performed with a tiered approach:

Tier I: 100 percent conversion of nitrogen oxides (NO_x) to nitrogen dioxide (NO_2).

Tier II: Ambient Ratio Method 2 (ARM2) uses an ambient ratio between 0.5 and 0.9 that must be derived from U.S. EPA's Air Quality System. Colorado no longer accepts the EPA-recommended ARM ratio of 0.8 as monitoring data has shown NO_2/NO_X ambient ratios exceeding 0.8 conversions. Justification for ambient ratio used is required. This method should also be used if the following are true:

- Tier I results are within or below a range of 150 – 200 ppb
- NO_2 background concentrations are below EPA's recommended range of 20 – 30 ppb
- O_3 background concentrations are below EPA's recommended range of 80 – 90 ppb
- In-stack NO_2/NO_x ratios at or below 0.2

Tier III: Ozone Limiting Method (OLM) uses in-stack NO_2/NO_x ratios and background concentrations. The EPA established a general acceptance of 0.5 as a default in-stack ratio of NO_2/NO_x for input to OLM. If the applicant proposes to use an in-stack NO_2/NO_x ratio other than the EPA default, sufficient justification and documentation will need to be provided to support the source-specific data. The source-specific in-stack NO_2/NO_x ratio needs approval from the permit engineer. Hourly by season profiles of both NO_2 and O_3 should be requested from the Division for input to OLM.

The maximum highest first high (H1H) modeled concentration from all receptors should be the design value from the SIA to compare to the SILs. When using representative meteorological data, the 1-hour design value should be the maximum 5-year average of the 98th percentile of the annual distribution of the maximum daily 1-hour modeled concentrations or the highest eighth high (H8) for each receptor. When using representative meteorological data, the annual design value should be the maximum modeled concentration for all receptors across all years of meteorological data.

Ozone

In general, accurate and cost effective methods for modeling ozone impacts from stationary point sources are not available. Therefore, ozone modeling is not routinely requested for construction permits, although it could be in unusual cases such as situations where the Division believes ozone standards could realistically be violated by the proposed source or modification. If modeling is considered, the cost of conducting such an analysis will be factored into the decision process.

Precursors to ozone need to be discussed with the Division's TSP modeling staff. The applicant should review applicable EPA guidance regarding precursors to ozone.

Particulate Matter < 10µm (PM_{10})

Compliance demonstrations should address the 24-hour NAAQS. The annual PM_{10} NAAQS was revoked in 2006 so compliance is no longer required for this averaging period. The maximum highest first high (H1H) modeled concentration from all receptors should be the design value from the SIA to compare to the SILs. When using representative meteorological data, the design value should be maximum highest sixth high (H6H) modeled concentration for all years of meteorological data.

Particulate Matter < 2.5µm ($PM_{2.5}$)

Compliance demonstrations should address both the 24-hour and annual NAAQS. The maximum highest first high (H1H) modeled concentration from all receptors should be the design value from the SIA to compare to the SILs. When using representative meteorological data, the 24-hour design value should be the maximum 5-year average of the 98th percentile of the annual distribution of the maximum 24-hour modeled concentration or the highest eighth high (H8H) for each receptor. When using representative meteorological data, the annual design value should be the maximum 5-year average modeled concentration from all receptors.

Secondary formation of $PM_{2.5}$ needs to be discussed with the Division's TSP modeling staff. The applicant should review applicable EPA guidance regarding when modeling secondary formation of $PM_{2.5}$ is necessary.

Sulfur Dioxide

Compliance should be demonstrated with the 1-hour, 3-hour, 24-hour, and annual NAAQS as well as with the Colorado 3-hour standard of 700 µg/m^3. The 24-hour and annual NAAQS remain in effect for "*any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards and any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards.*" The state of Colorado was designated as attainment/unclassifiable on December 21, 2017; therefore, compliance demonstrations for the 24-hour and annual NAAQS are required until December 21, 2018.

Also, the Division's Stationary Sources Program (SSP) published a memo (PS Memo 10-01) that exempts facilities from showing compliance with the 1-hour SO_2 NAAQS if the long-term modeling threshold is not exceeded. This memo does not exempt a facility from showing compliance with the 3-hour and 24-hour NAAQS and CAAQS. Please be aware that the Division's TSP modeling staff will model the 1-hour averaging period if the facility emissions are above the short-term threshold regardless of their long-term emissions rate. The Division's TSP modeling staff will perform this analysis in support of Regulation No. 3 to demonstrate the facility's impact will not cause or contribute to a violation of the NAAQS. The outcome of the analysis will be included in the public final modeling report.

The maximum highest first high (H1H) modeled concentration from all receptors should be the design value from the SIA to compare to the SILs. When using representative meteorological data, the 1-hour design value should be the maximum 5-year average of the 99th percentile of the annual distribution of the maximum daily 1-hour modeled concentration or the highest fourth high (H4H) for each receptor. When using representative meteorological data, the 3-hour and 24-hour design values should be the maximum highest second high (H2H) modeled concentration from all receptors. When using representative meteorological data, the annual design value should be the maximum modeled concentration from all receptors across all years of meteorological data.

Mobile Sources Data

Facilities that involve haul trucks need to include fugitive dust emissions in both the permit application and the air quality impact analysis. Large mining equipment tailpipe emissions should also be included. The Division is currently developing more guidelines to establish when to include tailpipe emissions from haul road traffic and mining equipment. The Division has the current procedure if tailpipe emissions are to be included in the air quality impact analysis. If the applicant is unsure whether tailpipe emissions should be included, please contact the Division.

A facility is likely to have a fleet of trucks that is made up of a variety of different trucks. If the air quality impact analysis involves NO_2 modeling using the Tier III approach, an in-stack NO_2/NO_x ratio is necessary. Different trucks will have different in-stack NO_2/NO_x ratios. The Division recommends using a similar tiered approach.

> ***Tier A:*** Use the highest in-stack NO_2/NO_x ratio of all the mobile engines in the fleet. This ratio should be applied to all sources used to represent the truck traffic or non-road engines.
>
> ***Tier B:*** Calculate a weighted average in-stack NO_2/NO_x ratio based on the total vehicle fleet and the number of units with different in-stack NO_2/NO_x ratios and use that value for the entire vehicle

fleet. This accounts for the influence of the different types of engines according to the number of units with higher or lower in-stack NO_2/NO_x ratios while at the same time keeping the modeling analysis simple.

Tier C: Represent vehicles with similar in-stack NO_2/NO_x ratios with separate sets of sources assigning the corresponding in-stack NO_2/NO_x ratio to each set of sources. Each road segment could have multiple sets of sources overlaid on top of each other. This is the most accurate representation of the vehicle traffic.

All proposed in-stack NO_2/NO_x ratios require sufficient justification and documentation to support the source-specific data. The source-specific in-stack NO_2/NO_x ratios need approval from the permit engineer.

Nearby Sources Data

U.S. EPA recommends that, at a minimum, all nearby sources should be explicitly modeled as part of the NAAQS analysis. Other background sources usually are accounted for by using an appropriate ambient background concentration (i.e., see §9.2.2 of the USEPA Guideline on Air Quality Models) or, if a suitable ambient background concentration is not available, by application of a model. Nearby sources and other background sources are terms used to reference all stationary sources except the new source or modification under permit review.

The emissions estimates used in modeling nearby and other background sources should be consistent with U.S. EPA recommendations in Table 8.2 of the USEPA Guideline on Air Quality Models and other applicable U.S. EPA guidance. Table 8.2 recommends that actual operating levels averaged over 2 years and federally enforceable permit limits should be used for all nearby sources. That is, emission rates based on a combination of both allowable and actual data, if the actual data is available. A nearby source is any major source, major stationary source, or minor source that causes a significant concentration gradient in the vicinity of a new or modified source. All sources should be included if they are within 5 kilometers of the significant impact area of the source (significant impact area + 5km). Nevertheless, this is not a bright line; in some cases, the 5-kilometer distance from the significant impact area should be expanded. Professional judgment should be used when selecting sources to model.

The Division does not recommend a specific objective procedure for determining which sources should be classified as nearby sources and which should be classified as other background sources. The procedure used to select nearby sources should be based on professional judgment. In addition, it should consider local conditions such as topography, meteorology, dispersion characteristics, availability of ambient monitoring data, existing air quality, and other relevant factors. The procedure should include an examination of the modeling results to ensure that all sources that should have been included were included.

The nearby sources inventory provided by the Division may be missing key stack parameters as this information is taken from submitted APENs. When the APENs are missing the stack parameters, this information is left blank in the inventory. The Division has developed an initial approximation procedure for applicants to use when the stack parameters are missing. Further refinement may be necessary in order to demonstrate compliance.

- Determine the type of emission source: stack (point) or fugitive.

- Point source: Find stack parameters for similar equipment in the inventory. Provide justification for the stack parameters used.
- Fugitive source: Group all the fugitive (non-stack) emissions from a facility into one area source with dimensions of 100m x 100m, release height of 2 m, and initial sigma-z of 3 m. The x and y coordinates of the facility in the nearby source inventory can be used as the southwest corner of the area source.

A nearby sources inventory will be provided to the applicant upon request from the Division's Inventory and Support staff. The applicant must specify the following when requesting a nearby source inventory:

- Coordinates of the project site
- Pollutants to be modeled
- Extent of the area included in the inventory

Background Concentrations

In general, the background concentration is intended to account for sources not explicitly included in the modeling.

For annual standards, the recommended background is typically based on the annual average value. For shorter-term standards, selection of a background concentration can be more challenging. In general, the background concentration should be one that can reasonably be assumed to occur with the modeled concentration.

Determination of a background that can "reasonably be assumed to occur" is sometimes difficult. In general, the niche being filled by the background concentration should be defined before a value is selected. Since the background concentration field is usually assumed to be spatially uniform, the background should account for elevated concentration levels that are expected to occur in the receptor grid from non-modeled sources. Alternatively, a variable background field could be used if there is sufficient data to generate one.

For purposes of addressing short-term standards, the total predicted concentration distribution should represent combinations of impact and background that can reasonably be expected to occur simultaneously in the particular application. The Division recognizes that the chance of two independently caused short-term concentration maxima occurring simultaneously at any particular location may be low.

The Division can usually provide a background concentration upon request to account for other background sources, including mobile sources and transport from distant sources. Determination of the nearby sources accounted for by the background concentration can be rather subjective. Consequently, the applicant should review the location and the collection date of the background data with respect to nearby sources to determine how it should be incorporated into the overall modeling procedure.

The Division does not typically recommend the use of a background concentration to account for increment consumption. Nevertheless, there may be situations where a statistical analysis or review of trends in ambient air quality data would be useful to quantify local or regional changes in air quality since the minor source baseline date.

To streamline the background concentration requests, a form is available on the Division's website (https://www.colorado.gov/airquality/permits.aspx). If the applicant would like seasonal background data, please contact the Division's TSP modeling staff.

Elevation Data

Terrain elevations for sources and receptors should be used when appropriate. Discuss the source of terrain data in the modeling report.

Terrain elevations for receptors as well as nearby and other background sources should be based on U.S. Geological Survey (USGS) National Elevation Dataset (NED). A minimum resolution of 1/3 arc second (10-meter) files covering a minimum radius of 40 kilometers from the facility under review. NED files can be downloaded using the CDPHE Elevation Data Quad Download Tool (https://www.colorado.gov/airquality/quad_selector_map.aspx).

Some facility sites are graded (e.g., flat) so that actual site topography is or will be significantly different from the topography that is found in a USGS NED or in other elevation data. Thus, it is appropriate to use the site-specific graded elevations for the facility sources and buildings. A plot plan should be provided that depicts the site-specific elevations. If NED files are used for facility sources and buildings, sufficient justification and documentation will need to be provided to support the use of non-site-specific data.

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.

Hg = 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,

Hg = H + 1.5L

where

Hg 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.

Receptor Network

The approach to creating a receptor network varies with the goals of the modeling study. Case-by-case professional judgement should be used. Factors such as topography, density of nearby sources, meteorology, and requirements of the selected model should be considered when selecting receptors. In general, the network should be consistent with U.S. EPA's recommendations. It should extend far enough to define the significant impact area for the source or modification under review. For elevated point sources, it is sometimes useful to initially use a simple screening-level model to help determine how far out to extend the receptor network.

If the concentration gradient is increasing at the edge of the network, the network should be extended. 1-hour modeling analyses tend to result in large significant impact areas; therefore, professional judgement should be used when extending and refining the receptor network. Refer to U.S. EPA Memos (https://www.epa.gov/scram/air-quality-models-clarification-memos-dispersion-models) for guidance. The Division generally considers a fine receptor grid to have receptor spacing of 100 meters or less. A coarse receptor grid usually refers to receptor spacing greater than 100 meters.

While source-specific issues such as expected plume rise and topography should be considered when deciding if the following recommendations are appropriate, the following recommendations often provide a good starting point:

a. Up to 1 kilometer – grid with 100-meter receptor spacing (fine)
b. From 1 to 3 kilometers – grid with 250-meter spacing (coarse)
c. From 3 to 10 kilometers – grid with 500-meter spacing (coarse)
d. Beyond 10 kilometers – grid with 1-kilometer spacing (coarse)
e. Along fence line or ambient air boundary – 50 to 100 meter receptor spacing
f. If no fence or boundary – 50-meter receptor spacing within source facility
g. Discrete receptors for sensitive nearby sites (e.g., residences, schools) unless the grid is sufficient

h. Flagpole receptors on balconies and rooftops of buildings not owned or operated by the facility under review (e.g., balconies on apartment buildings, rooftop restaurants, rooftop pools)

i. If the modeled maximum values from the facility under review (or maximum values in an air quality impact analysis such as a CAAQS and NAAQS analysis) occur in a coarse receptor grid, additional modeling should be performed with a fine grid to find the maximum concentrations

j. Additional fine receptor grids or discrete receptors may be necessary in complex terrain or sensitive areas to clearly define the area of maximum impact

Receptors may be omitted from the property of the facility under review, provided that public access is precluded by a fence or other physical barrier. Refer to the definition of ambient air in the definitions section at the beginning of this document. If there is not a physical barrier (e.g., fence, wall), receptors should be located on the property of the applicant. Division and/or U.S. EPA approval is necessary if the applicant wants to use a physical barrier such as a canyon, river, tailings pile, intense terrain or other physical features as the ambient air boundary. Intense terrain will be approved on a case-by-case basis to preclude public access as a physical barrier. Intense terrain that acts as a physical barrier needs to have a minimum slope of 5 to 1, per EPA guidance. If a physical barrier is approved by the Division to preclude public access, frequent posting is usually necessary along with routine security patrols; in addition, points of public access into the posted area (e.g., roads, trails) should be fenced or gated. Refer to U.S. EPA memos on this subject.

Meteorological Data

Meteorological data should be collected, processed, and applied in ways that are consistent with the most current federal regulations (https://www3.epa.gov/ttn/scram/guidance/guide/appw_17.pdf), guidance and model user's guides. If representative meteorological data are not available, it may be necessary to collect at least one (1) year of site-specific data. Any source intending to collect site-specific data should contact the Division prior to setting up a monitoring program. The Division has monitoring guidance available.

Meteorological data will be provided by the Division. The Technical Services Program modeling staff will determine the most representative meteorological data appropriate to use for the facility under review. The applicant should provide the following information to the Division to obtain AERMOD-ready meteorological data:

- Coordinate (latitude/longitude or UTM) of source location, including datum
- Source location identified on 1:24,000-scale topographic map(s)
- Brief description of the sources of emissions (i.e., stack vs fugitive, stack heights, source types)

The Division staff takes the above information and assesses the expected conditions at the source location and for each source type. A dataset will be identified that best matches the conditions expected at the source location from the available meteorological datasets known and that meet the completeness requirement.

Per regulatory requirements, for PSD applications where the Division has required pre-construction meteorological monitoring, the permit application will not be ruled complete until the data has been submitted to the Division and approved.

As stated in §8.4.2 of the USEPA Guideline on Air Quality Models, 5 years of adequately representative NWS data, at least 1 year of site-specific data, or at least 3 years of prognostic meteorological data should be used. If more than 1 year of site-specific data exist, multiple years (up to 5 years) should be used. For long-range transport modeling and complex wind situations see §8.4.4.2 of the USEPA Guideline on Air Quality Models.

The use of prognostic meteorological data is currently not accepted in Colorado due to complex terrain. The Division is currently reviewing how prognostic meteorological data can be used to capture the effects of complex terrain.

When deciding whether or not to recommend or require collection of site-specific meteorological data, Division modeling staff considers:

a. Dispersion characteristics of the source under review
b. Meteorological and dispersion issues associated with complex terrain
c. Distance to the nearest Class I area (for new sources and modifications subject to PSD rules)
d. The likelihood that the source will have an adverse impact on ambient air quality
e. Whether or not the source is subject to PSD rules (monitoring is more likely to be requested for new major stationary sources or major modifications subject to PSD rules than for minor sources)
f. Other relevant factors

To streamline the permit process and reduce the economic burden for minor sources and minor modifications, collection of site-specific meteorological data is seldom requested for minor sources and modifications. Nevertheless, it may be recommended if there is reason to believe the new source or modification will cause or contribute to a violation of CAAQS or NAAQS.

If allowed under federal regulations and approved by the Division, conservative screening meteorological data may be used in refined models instead of site-specific data for compliance demonstrations.

Modeling Scenarios

It is common for facilities to have sources that do not operate simultaneously with other sources at the facility. This situation results in modeling different scenarios. For example, if a facility wants a permit that allows operation of either flares or engines, but not both at one time, both the flare scenario and engine scenario should be modeled.

If there are several sources that cannot operate simultaneously which would result in a significant amount of scenarios, the applicant can simply include the worst-case source. Please be aware that using this approach requires demonstration of the worst-case source. Comparing emission rates of these sources does not equate to a worst-case analysis.

Permit conditions will be proposed based on the information used in the modeling. Restricted operating schedules used to demonstrate compliance will be become permit conditions.

Section 6 – Reporting Requirements

Include in the air quality impact analysis a written discussion covering the project, the modeling performed, and the results.

The air quality impact analysis 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 Division's TSP modeling staff unless the items are clearly not applicable to the project. Follow the reporting requirements to expedite the technical review of the air quality impact analysis and to eliminate unnecessary modeling.

Specific data are needed to review and perform modeling. The recommended list of data elements presented here are often necessary to perform and/or review dispersion modeling. The applicant should be prepared to provide these data with the application or upon request by the Division. If the data are not provided with the application and cannot be provided upon request in a timely manner, the permit process may be delayed. In addition, if data cannot be provided in a suitable format, additional staff time may be necessary for data-processing tasks. Staff time is usually charged back to the applicant at the permit processing hourly rate. While some of the data elements discussed here are already part of the permit application and APEN forms, they are mentioned here for emphasis.

Send the air quality impact analysis to the permit engineer that requested the analysis. In addition, for PSD applications send a copy of the air quality impact analysis to EPA Region 8.

Consistency in Geographic Coordinates

Geographic coordinates are used in modeling. Whenever possible, the datum upon which geographic coordinates are based should be provided. For example, potentially significant discontinuities in source and receptors coordinates may occur if some Universal Transverse Mercator (UTM) coordinates are based on the North American Datum of 1927 (NAD27) while others are based on NAD83. Often, site surveys are performed using GPS systems that are based upon WGS84 while UTMs might be based upon a NAD27 topographic map. Therefore, a coordinate conversion should be performed when appropriate so that receptors, source locations, and other coordinates reference a consistent system.

Exemptions from Submitting Modeling-Related Data

New sources and modifications with emissions less than the thresholds in Table 1 that do not meet any of the situations described in the footnotes of Table 1 and sources not emitting any of the pollutants listed in Table 1 do not need to provide any modeling-related data beyond what is requested in the permit application and/or APEN forms.

Since ozone modeling and HAPs modeling are not routinely performed as part of the permit review process, VOC sources do not need to provide any modeling-related data beyond what is requested in the permit application and/or APEN forms.

New Sources and Modifications Not Subject to PSD Rules

At a minimum, new sources and modifications not subject to PSD rules with emissions greater than the thresholds in Table 1 should submit the data outlined in the Modeling Submittal Completeness Checklist with the permit application or be prepared to provide the data upon request. The Modeling Submittal Completeness Checklist can be found on the Division's Air Quality website (https://www.colorado.gov/airquality/permits.aspx).

New Sources and Modifications Subject to PSD Rules

New sources and modifications subject to PSD rules with emissions greater than the thresholds in Table 1 should submit the data outlined in the Modeling Submittal Completeness Checklist with the permit application or be prepared to provide the data upon request. The Modeling Submittal Completeness Checklist can be found on the Division's Air Quality website (https://www.colorado.gov/airquality/permits.aspx).

The following additional items should be submitted as well:

- For each pollutant for which the new source or modification is subject to modeling under PSD rules, provide a source history that clearly shows the start-up and shutdown dates of each unit (e.g., emissions source) at the facility. Include current and historic stack parameters and source/building configurations. Compare start-up and shutdown dates to applicable PSD baseline dates to determine PSD increment consuming and expanding emissions (see the Division's "PSD Increment Tracking System" for baseline dates and related information). Provide metadata (i.e., describe the methods used to generate the data). The applicant may choose to ignore this data element if an air quality impact analysis is not requested or if PSD increment modeling is not requested; however, the Division encourages applicants to provide these data so that PSD increment consumption and expansion can be tracked.
- A table showing nearby increment consuming/expanding sources (only recommended if a PSD increment analysis has been performed). Refer to the Division's "PSD Increment Tracking System" guidance for details, in particular section 2.1.2.
- A table comparing maximum modeled impacts with appropriate thresholds such as modeling significance levels, standards, PSD increments, significant monitoring concentrations, and levels of acceptable change to AQRVs.
- UTM coordinates for maximum modeled concentration estimate(s) from the PSD increment compliance demonstration modeling (if applicable). These data are used to help the Division track increment consumption across the state.

Recommended Additional Guidance

Air Quality Models – Clarification Memos for Dispersion Models: https://www.epa.gov/scram/air-quality-models-clarification-memos-dispersion-models

Federal Land Managers' Air Quality Related Values Work Group (FLAG): https://www.nature.nps.gov/air/Pubs/pdf/flag/FLAG_2010.pdf

Model Clearinghouse Information Storage and Retrieval System: https://cfpub.epa.gov/oarweb/MCHISRS/

Clean Air Act Permit Modeling Guidance: https://www.epa.gov/scram/clean-air-act-permit-modeling-guidance

Air Quality Dispersion Modeling – Preferred and Recommended Models User Guides and Implementation Guides: https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models

CDPHE APCD Air Quality Modeling Guidance for Permits: https://www.colorado.gov/airquality/permits.aspx

Air Dispersion Modeling Analysis to Support the Modeling Thresholds and Associated Language in Section 2 of the Colorado Modeling Guideline for Air Quality Permits (January 2002, April 2010)

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1. Preface

The Air Pollution Control Division (Division) participated in a review of the "Colorado Modeling Guideline for Air Quality Permits" (Colorado Modeling Guideline). The review process resulted in revisions to the modeling guideline based on comments from a technical peer review conducted in 2000 and 2001, public comments, and comments from several stakeholder meetings. A public hearing on the guideline was held on December 20, 2001.

As part of the review process, the Division performed air quality modeling to help in the development of appropriate language and emission modeling thresholds for Table 1 of the Colorado Modeling Guideline. This report provides the results of the Division's modeling study. While the body of this report is focused on point source modeling, a series of graphical images are provided in the appendix to illustrate the magnitude and spatial extent of strong concentration gradients near fugitive sources. All of the fugitive source modeling is based on a continuous emission rate of 15 tons per year, which is the PM-10 modeling threshold in Table 1 of the Colorado Modeling Guideline.

Table 1 from the January 1, 2002 version of the Colorado Modeling Guideline and associated language in Section 2.5 – Modeling Thresholds - is presented on the next two pages. The Colorado Modeling Guideline was updated on December 27, 2005 to reflect revisions to Colorado AQCC Regulation No. 3 and EPA's Appendix W to 40 CFR Part 51 - Guideline on Air Quality Models and did not result in any material change to Table 1 or its associated language in Section 2.5.

[Excerpts from the January 1, 2002 version of the Colorado Modeling Guideline.]

Section 2.5 Modeling Thresholds

The modeling thresholds in this section are applicable for sources located in nonattainment and attainment areas (see sections2.1, 2.2, and 2.3). The thresholds were not developed to address situations such as those described in section 2.4.

The modeling thresholds were developed to identify new sources and modifications that would have relatively small impacts and do not warrant further analysis with respect to applicable air quality standards. The development of these thresholds is intended to assist the Division Staff, permit applicants, air quality consultants, and others decide when modeling is warranted to determine the impact from a source. This section introduces de minimis emissions, which have a low probability of causing or contributing to an exceedance of an air quality standard. By using this approach, permitting costs associated with the impact analysis required by Regulation No. 3 can be minimized.

Air quality modelers developed the modeling thresholds in Table 1 during a technical peer review of the Division's modeling practices. The Division performed dispersion modeling to help demonstrate that the thresholds in Table 1 are appropriate.[1] Permit applicants and the Division should try to avoid situations where the decision to perform modeling takes longer than actually performing a screening-level modeling analysis (screening-level models can often be run quickly with minimal cost).

For a given pollutant, modeling is usually warranted if the long-term (tons per year) or short-term (pounds per hour, etc.) ***requested emission rate*** for a new source or the facility-wide net emissions increase for a modification is above the applicable emission threshold in Table 1. If the requested emission rate and/or the facility-wide net emissions increase is below both of the thresholds, modeling is usually not warranted unless one of the situations at the bottom of Table 1 applies. If there is doubt regarding the need for modeling, the applicant should consult with the Division.

[1] The Division's modeling study shows that the thresholds are appropriate in situations where a source has reasonably good dispersion characteristics. In situations where a source has poor dispersion characteristics or in areas with poor existing air quality, the thresholds might not be appropriate. In these situations, the Division will work with the source to determine an appropriate threshold.

Table 1 [January 1, 2002]. Modeling Thresholds. Modeling is usually warranted to quantify the impact if the emission rate is equal to or greater than these long-term (tons per year) and/or short-term (pound per hour, etc.) emission thresholds. If the emission rate is less, a qualitative description of the impact is adequate unless there is a situation that warrants modeling. (1)

Pollutant	Requested Emission Rate from a New Source or Facility-Wide Net Emissions Increase from a Modification
Carbon Monoxide (CO)	100 tons per year or 23 pounds per hour
Nitrogen Oxides (NO_x)	40 tons per year[2]
Sulfur Dioxide (SO_2)	40 tons per year or 27 pounds per 3-hours
Particulate Matter (PM-10)	15 tons per year or 82 pounds per day
Lead (Pb)	0.6 tons per year or 100 pounds per month

(1) Modeling is usually warranted, even though the source or modification does not exceed the modeling thresholds in Table 1, if it is reasonable to believe the source will cause or contribute to a violation of applicable ambient air quality standards in circumstances such as:

(a) Sources of SO_2, PM-10, CO, or Pb where a substantial portion of the new or modified emissions have poor dispersion characteristics (e.g., rain caps, horizontal stacks, fugitive releases, [3] or ***building downwash***[4]) in close proximity to ***ambient air*** at the site boundary;

(b) Sources of SO_2, PM-10, CO, or Pb located in ***complex terrain*** (e.g., terrain above stack height in close proximity to the source);

(c) Sources located in areas with poor existing air quality;

(d) Modifications at existing major stationary sources, including grandfathered sources that have never been modeled before.

[2] For new sources or modifications, including those with poor dispersion characteristics, that emit less than 40 tons per year (tpy) of NO_x, modeling is usually warranted only in the situations described in caveats (1)(c) and (1)(d), provided that most (e.g., >85%) of the NO_x is emitted as nitric oxide (NO). That is, because of near-field chemical transformation assumptions, NO_2 impacts from a 40 tpy NO_x source are usually expected to be below the NO_2 ambient air quality standard. Thus, modeling is only warranted in situations where existing NO_2 levels are high enough that the ***significant impact*** from the new source or modification might "contribute" to a modeled violation of the NO_2 air quality standard.

[3] For sources without stacks (e.g., fugitive releases from area or volume sources), modeling may be warranted at levels less than those in Table 1 if most of the emissions are from sources located less than 250-meters from the limit to public access. The 250-meter recommendation is based on a modeling study performed by the Division.

[4]For sources with emission rates below those in Table 1 where the stack height is less than the U.S. EPA's ***good engineering practice (GEP) stack height,*** modeling may be warranted; however, the presence of a non-GEP stack height does not mean that modeling is automatically warranted. The degree (e.g., severity) of the downwash effects, existing air quality levels, the distance to the boundary of ambient air, and any other relevant factors should be considered.

Table 1 was updated in April 2010 to address NAAQS changes for lead, particulate matter less than 2.5 microns, and nitrogen dioxide (the associated language in section 2.5 – Modeling Thresholds remains unchanged since January 1, 2002).

[Excerpts from the April 2010 update of Table 1 in the Colorado Modeling Guideline.]

Table 1 [April 2010]. Modeling Thresholds. Modeling is usually warranted to quantify the impact if the emission rate is equal to or greater than these emission thresholds. If the emission rate is less, a qualitative description of the impact is adequate unless there is a situation that warrants modeling.(1) [Note: The long-term (tons per year) thresholds apply to modeling decisions regarding annual average ambient air quality standards. The short term (pound per hour) thresholds apply to modeling decisions for short-term standards (i.e., ≤ 24-hr average).]

Pollutant	Requested Emission Rate from a New Source or Facility-Wide Net Emissions Increase from a Modification
Carbon Monoxide (CO)	100 tons per year or 23 pounds per hour
Nitrogen Oxides (NO_X)	40 tons per year[5] or 0.46 pound per hour
Sulfur Dioxide (SO_2)	40 tons per year or 27 pounds per 3-hours
Particulate Matter < 10 µm (PM_{10})	15 tons per year or 82 pounds per day
Particulate Matter < 2.5 µm ($PM_{2.5}$)	5 tons per year of primary $PM_{2.5}$ or 11 pounds per day of primary $PM_{2.5}$
Lead (Pb)	25 pounds per 3-months

(1) Modeling is usually warranted, even though the source or modification does not exceed the modeling thresholds in Table 1, if it is reasonable to believe the source will cause or contribute to a violation of applicable ambient air quality standards in circumstances such as:
(a) Sources where a substantial portion of the new or modified emissions have poor dispersion characteristics (e.g., rain caps, horizontal stacks, fugitive releases[6], or ***building downwash***[7]) in close proximity to ***ambient air*** at the site boundary;
(b) Sources located in ***complex terrain*** (e.g., terrain above stack height in close proximity to the source);
(c) Sources located in areas with poor existing air quality;
(d) Modifications at existing major stationary sources, including grandfathered sources that have never been modeled before.

[5]For new sources or modifications, including those with poor dispersion characteristics, that emit less than 40 tons per year (tpy) of NO_X, modeling for the annual NO_2 NAAQS is usually warranted only in the situations described in caveats (1)(c) and (1)(d), provided that most (e.g., >85%) of the NO_X is emitted as nitric oxide (NO). That is, because of near-field chemical transformation assumptions, NO_2 impacts from a 40 tpy NO_X source are usually expected to be below the annual NO_2 ambient air quality standard. Thus, modeling is only warranted in situations where existing annual NO_2 levels are high enough that the significant impact from the new source or modification might "contribute" to a modeled violation of the annual NO_2 air quality standard.

[6]For sources without stacks (e.g., fugitive releases from area or volume sources), modeling may be warranted at levels less than those in Table 1 if most of the emissions are from sources located less than 250-meters from the limit to public access. The 250-meter recommendation is based on a modeling study performed by the Division.

[7]For sources with emission rates below those in Table 1 where the stack height is less than the U.S. EPA's ***good engineering practice (GEP) stack height,*** modeling may be warranted; however, the presence of a non-GEP stack height does not mean that modeling is automatically warranted. The degree (e.g., severity) of the downwash effects, existing air quality levels, the distance to the boundary of ambient air, and any other relevant factors should be considered.

2. Introduction

In determining compliance with Ambient Air Quality Standards (AAQS), impacts from new/modified emission unit(s) are estimated with an air dispersion model. If estimated impacts from the new/modified emission unit(s) are above modeling significance levels, they are added to impacts from other emission units located at the facility, impacts from emission units located nearby, if appropriate, and a background concentration to determine total ambient air concentrations for compliance with the National Ambient Air Quality Standards (NAAQS) and Colorado Ambient Air Quality Standards (CAAQS). If the estimated impacts from the new/modified emission unit(s) are below modeling significance levels, the new/modified emission unit(s) is not considered to have a significant impact in ambient air[8] and no further analysis is necessary. Table 2 lists the modeling significance levels and AAQS for nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and fine particulate matter (PM_{10}).

Table 2 [January 2002]. Modeling Significance Levels and AAQS for NO_2, SO_2, and PM_{10}

	Modeling Significance Level (µg/m³)			NAAQS (µg/m³)			CAAQS (µg/m³)		
Pollutant	**3-hr**	**24-hr**	**Annual**	**3-hr**	**24-hr**	**Annual**	**3-hr**	**24-hr**	**Annual**
NO_2			1			100			100
SO_2	25	5	1	1300*	365	80	700		
PM_{10}		5	1		150	50		150	50

*Secondary NAAQS

Table 2 lists the modeling significance levels and AAQS for nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$) effective in April 2010.

Table 2 [April 2010]. Modeling Significance Levels and AAQS for NO_2, SO_2, PM_{10}, $PM_{2.5}$

	Modeling Significance Level (µg/m³)				NAAQS (µg/m³)				CAAQS (µg/m³)
Pollutant	**1-hr**	**3-hr**	**24-hr**	**Annual**	**1-hr**	**3-hr**	**24-hr**	**Annual**	**3-hr**
NO_2	4[a]			1	~189			100	
SO_2		25	5	1		1300[b]	365	80	700
PM_{10}			5	1			150		
$PM_{2.5}$			1.2[c]	0.3[c]			35	15	

[a]Interim modeling significance level developed by the Division
[b]Secondary NAAQS
[c]Interim modeling significance level developed by the Division based on level proposed by EPA for NAAQS only

[8] "Ambient air" is defined as "that portion of the atmosphere, external to the source, to which the general public has access."

The "Colorado Modeling Guideline for Air Quality Permits" (Colorado Modeling Guideline) does not require a quantitative impact analysis for every new source/modification. The Colorado Modeling Guideline provides threshold emission levels that would trigger a quantitative impact analysis. Some of the public comments argue that only new/modified emission units emitting pollutants greater than Prevention of Significant Deterioration (PSD) Significant Emission Rates (shown below in Table 3) should trigger a quantitative impact analysis. Others also support raising the PM_{10} emission threshold level from 15 tons per year (tpy) to 40 tpy. This implies that new/modified emission units with emission rates equivalent to or greater than the PSD Significant Emission Rates would not cause or contribute to an exceedence of the AAQS.Table 3. Current (1998) and proposed (2001) modeling emission rate thresholds in tons per year, tpy. The proposed levels are the same as the PSD Significant Emission Rates of Criteria Pollutants in Regulation No. 3 **[Note: One exception is that the fugitive PM_{10} threshold would remain at 5 tpy].**

Pollutant	Current Emission Rate (tpy) Thresholds (Table 1; 12/23/98 Guideline)	Proposed Emission Rate (tpy) Thresholds (Table 1; 2/14/01 Guideline)
CO	50 attainment, 25 nonattainment	100
NO_X	20	40
SO_2	20	40
PM_{10} (Stack)	5	15
PM_{10} (Fugitive)	5	5
Pb	0.1	0.6

The January 2002 modeling analysis was performed to determine if a point source emitting 40 tpy of NO_X[9], SO_2, or PM_{10} or 15 tpy of PM_{10} would have a significant impact in ambient air (refer to Sections 4, 5, and 6).

The April 2010 modeling analysis (refer to Section 7) was performed to determine if the emission rate thresholds in Table 3 (above) are adequate to indicate when a quantitative impact analysis is necessary to demonstrate if the proposed modification or source will or will not cause or contribute to a violation of a recently promulgated NAAQS [24-hr and annual $PM_{2.5}$ (December 18, 2006, includes retaining the 24-hr revoking of the annual PM_{10} standard), 3-month rolling Pb (January 12, 2009), and 1-hr NO_2 (April 12, 2010)].

3. Effects on Ambient Air Impact Estimations

Ambient air impacts are a function of atmospheric dispersion. Various factors affect atmospheric dispersion, including plume rise, building wake effects, and meteorological

[9] The ambient air standards are for nitrogen dioxide (NO_2), not oxides of nitrogen (NO_x). NO_x includes both nitric oxide (NO) and NO_2. While some NO_2 is directly emitted from the stacks of stationary sources, a significant portion of the emissions usually occur as nitric oxide (NO). The NO is converted to NO_2 by chemical mechanisms in the atmosphere. To account for possible chemical conversion in the atmosphere, the total NO_x emission rate is used in Table 2 instead of only the primary NO_2 emission rate.

conditions. Plume rise is due to the momentum or buoyancy of the exhaust gases. Factors that hinder plume rise are stack-tip downwash and building wake effects.

3.1. Buoyancy

Stack gases exhausted into the atmosphere having a density less than that of ambient air will experience plume rise due to buoyancy. Lower molecular weight or high stack gas exit temperature will result in a stack gas density lower than that of ambient air. In most regulatory air models, buoyancy is a function of the difference between stack gas exit temperature and ambient temperature. Model inputs used to determine the magnitude of buoyant forces are stack gas exit temperature, ambient temperature, stack diameter, and stack gas exit velocity. The larger of buoyancy force and momentum force is used to determine the effective plume height.

3.2. Momentum

The force imparted on the stack gases provides the momentum necessary for successful exhaustion into the atmosphere. Momentum is important if the temperature of the stack gases is within a few degrees of ambient temperature or subject to building wake effects. Obstructions at the top of a vertical stack, such as a rain cap, can reduce or eliminate vertical momentum and affect plume rise. Horizontal discharges also have essentially no momentum plume rise. Model inputs that affect momentum are stack gas exit velocity and stack diameter. Depending on meteorological conditions, stack gas exit temperature and ambient temperature also affect momentum calculations.

3.3. Stack-Tip Downwash

Stack-tip downwash occurs when the stack gas plume is drawn down to the low pressure or slight vacuum region downwind of the stack. The area of low pressure/slight vacuum is cause by wind flowing past the stack. Stack-tip downwash can be eliminated if exit velocities are greater than or equal to 150% of the wind speed at the stack top. Model inputs that affect stack-tip downwash are stack gas exit velocity and wind speed. Stack diameter is also used to determine the effective plume height.

3.4. Building Downwash

Wind flow around a building creates turbulent eddies downwind of the building. Plumes released near buildings can be caught in the turbulent wake of the building. For elevated releases, plumes subject to building downwash usually result in increased ground-level concentrations. To avoid the effect of building downwash, the general rule is to design a stack that is 2.5 times the lesser of the height or projected width of nearby buildings.[10] This is known as the Good Engineering Practice (GEP) height. Building dimensions are input into modeling systems to determine if the stack gas plume will be affected by downwash.

[10] A building is considered to be nearby if it is within 5L (five times L, where L is the lesser of the building height or the projected width of the building) of a building or structure [see 40 CFR 51.100 (jj)(1)].

4. Methodology (January 2002 Analysis)

Multiple model runs were performed using a range of values in stack parameters. The Industrial Source Complex Model (ISCST3 version 00101) was used with 1989 Denver Stapleton Meteorological Data. The emission rate used for all runs is 1.15 g/s (40 tpy) to determine NO_X, SO_2, and PM_{10} concentration levels. Since modeling was performed for only one emission unit and concentration is directly proportional to emission rate, concentration levels determined with a 40 tpy emission rate are scaled to obtain PM_{10} concentrations at 15 tpy.

Table 5 summarizes the values of each parameter for each model run. Stack characteristics were selected to illustrate the effects of each/combination of parameter(s) on impact estimates. The range of values in Table 5 is not intended to represent all possible stack characteristics and combinations. In practice, many emission units have stack parameters that are lower or higher than the range of values used in this study.

4.1. Receptor Spacing

The receptor network is described in Table 4 below.

Table 4. Receptor spacing and location

Distance from Source Location	Receptor Spacing
Fenceline	8 receptors spaced 50 m, 30 m, or 15 m (see Table 5) apart forming a square perimeter with source location in the center; spacing varies per run
50 m	8 receptors spaced 50 m apart forming a square perimeter with source location in the center
0 to 5000m	100 m Cartesian grid
5000 m to 10,000 m	250 m Cartesian grid

4.2. Model Runs

4.2.1. Sensitivity Analysis (Runs 1 through 10)

A base case (Run 1) was selected to compare with Runs 2 through 10. The sensitivity analysis consists of 9 runs where each run differed from the base case by only one modeling parameter. The parameters are stack height, urban dispersion, stack diameter, stack gas exit velocity, and stack gas exit temperature. These runs assume that the plume is not subject to building downwash.

4.2.2. Building Downwash (Runs 11 through 18)

Runs 11 through 18 were performed to examine the effects of building downwash effects on the impacts and their location from the source. The footprint of the building is 9.14 m x 9.14 m (30 ft x 30 ft). Building height of 50% and 75% of the stack height were used. Runs 13 and 14 use

urban instead of rural dispersion coefficients. Runs 15 through 18 with urban dispersion include fenceline receptors closer to the source.

4.2.3. Multiple changes in Stack Characteristics with Building Downwash (Runs 19 through 22)

Runs 19 through 22 represent vertical unobstructed stacks with stack and building configurations that hinder plume rise.

4.2.4. Horizontal Stack (Runs 23 through 25)

The stack inputs were modified to follow EPA guidance for modeling horizontal stacks (July 9, 1993 memo from Joseph A Tikvart to Ken Eng). Stack diameter is set to 0.001 m. Actual stack height is used.

4.2.5. Capped Stack (Runs 26 through 28)

The stack inputs were modified to follow EPA guidance for modeling capped stacks (July 9, 1993 memo from Joseph A. Tikvart to Ken Eng). Stack diameter is set to 0.001 m. Stack height is reduced by 3 times the actual stack diameter.

4.2.6. Minimum and Maximum Range of Values (Runs 29 and 30)

Run 29 represents a vertical stack with no obstruction that is subject to building downwash with the lowest stack parameters in Table 4. Run 30 represents a vertical stack with no obstruction and no downwash effects with the highest stack parameters in Table 4.

4.3. Comparison with Modeling Significance Levels and AAQS

According to U.S. EPA guidance, the highest impact concentration of any averaging period should be used to determine whether the emission unit will have a significant impact in ambient air. That is, the modeling significance level is used to determine if a source "contributes" to a modeled violation of AAQS. When impacts are significant for an averaging period at a specific receptor, the impacts from the emission unit are added to the impacts from nearby sources, if appropriate, and a reasonable background concentration to determine the total ambient air concentration for the compliance demonstration with the AAQS. The maximum annual and highest-2nd-highest (H2H) short-term SO_2 and PM_{10} (the allowance of one exceedence of the 24-hr PM_{10} when using one year of meteorological data) total ambient air concentrations are compared to the AAQS. For simplicity in this modeling analysis, H2H short-term SO_2 and PM_{10}, and maximum annual concentrations are compared to the modeling significance level for significance determination and used to determine whether the impact itself would exceed the AAQS.

5. Results (January 2002 Analysis)

The results are presented in tabular format for all runs by emission rate and averaging period in Table 6. The 24-hr results of model Runs 1 through 10 are also presented in Figure 1 through Figure 5 to examine the magnitude and location of impacts. Since no chemical transformations or conversion factors were used, the impacts listed below apply to any pollutant.

Table 5. Summary of stack, building and fenceline parameters for each model run

Model Run[1]	Dispersion[2]	Stack Height (m)	Stack Diameter (m)	Stack Gas Exit Temperature (K)	Stack Gas Exit Velocity (m/s)	Stack Orientation[4]	Building Height (m)[3]	Fenceline Distance (m)
1 - Base Case	R	6.10	0.31	644	25.4	V	0	50
2 - Height Decrease	R	3.05	0.31	644	25.4	V	0	50
3 - Height Increase	R	9.14	0.31	644	25.4	V	0	50
4 - Urban	U	6.10	0.31	644	25.4	V	0	50
5 - Diameter Decrease	R	6.10	0.15	644	25.4	V	0	50
6 - Diameter Increase	R	6.10	0.46	644	25.4	V	0	50
7 - Velocity Decrease	R	6.10	0.31	644	9.14	V	0	50
8 - Velocity Increase	R	6.10	0.31	644	76.2	V	0	50
9 - Temperature Decrease	R	6.10	0.31	477	25.4	V	0	50
10 - Temperature Increase	R	6.10	0.31	811	25.4	V	0	50
11- BH 50% SH	R	6.10	0.31	644	25.4	V	3.05	50
12 - BH 75% SH	R	6.10	0.31	644	25.4	V	4.58	50
13 - BH 50% SH, urban	U	6.10	0.31	644	25.4	V	3.05	50
14 - BH 75% SH, urban	U	6.10	0.31	644	25.4	V	4.58	50
15 - BH 50% SH, urban, 30 m FL	U	6.10	0.31	644	25.4	V	3.05	30
16 - BH 75% SH, urban, 30 m FL	U	6.10	0.31	644	25.4	V	4.58	30
17 - BH 50% SH, urban, 15 m FL	U	6.10	0.31	644	25.4	V	3.05	15
18 - BH 75% SH, urban, 15 m FL	U	6.10	0.31	644	25.4	V	4.58	15
19 - T/D/V Decrease, BH 75% SH, 30 m FL	R	6.10	0.15	477	10	V	4.58	30
20 - H/T/D/V Decrease, BH 67% SH, 30 m FL	R	4.58	0.15	477	10	V	3.05	30
21 - T/D/V Decrease, BH 75% SH, urban, 30 m FL	U	6.10	0.15	477	15	V	4.58	30
22 - H Decrease, BH 100% SH, urban, 30 m FL	U	3.05	0.31	644	25.4	V	3.05	30
23 - Horizontal[5]	R	6.10	0.001	644	0.001	H	0	50
24 - Horizontal, BH 50% SH[5]	R	6.10	0.001	644	0.001	H	3.05	50
25 - Horizontal, BH 50% SH, 30 m FL[5]	R	6.10	0.001	644	0.001	H	3.05	30
26 - Capped[6]	R	5.17	0.001	644	0.001	C	0	50
27 - Capped, BH 50% SH[6]	R	5.17	0.001	644	0.001	C	3.05	50
28 - Capped, BH 50% SH, 30 m FL[6]	R	5.17	0.001	644	0.001	C	3.05	30
29 - Low range of values, Building 100% SH	R	3.05	0.15	477	9.14	V	3.05	30
30 - High range of values	R	9.14	0.46	811	76.2	V	0	30

[1]Model Run Codes: BH = Building Height, SH = Stack Height, D = Diameter, V = Exit Velocity, T = Exit Temperature, FL = Fenceline.
[2]Dispersion Codes: R = Rural, U = Urban.
[3]Building Footprint Dimensions: 9.14 m x 9.14 m (30 ft x 30 ft).
[4]Stack Orientation Codes: V = Vertical, H = Horizontal, C = Capped, Vertical Obstructed.
[5]Stack parameters adjusted according to EPA Guidance (July 9, 1993 memo from Joseph A Tikvart to Ken Eng)
[6]Stack parameters adjusted according to EPA Guidance (July 9, 1993 memo from Joseph A Tikvart to Ken Eng), assumes D = 0.31 m
Shaded Values – Values different than base case

Table 6. Summary of impacts for 40 tpy and 15 tpy emission rates. [Note: In a compliance demonstration with ambient air quality standards (AAQS),[11] impacts from nearby sources, if appropriate, and background sources would be added to these results.]

Model Run	Impact Concentration (µg/m^3)				
	40 tpy H2H 3-hr	40 tpy H2H 24-hr	40 tpy Max Annual	15 tpy H2H 24-hr	15 tpy Max Annual
1 - Base Case	88.26	28.15	3.74	10.56	1.40
2 - Height Decrease	148.08	37.90	5.57	14.21	2.09
3 - Height Increase	61.71	17.88	2.68	6.71	1.01
4 - Urban	161.08	71.03	9.77	26.64	3.66
5 - Diameter Decrease	283.71	76.96	12.21	28.86	4.58
6 - Diameter Increase	46.37	12.35	1.55	4.63	0.58
7 - Velocity Decrease	203.94	59.79	8.75	22.42	3.28
8 - Velocity Increase	36.12	9.05	1.07	3.39	0.40
9 - Temperature Decrease	118.95	35.72	5.16	13.40	1.94
10 - Temperature Increase	74.16	24.62	3.14	9.23	1.18
11- BH 50% SH	128.26	28.35	3.77	10.63	1.41
12 - BH 75% SH	308.61	83.93	6.47	31.47	2.43
13 - BH 50% SH, urban	196.43	71.42	9.80	26.78	3.68
14 - BH 75% SH, urban	544.72	237.69	35.92	89.13	13.47
15 - BH 50% SH, urban, 30 m FL	208.77	71.42	9.80	26.78	3.68
16 - BH 75% SH, urban, 30 m FL	949.60	317.85	54.00	119.19	20.25
17 - BH 50% SH, urban, 15 m FL	196.43	71.42	9.80	26.78	3.68
18 - BH 75% SH, urban, 15 m FL	1045.30	237.69	35.92	89.13	13.47
19 - T/D/V Decrease, BH 75% SH, 30 m FL	1487.95	463.76	99.96	173.91	37.49
20 - H/T/D/V Decrease, BH 67% SH, 30 m FL	1444.40	582.41	109.67	218.40	41.13
21 - T/D/V Decrease, BH 75% SH, urban, 30 m FL	1683.62	626.98	114.99	235.12	43.12
22 - H Decrease, BH 100% SH, urban, 30 m FL	1606.12	654.28	101.58	245.36	38.09
23 – Horizontal[5]	1341.46	377.22	54.20	141.46	20.33
24 - Horizontal, BH 50% SH[5]	4308.35	1138.81	188.96	427.05	70.86
25 - Horizontal, BH 50% SH, 30 m FL[5]	5676.34	1546.20	239.56	579.83	89.84
26 - Capped[6]	1824.50	480.88	80.05	180.33	30.02
27 - Capped, BH 50% SH[6]	5990.40	1577.67	252.12	591.63	94.55
28 - Capped, BH 50% SH, 30 m FL[6]	8643.41	2357.32	364.89	884.00	136.83
29 - Low range of values, Building 100% SH	8693.97	2037.43	487.96	764.04	182.99
30 - High range of values	9.38	2.30	0.31	0.86	0.12

[11] Modeling Significance Levels and AAQS for NO_2, SO_2, and PM_{10}

	Modeling Significance Level (µg/m^3)			NAAQS (µg/m^3)			CAAQS (µg/m^3)		
Pollutant	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual
NO_2			1			100			100
SO_2	25	5	1	1300	365	80	700		
PM_{10}		5	1		150	50		150	50

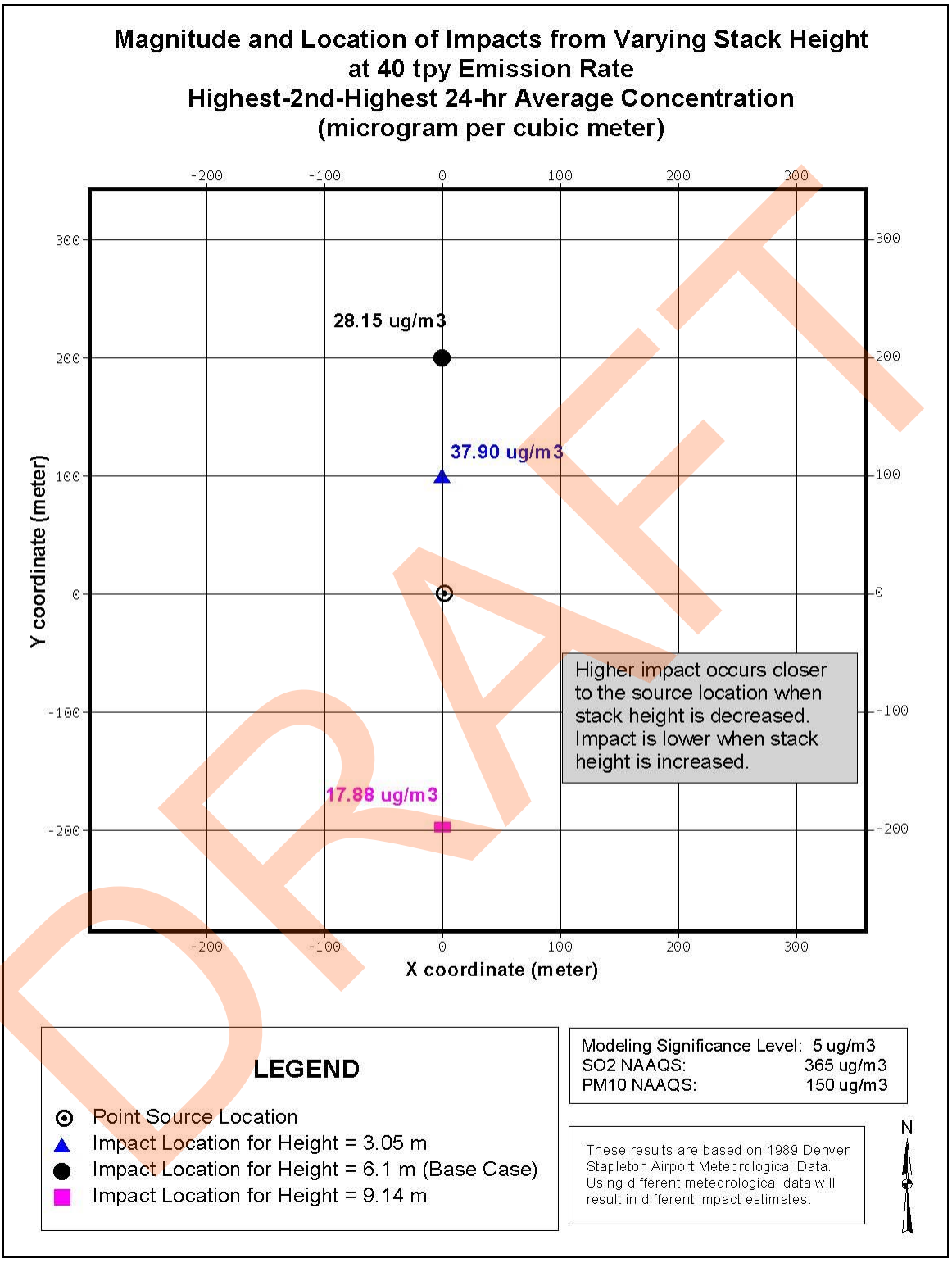


Figure 1. Magnitude and Location of Impacts from Varying Stack Height

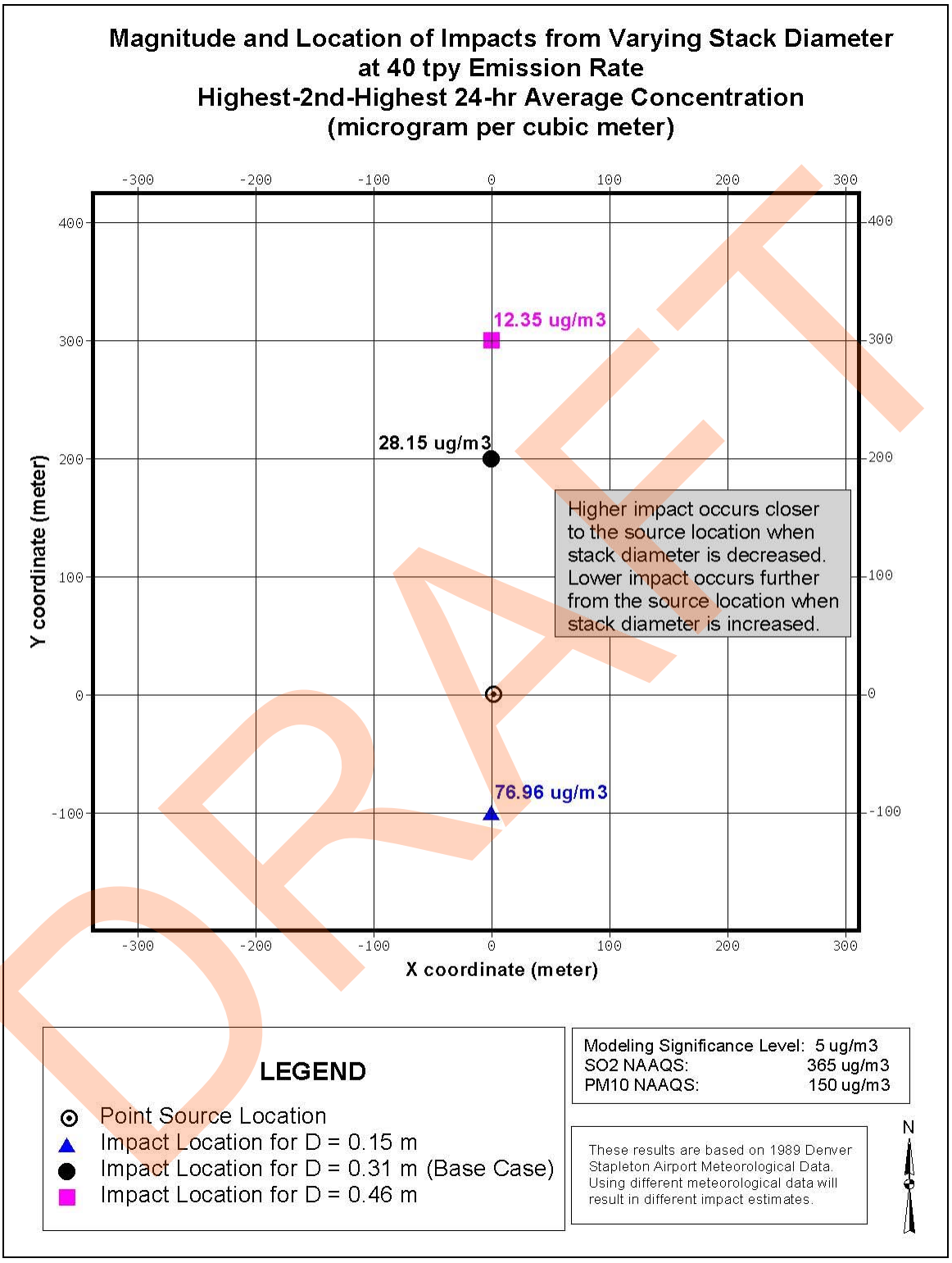


Figure 2. Magnitude and Location of Impacts from Varying Stack Diameter

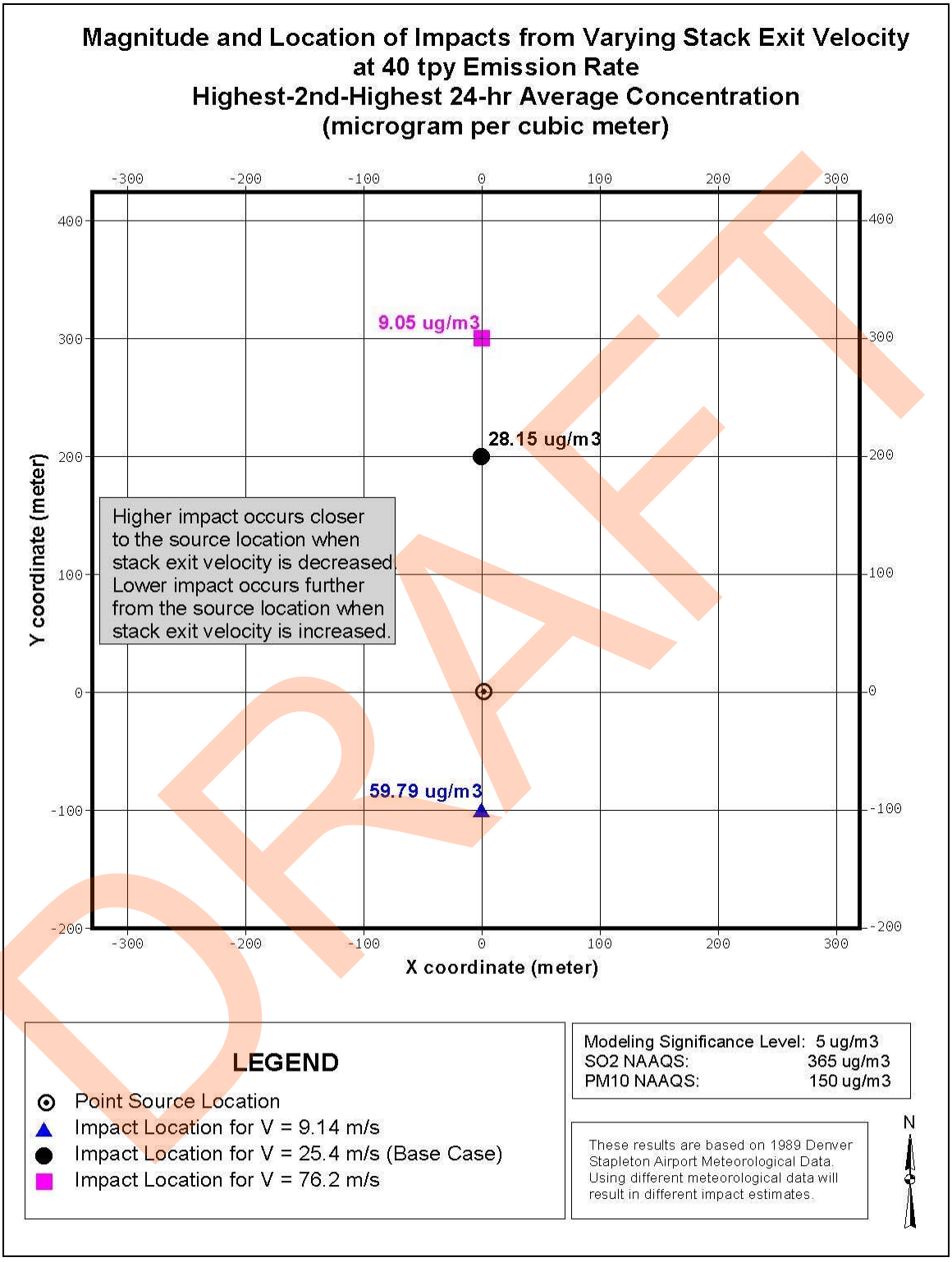


Figure 3. Magnitude and Location of Impacts from Varying Stack Exit Velocity

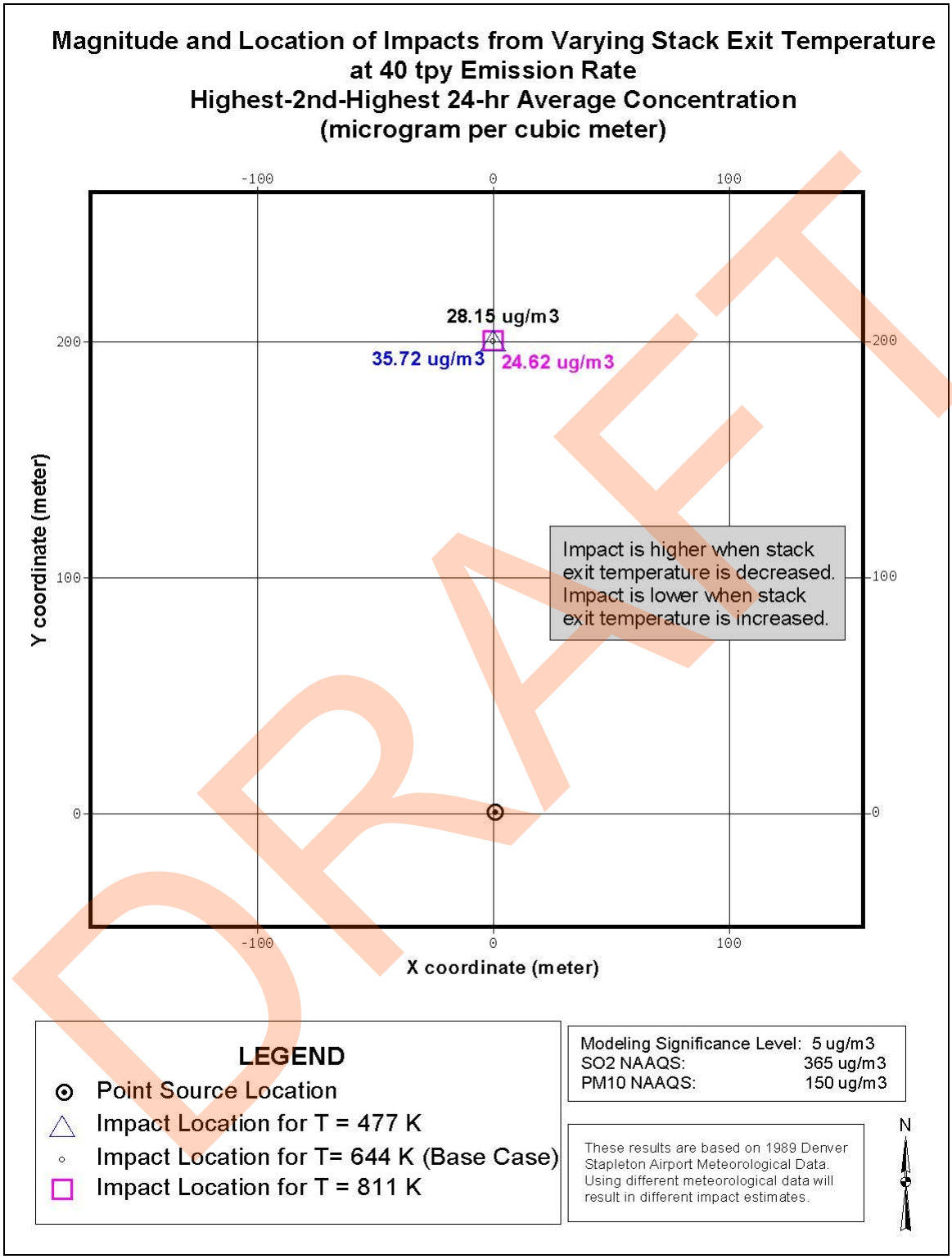


Figure 4. Magnitude and Location of Impacts from Varying Stack Gas Exit Temperature

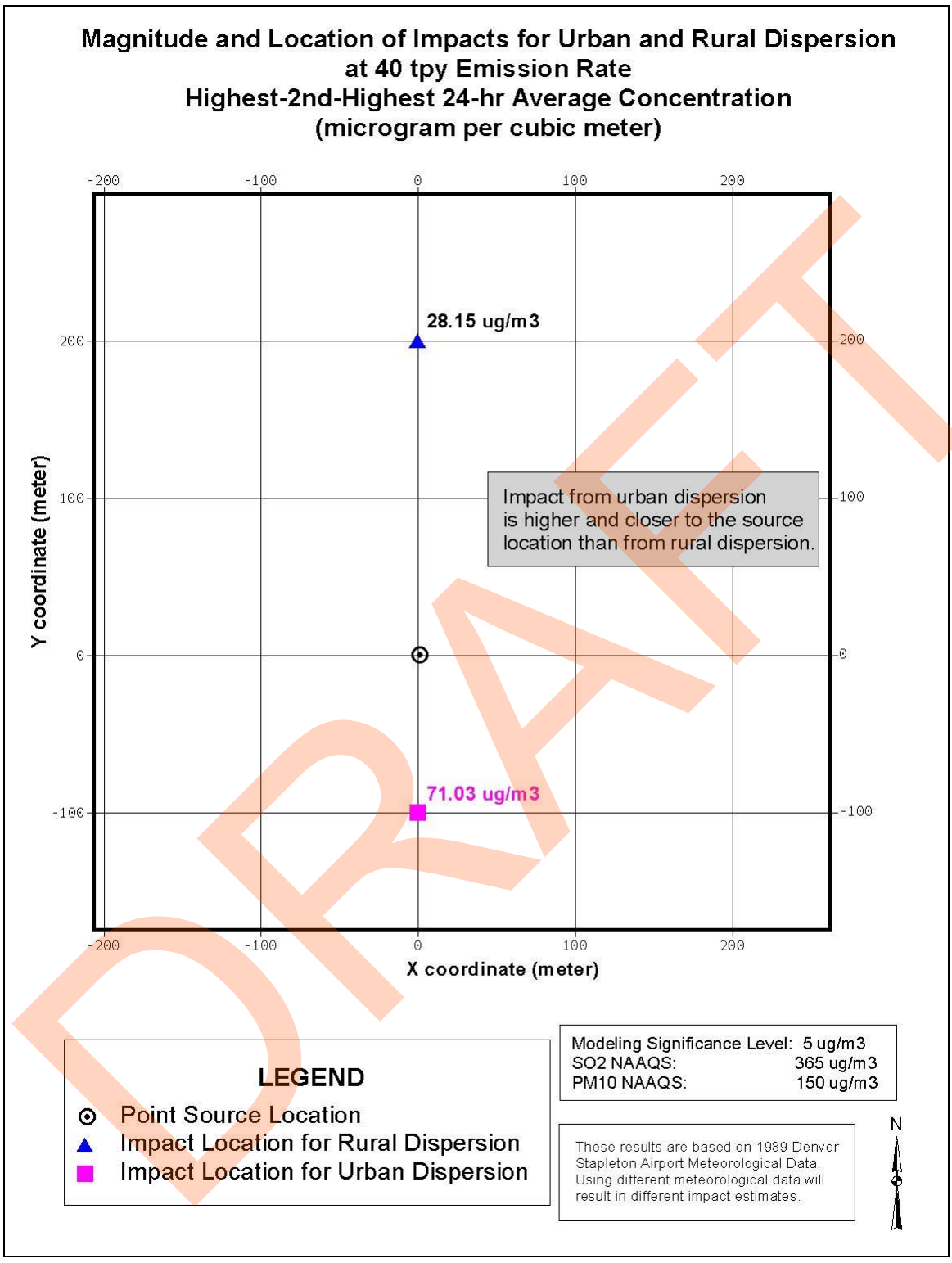


Figure 5. Magnitude and Location of Impacts for Urban and Rural Dispersion

6. Discussion (January 2002 Analysis)

6.1. Sensitivity Analysis (Runs 2 through 10)

The results show that increases in stack height, stack diameter, stack gas exit velocity, and stack gas exit temperature decrease ambient pollutant concentration levels and increase the distance of impact from the source. Decreases in stack height, stack diameter, stack gas exit velocity, and stack gas exit temperature increase ambient pollutant concentration levels and decrease the distance of impact from the source. Tall and wide stacks with high velocity and temperature promote plume rise. Short and narrow stacks with low velocity and temperature impede plume rise. The modeling parameters used for these runs with an emission rate of 40 tpy resulted in exceedances of the modeling significance levels for all averaging periods for SO_2, NO_2, and PM_{10}. All impact concentrations for 15 tpy PM_{10}, except for diameter and velocity increases, are above the modeling significance levels for both averaging periods for PM_{10}.

6.2. Building Downwash (Runs 11 through 18)

Increase in building height increases the magnitude of impact and decreases the distance of impact from the source. Examining the concentrations for runs 13 through 18 in Table 7 reveals the relationship between maximum impacts and fenceline receptors. The maximum impacts obtained for a given emission unit can vary with the location of the fenceline. Thus, the fenceline location is important because it usually determines the ambient air boundary.[12] For example, the maximum annual concentration for an emission unit subject to downwash from a building height equal to 75% of the stack height with a fenceline at 50 m is 35.92 μg/m^3. If the same emission unit has a fenceline at 30 m, the maximum annual concentration is 54.00 μg/m^3, a 50% increase. For the emission unit subject to downwash from a building height equal to 50% of the stack height, the H2H 24-hr and maximum annual concentrations are the same for all fenceline distances used. The modeling parameters used for these runs with an emission rate of 40 tpy resulted in exceedences of the modeling significance levels for all averaging periods for SO_2, NO_2, and PM_{10}. All impact concentrations for 15 tpy PM_{10} are above the modeling significance levels for both averaging periods for PM_{10}. The 3-hr SO_2 CAAQS is exceeded by the source impacts.

Table 7. Impacts from 40 tpy by fenceline distance from source

Fenceline Distance from Source	Impact Concentration from 40 tpy (μg/m^3)					
	Building Height = 50% Stack Height			Building Height = 75% Stack Height		
	H2H 3-hr	H2H 24-hr	Max Annual	H2H 3-hr	H2H 24-hr	Max Annual
50 m	196.43	71.42	9.8	544.72	237.69	35.92
30 m	208.77	71.42	9.8	949.60	317.85	54.00
15 m	196.43	71.42	9.8	1045.30	237.69	35.92

6.3. Multiple Changes in Stack Characteristics with Building Downwash (Runs 19 through 22)

These runs were performed to determine impact concentrations resulting from vertical, unobstructed stacks subject to building downwash with poor dispersion characteristics (low temperature, velocity and stack diameter). Short stacks with fairly good dispersion can have high impacts due to an overwhelming effect from building downwash. The modeling parameters used for these runs with an emission rate of 40 tpy resulted in exceedances of the modeling significance levels for all averaging periods for SO_2, NO_2, and PM_{10}. All impact concentrations for 15 tpy PM_{10} are above the modeling significance levels for both averaging periods for PM_{10}. The SO_2 AAQS and 24-hr PM_{10} NAAQS (at 40 tpy and 15 tpy) have been exceeded by the

[12] Ambient air quality standards apply only in "ambient air." That is, it is not necessary to place receptors (e.g., to estimate impacts) within property owned or controlled by the facility if public access is precluded by a fence or physical barrier.

source impacts. The NO_2 impacts, using a 75% annual conversion to NO_2 from NO_X, range from 75 $\mu g/m^3$ to 86 $\mu g/m^3$, greater than 75% of the NO_2 NAAQS.

6.4. Horizontal Stack (Runs 23 Through 25) and Capped Stack (Runs 26 through 28)

Horizontal and capped stacks do not promote plume rise. This is illustrated by the exceedances of the modeling significance levels for all averaging periods as well as most of the AAQS for SO_2, NO_2, and PM_{10} with a few exceptions (annual NAAQS for runs with no building downwash).

6.5. Minimum and Maximum Range of Values (Runs 29 and 30)

These runs were performed to determine the range of impact concentrations for the range of stack and building characteristics used in this modeling analysis. Run 29 is the poor dispersion example with all impact concentrations exceeding the modeling significance levels and AAQS. Run 30 is a good dispersion example with all impact concentrations below the modeling significance levels.

6.6. Other Modeling Variables Not Examined in this Modeling Analysis

There are other parameters used in modeling that are not examined here, such as different meteorological data sets, elevated terrain, and background concentrations. Typical yearly variations of meteorological data at one location can result in modeled design concentration differences of up to 25% or even higher in some locations.[13] Higher impacts may result when plume rise is insufficient to clear nearby terrain.

Contributors to ambient air concentration for determining compliance with AAQS are impacts from the source of interest and nearby sources, and the background concentration. Even though impacts are just above modeling significance levels or only a small fraction of the AAQS, a complete compliance demonstrate must also take existing air pollutant concentration levels into account. This may mean that, in addition to adding a background concentration, nearby sources with strong concentration gradients should be included in the modeling. Since it's not reasonable to model all sources, it is necessary to add a background concentration to account for the emissions from all sources that have not been explicitly included in the modeling. Background concentrations vary by geographic area. For areas with high background concentrations (and/or strong concentration gradients from nearby sources) near the AAQS, a source impact that is greater than the modeling significance levels, but still a relatively small percentage of the AAQS, can result in a modeled violation of the AAQS.

[13] In a recent study conducted in Alaska, it was found that the modeled maximum annual average concentration varied by as much as 200% over a five (5) year period at one particular site, depending on which year of meteorological data was used in the model. At two other sites, the maxima varied by 139% and 122%, respectively. For short-term (24-hour) concentrations, the maximum modeled concentration varied by 161%, 148%, and 121% at three different sites, depending on which one of the five years of meteorological data were used. In addition to the variation in the maximum modeled impact, the location (geographic location) of the modeled maxima varied significantly from one year to the next. [Reference: Presentation by Alan Schuler, Alaska Department of Environmental Conservation, 2001 EPA/State/Local Modeler's Workshop, Chicago]

7. Methodology, Results, and Discussion of the April 2010 Analysis

7.1. Methodology

Annual, 24-hr, and 1-hr impacts for 22 individual point source scenarios using 48 one-year periods of hourly meteorology were estimated with AERMOD (09292) and SCREEN3 for a range of emission rates. Since no chemical transformations or conversion factors were used, the impacts in Figures #-# below are applicable for any pollutant. Urban effects were not modeled.

7.1.1. Meteorology

The following meteorological data (station/years) were used in this analysis.

DEN (Denver Stapleton) 1990-1994
Greely (Greeley) 2002-2006
Akron (Akron) 1990-1994
Pueblo (Pueblo Memorial Airport) 2002-2006
COSprings (Colorado Springs) 1987-1991
Sydney (Sydney) 2003-2007
Kodak 1993-1997
PRPA06 (Platte River Power-Rawhide)
Thermo/Ft Lupton
FtStVrain (Fort St Vrain Power)
PuebloDepot (Peublo Chemical Depot) 1998-2000
Portland
Asarco1993, 1994, 1998-2000
Naturita

7.1.2. Receptor Network

Receptors were placed every 10 degrees at the following distances (meters) from the point source: 30, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2100, 2200, 2300, 2400, 2500, 2600, 2700, 2800, 2900, 3000, 3100, 3200, 3300, 3400, 3500, 3600, 3700, 3800, 3900, 4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700, 4800, 4900, 5000, 5500, 6000, 6500, 7000, 7500, 8000, 8500, 9000, 9500, 10000. Flat terrain was assumed.

7.1.3. Point Sources

Table 8 summarizes the point source parameters (building dimensions, where applicable) for each scenario/model run. The range of source types in this analysis (points, with and without building downwash) is not intended to represent all possible stack characteristics and combinations but is intended to illustrate the effects of each/combination of parameter(s) on impact estimates.

Table 8. Summary of Point Source Inputs

Source ID	Emissions Rate (g/s)	Stack Height (m)	Temp (K)	Exit Velocity (m/s)	Stack Diameter (m)	Bldg Height (m)	Bldg Width (m)	Bldg Length (m)	Location of Bldg
B1	100	10	293	1	2.4				
B2	100	35	293	11.7	2.4				
B3	100	35	432	11.7	2.4				
B4	100	100	416	18.8	4.6				
B5	100	150	425	26.5	5.6				
B6	100	200	425	26.5	5.6				
BC08	100	8	377	10	0.7				
BC10	100	10	300	15	0.2				
BCMD	100	40	325	10	1.5				
BCLG	100	91.4	467.6	17.1	4.57				
CO1	100	6	400	15	0.5				
ASOS1	100	55	432	11.7	2.4				
D1	100	10	293	1	2.4	34	60	120	NE bldg corner = stack location
D2	100	10	293	1	2.4	34	60	120	NE bldg corner SW of stack (-96 m, -96 m)
D3	100	35	432	11.7	2.4	34	60	120	NE bldg corner = stack location
D4	100	35	432	11.7	2.4	34	60	120	NE bldg corner SW of stack (-96 m, -96 m)
D5	100	100	416	18.8	4.6	50	60	120	NE bldg corner = stack location
D6	100	100	416	18.8	4.6	50	60	120	NE bldg corner SW of stack (-140 m, -140 m)
BC08D	100	8	377	10	0.7	6	10	6	North side of building centered on stack
BC10D	100	10	300	15	0.2	8	10	6	NE bldg corner located 4 m south of stack
CO1D	100	6	400	15	0.5	4	4.5	9	North side of building centered on stack
ASOS1D	100	55	432	11.7	2.4	34	60	120	NE bldg corner = stack location

7.2. Results and Discussion

Predicted concentrations from AERMOD and SCREEN3 for various emission rates are compared to the NAAQS for Pb (3-month), $PM_{2.5}$ (24-hr and annual), and NO_2 (1-hr) in the subsequent subsections. The SCREEN3 concentrations do not include estimates in the cavity region, consistent with past and present Division practice.

7.2.1. 1-hr Concentrations

Figure 6 through Figure 9 present the 1-hr concentrations for emission rates of 9.13 pounds per hr (annual NO_X emission rate threshold equivalent - 40 tpy), 2.28 pounds per hr, 1.14 pounds per hour, and 0.46 pound per hr. Based on these results, the 1-hr NO_2 NAAQS could be threatened by an individual emission unit with an emission rate around or greater than 2.28 pounds per hour. At a point source emission rate of 1.14 pounds per hour (with or without building downwash), it is reasonable to believe the source will cause or contribute to a violation of the 1-hr NO_2 NAAQS. For a point source with an emission rate of 0.46 pound per hour with poor dispersion, there will be situations (Table 1 footnotes and Section 7.2.5) when the modeling significance level is exceeded and it is reasonable to believe the source will cause or contribute to a violation of the 1-hr NO_2 NAAQS.

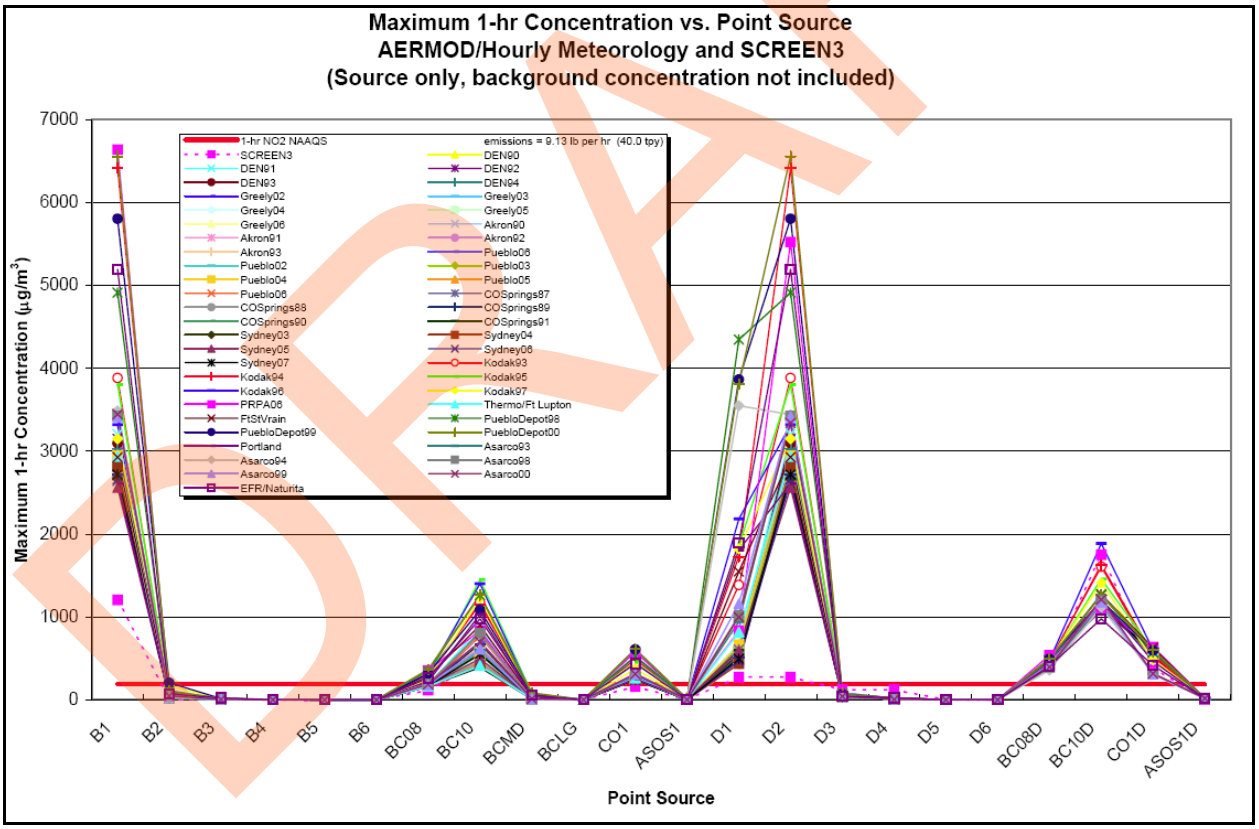


Figure 6. Maximum 1-hr Concentrations - 9.13 pounds per hr (40 tpy equivalent)

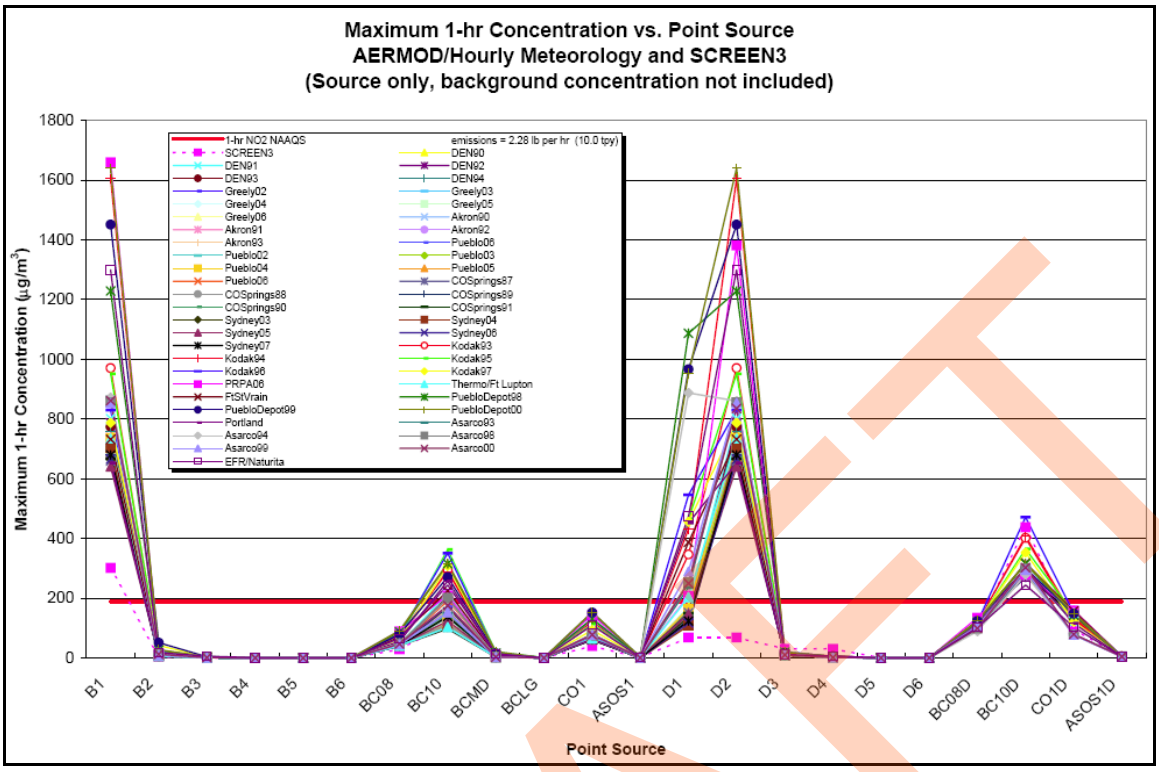


Figure 7. Maximum 1-hr Concentrations -2.28 pounds per hr (10 tpy equivalent)

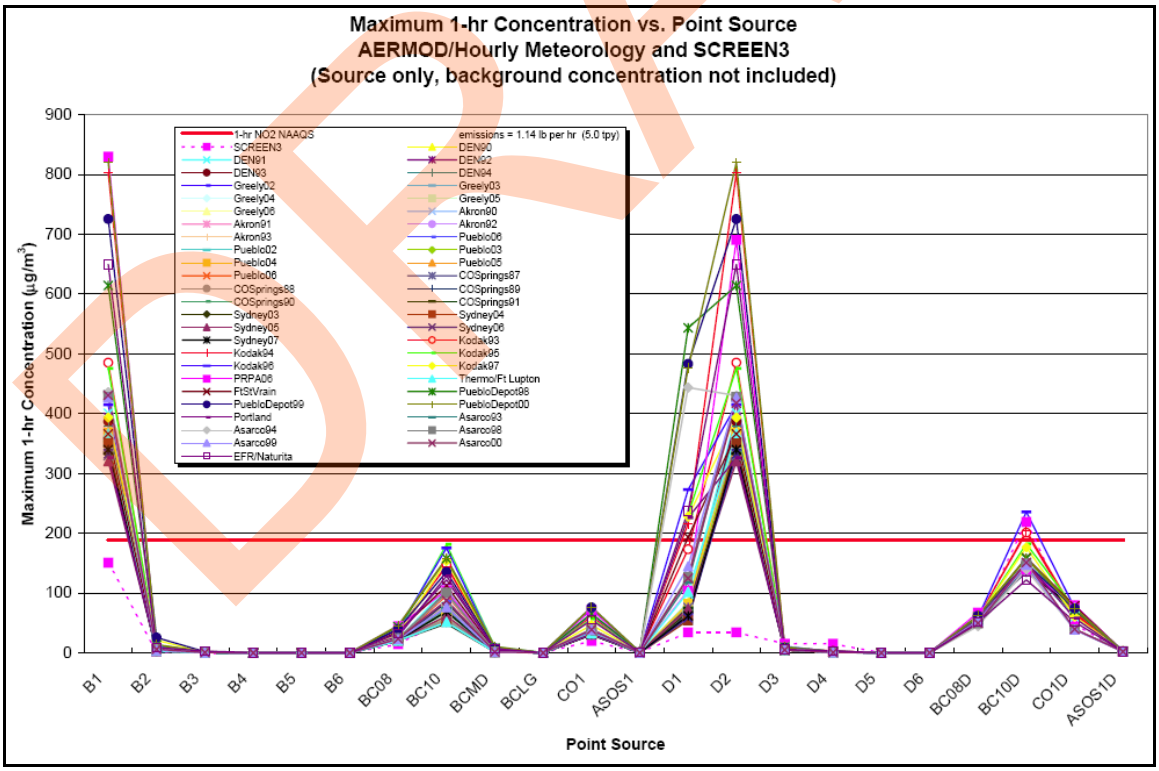


Figure 8. Maximum 1-hr Concentrations - 1.14 pounds per hr (5 tpy equivalent)

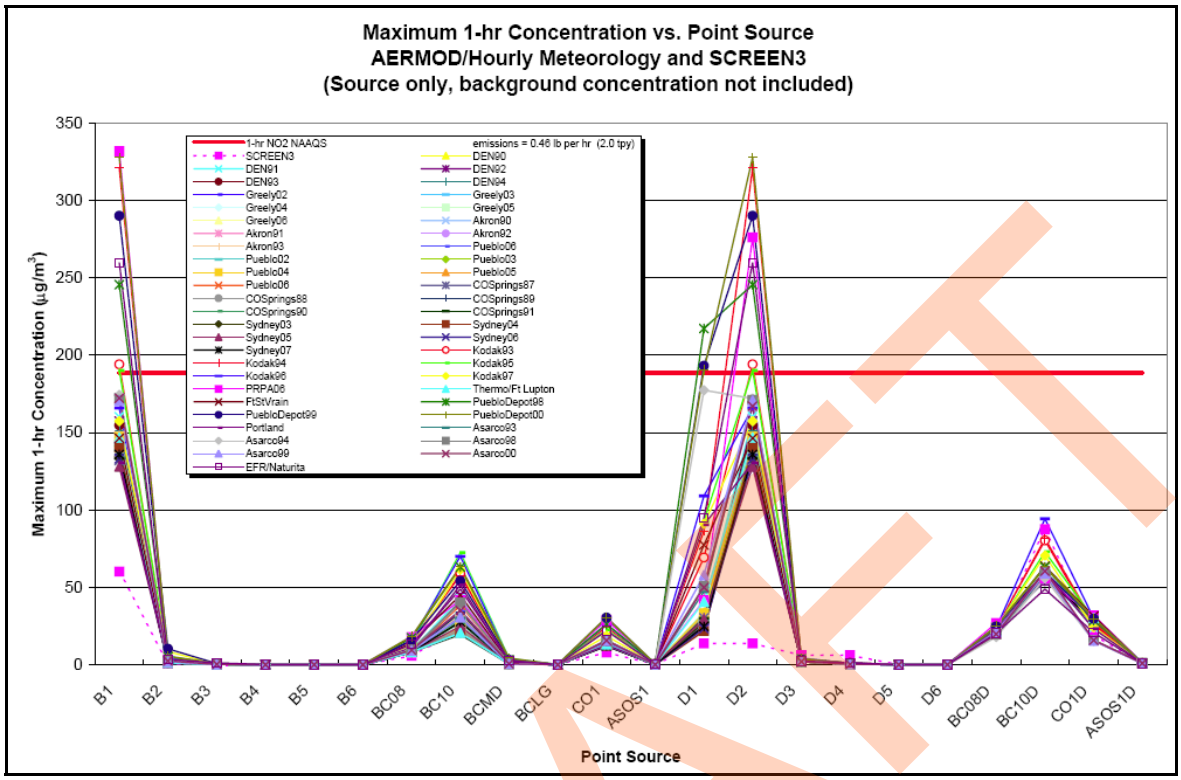


Figure 9. Maximum 1-hr Concentrations - 0.46 pound per hr (2 tpy equivalent)

7.2.2. 24-hr Concentrations

Figure 10 through Figure 12 present the 24-hr concentrations for emission rates of 82 pounds per day (24-hr PM_{10} emission rate threshold), 27 pounds per day, and 11 pounds per day. Based on these results, the 24-hr $PM_{2.5}$ NAAQS could be threatened by an individual emission unit with poor dispersion and an emission rate around or greater than 27 pounds per day. For a point source with an emission rate of 11 pounds per day with poor dispersion, there will be situations (Table 1 footnotes and Section 7.2.5) when the modeling significance level is exceeded and it is reasonable to believe the source will cause or contribute to a violation of the 24-hr $PM_{2.5}$ NAAQS.

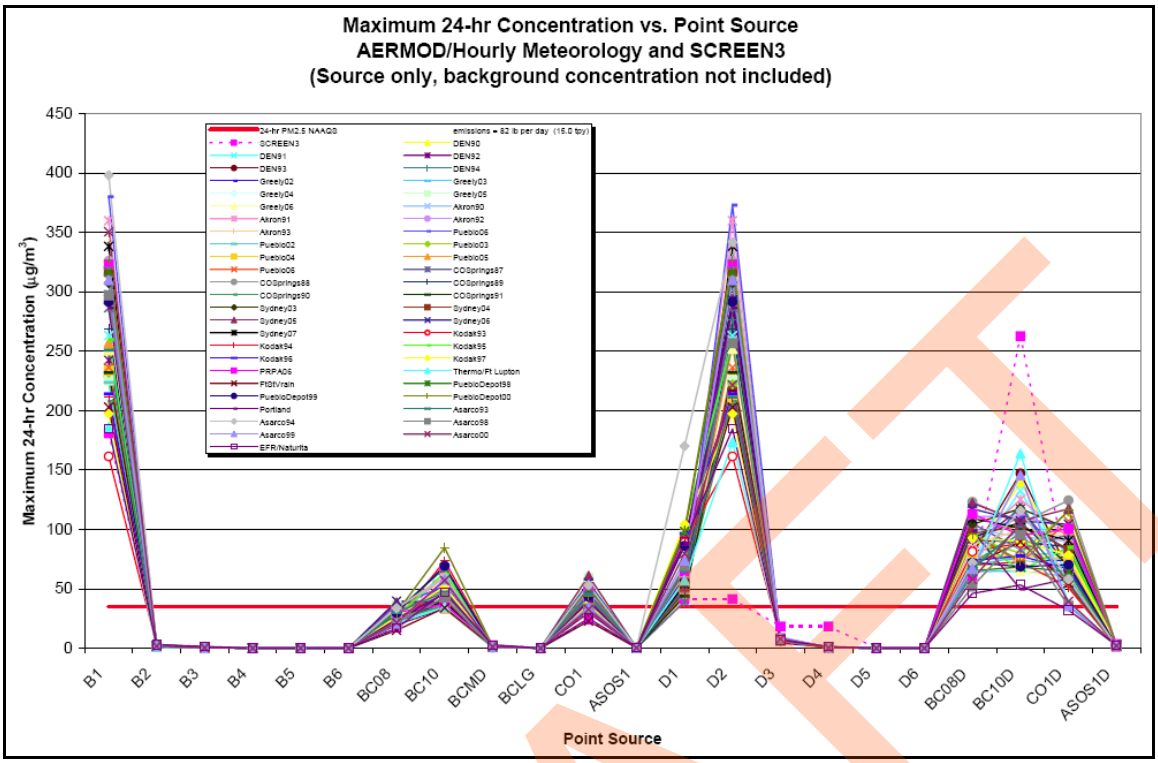


Figure 10. Maximum 24-hr Concentration - 82 lb per day (15 tpy equivalent)

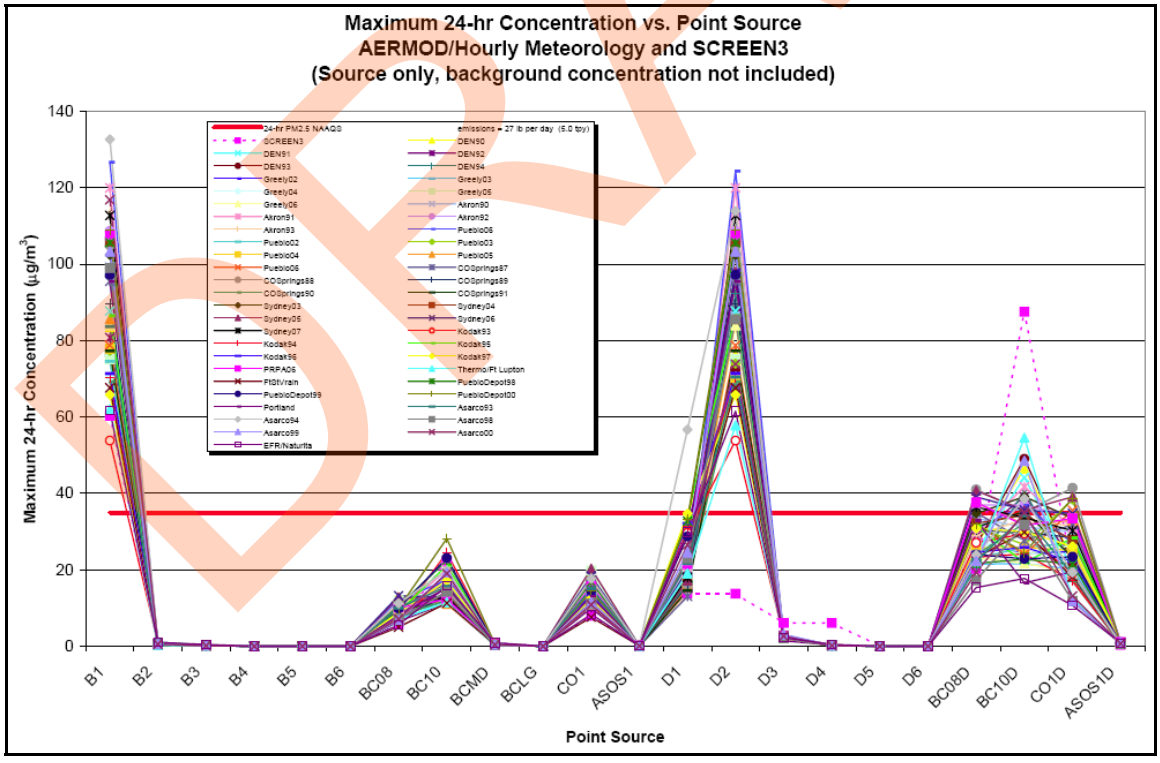


Figure 11. Maximum 24-hr Concentration - 27 lb per day (5 tpy equivalent)

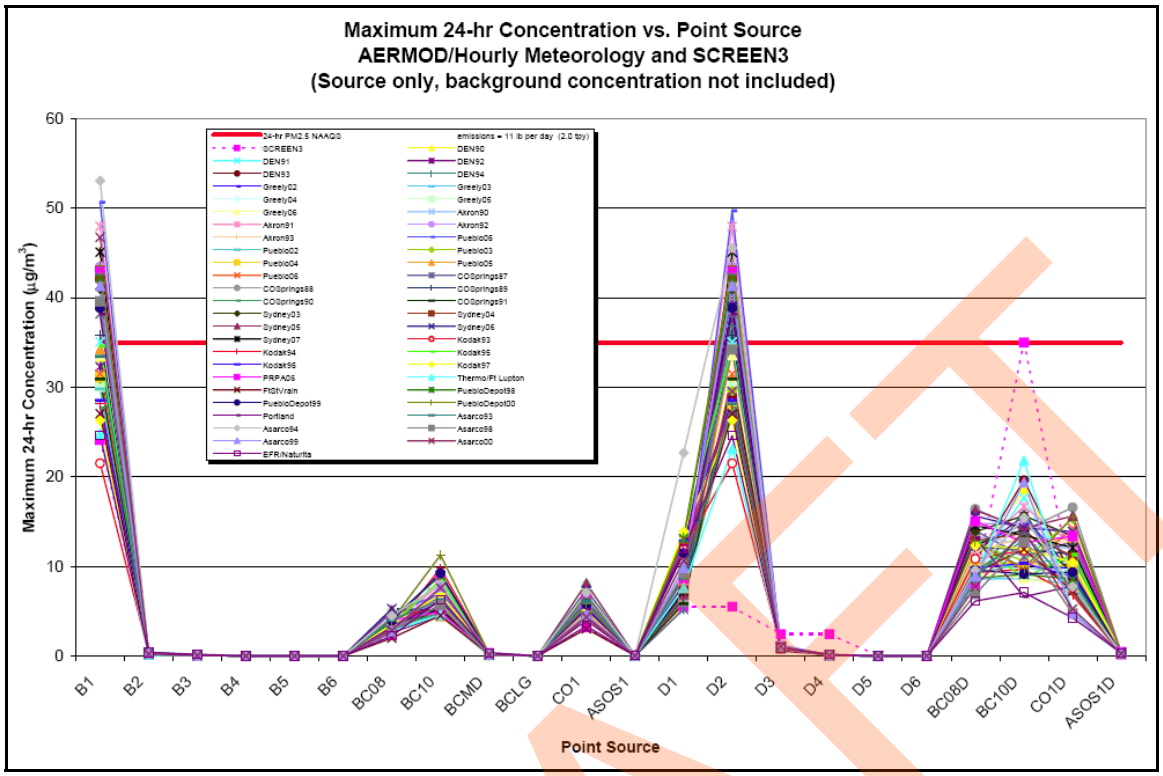


Figure 12. Maximum 24-hr Concentration - 11 lb per day (2 tpy equivalent)

7.2.3. Annual Concentrations

Figure 13 through Figure 15 present the annual concentrations for emission rates of 15 tpy, 10 tpy, and 5 tpy. Based on these results, the annual $PM_{2.5}$ NAAQS could be threatened by an individual emission unit with poor dispersion and an emission rate around or greater than 10 tpy. For a point source with an emission rate of 5 tpy with poor dispersion, there will be situations (Table 1 footnotes and Section 7.2.5) when the modeling significance level is exceeded and it is reasonable to believe the source will cause or contribute to a violation of the 24-hr $PM_{2.5}$ NAAQS.

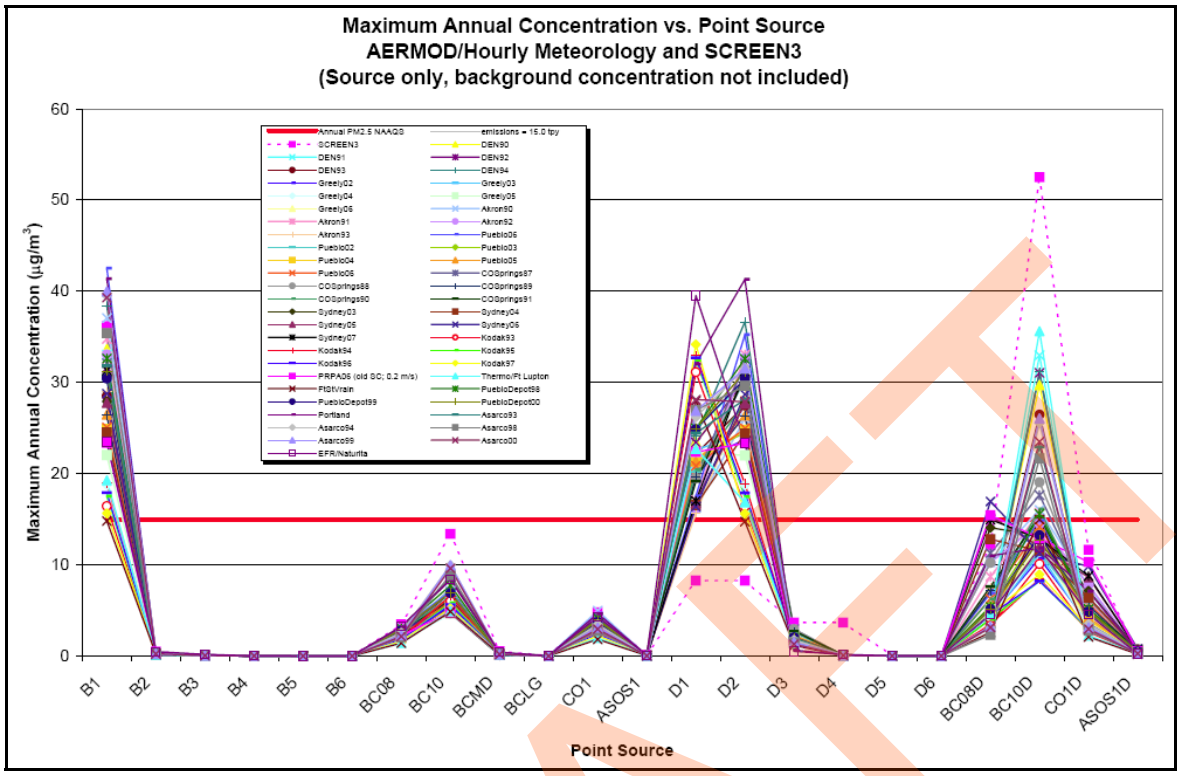


Figure 13. Maximum Annual Concentrations - 15 tpy

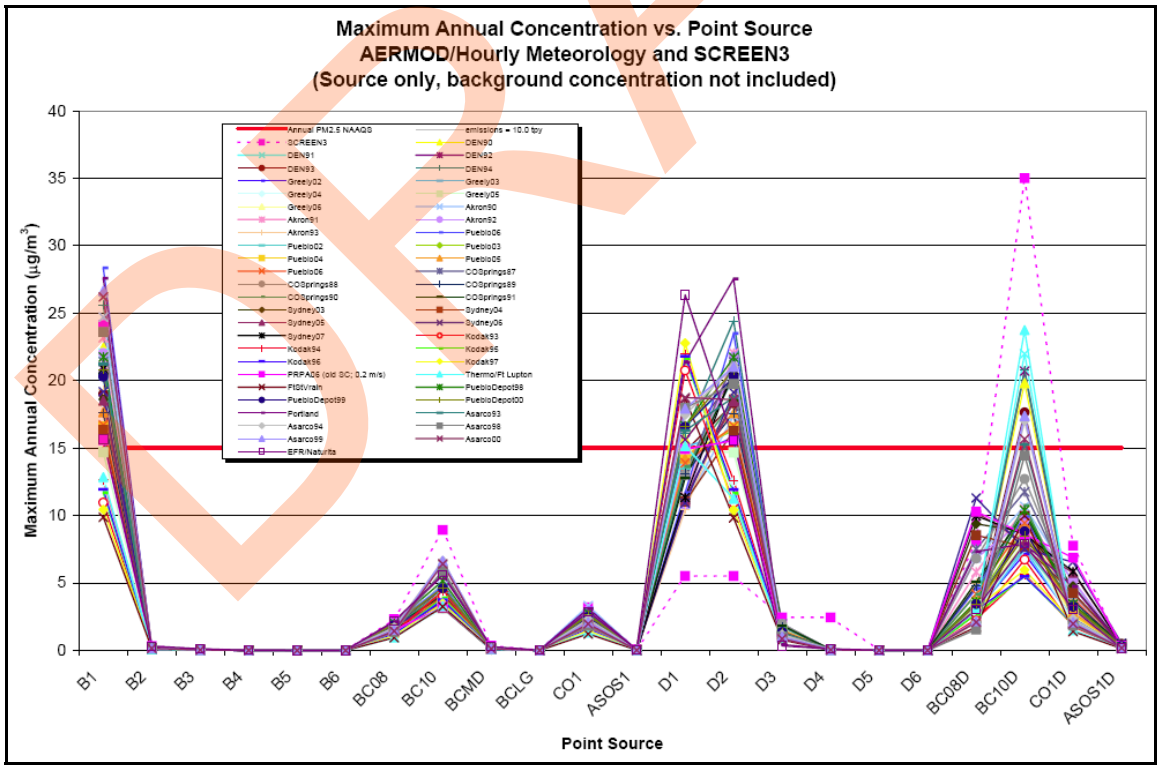


Figure 14. Maximum Annual Concentrations - 10 tpy

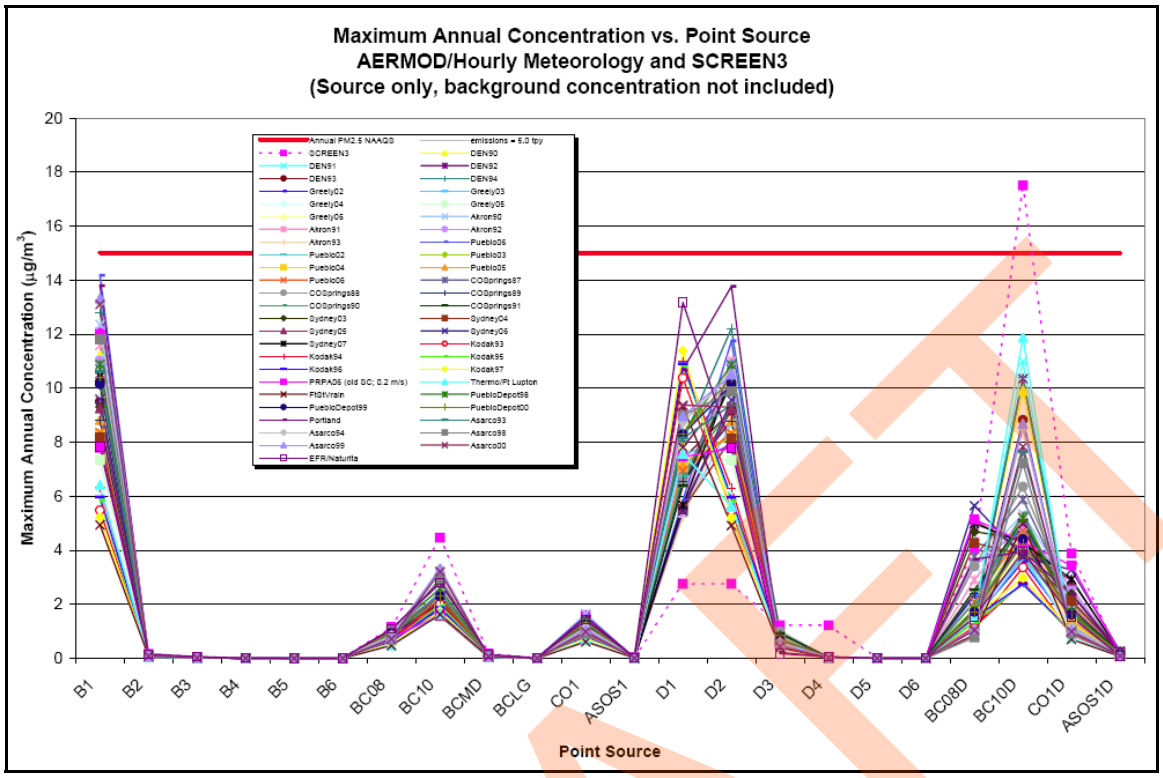


Figure 15. Maximum Annual Concentrations - 5 tpy

7.2.4. 3-month Concentrations

For the rolling 3-month Pb NAAQS, the annual and 24-hr concentrations (monthly average concentrations were not obtained from the model) were reviewed for emission rates of 0.6 tpy/300 pounds per 3-months (Figure 16 and Figure 17), 0.1 tpy/50 pounds per 3-months (Figure 18 and Figure 19), and 0.05 tpy/25 pounds per 3-months (Figure 20 and Figure 21). Concentrations for a 3-month average are greater than the annual average but less than the 24-hr average. Based on these results, the 3-month Pb NAAQS could be threatened by an individual emission unit with poor dispersion and an emission rate around or greater than 0.1 tpy/50 pounds per 3-months. For a point source with an emission rate of 0.05 tpy/25 pounds per 3-months with poor dispersion, there will be situations (Table 1 footnotes and Section 7.2.5) when it is reasonable to believe the source will cause or contribute to a violation of the rolling 3-month Pb NAAQS.

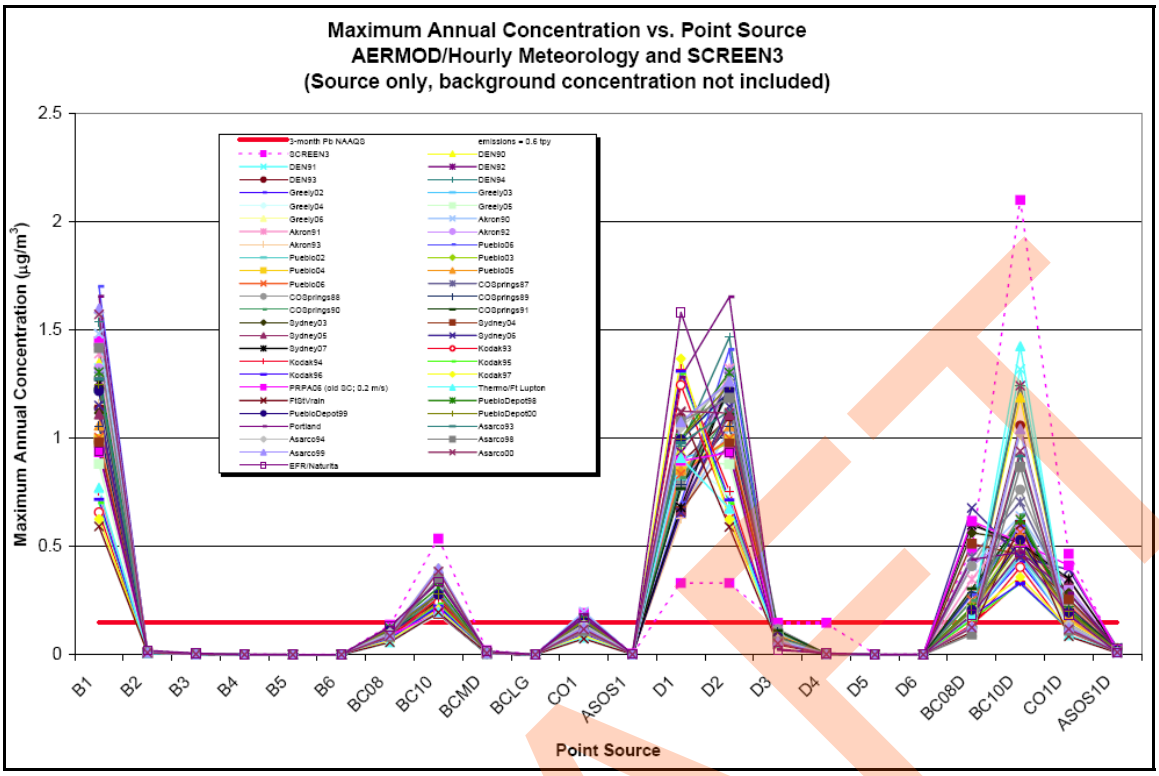


Figure 16. Maximum Annual Concentrations - 0.6 tpy

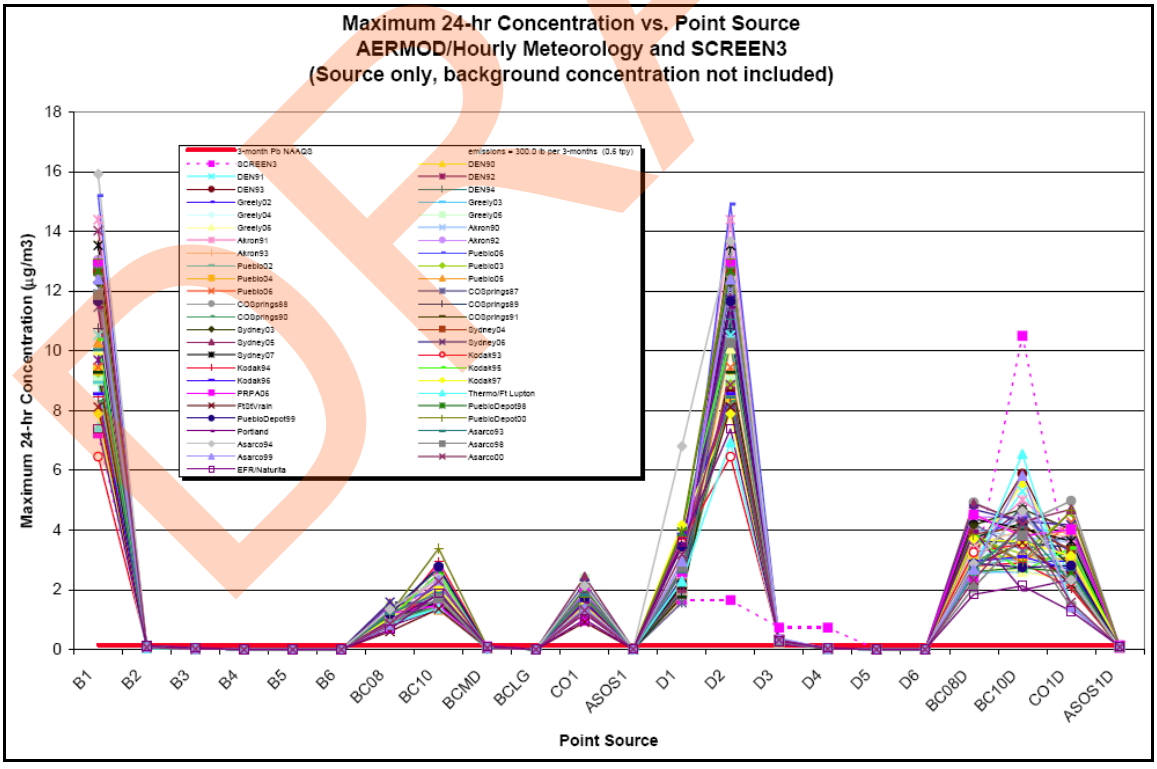


Figure 17. Maximum 24-hr Concentrations - 300 pounds per 3-months

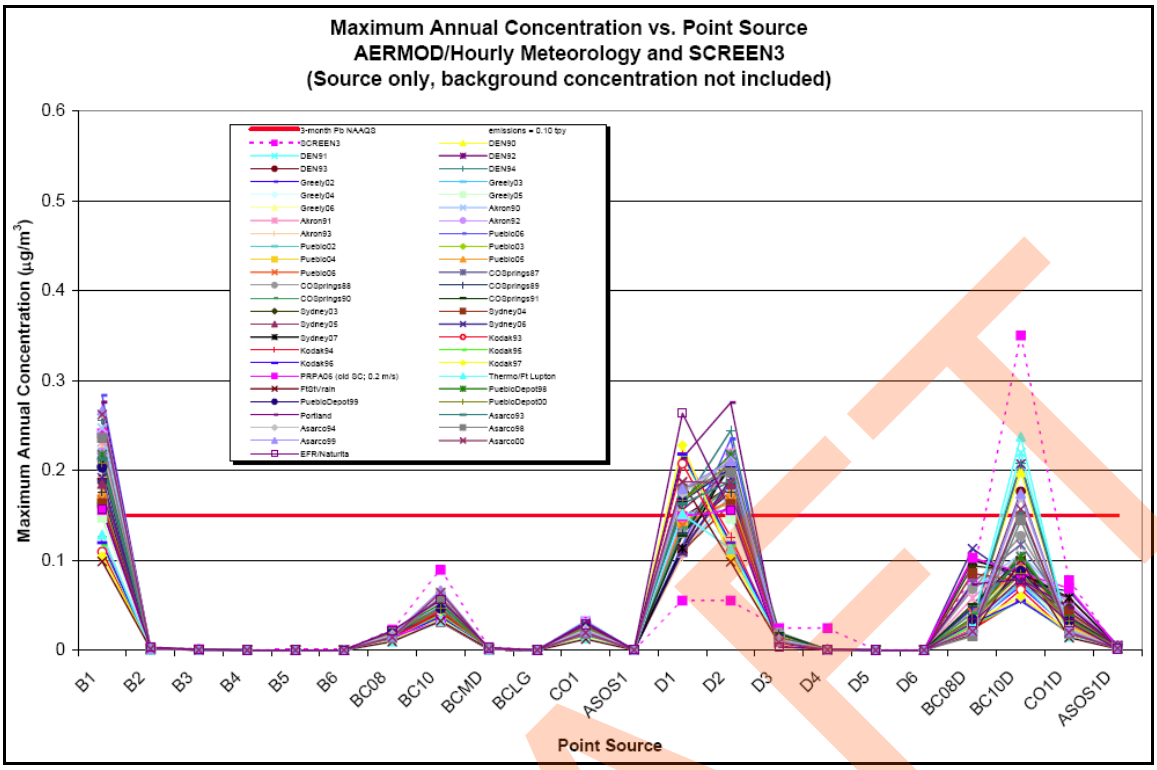


Figure 18. Maximum Annual Concentrations - 0.1 tpy

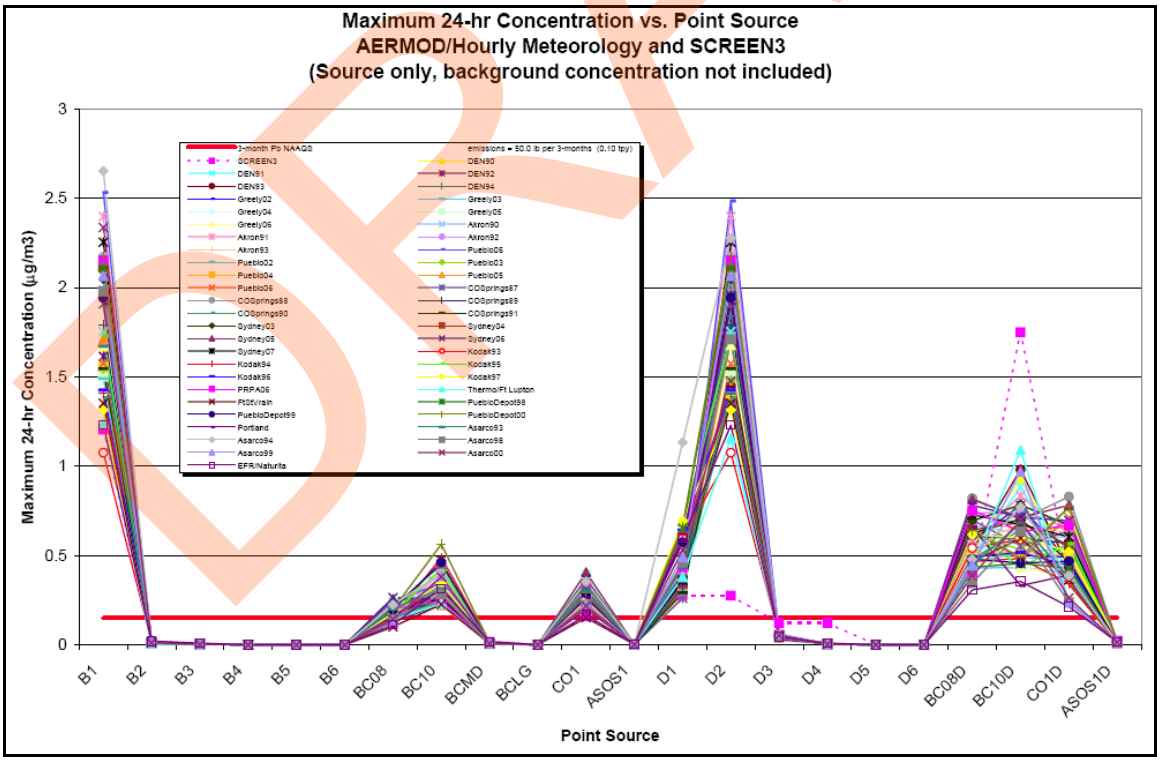


Figure 19. Maximum 24-hr Concentrations - 50 pounds per 3-months

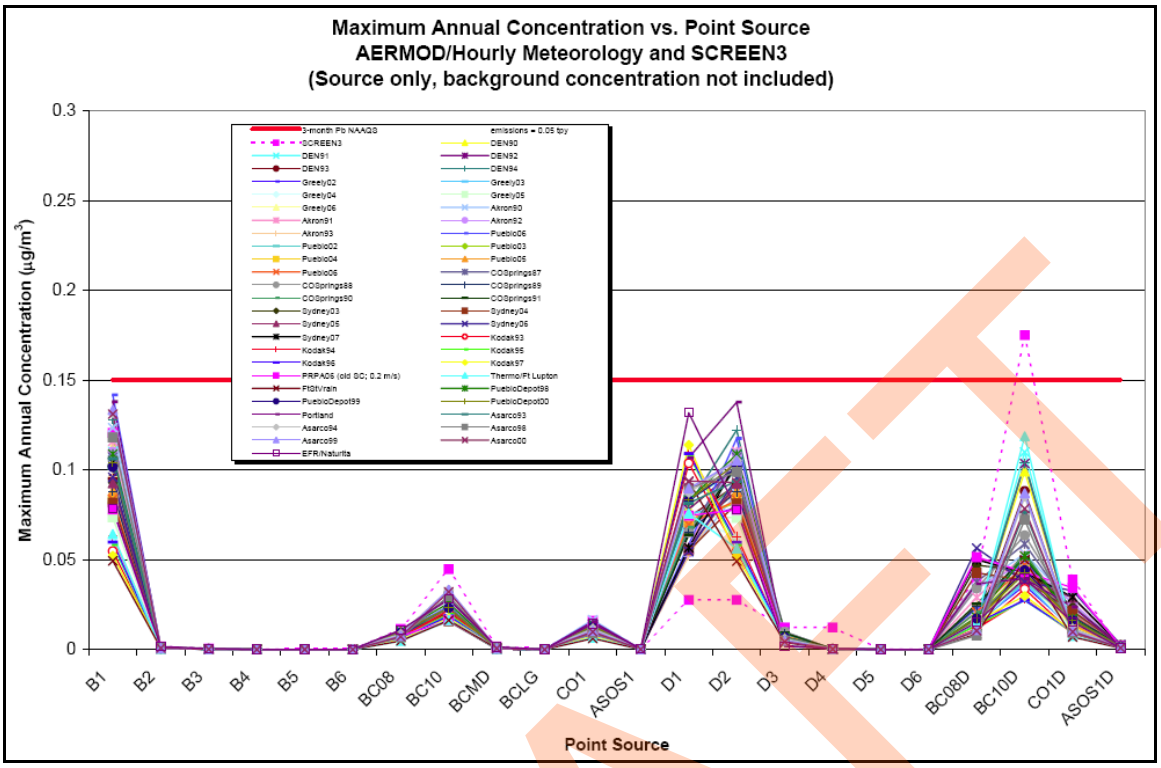


Figure 20. Maximum Annual Concentrations - 0.05 tpy

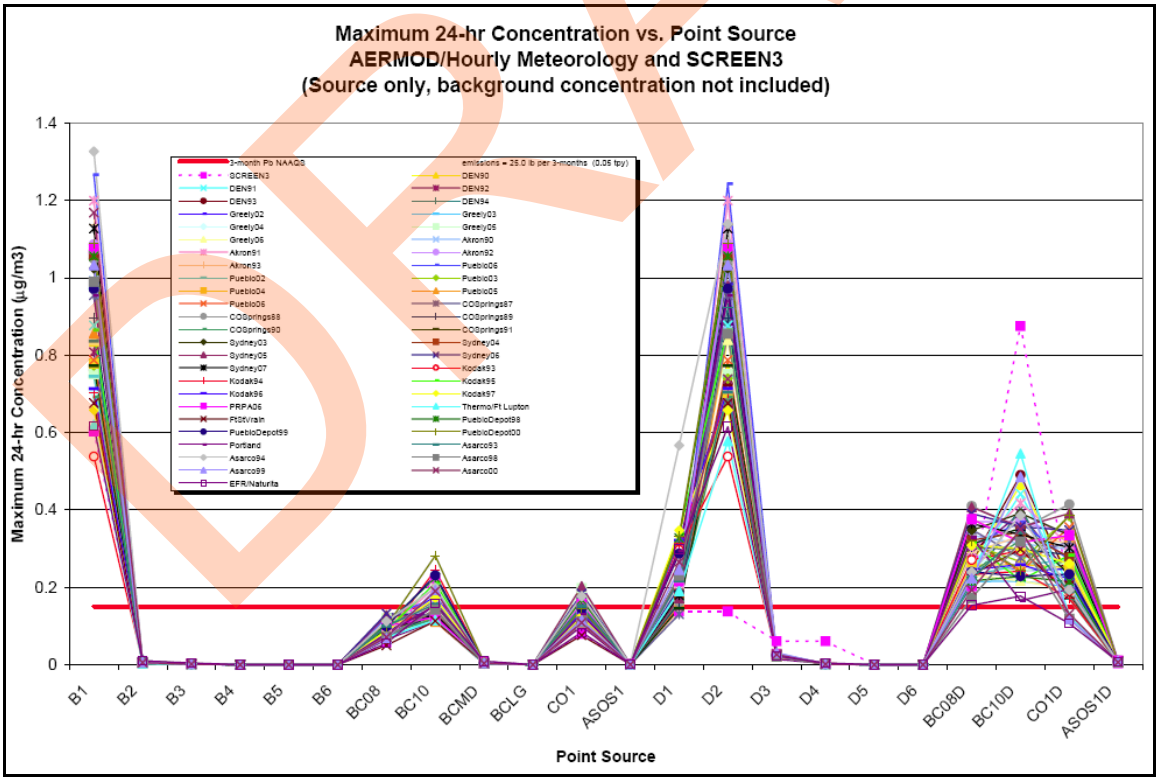


Figure 21. Maximum 24-hr Concentrations - 25 pounds per 3-months

7.2.5. Other Modeling Variables Not Examined in this Modeling Analysis

There are other parameters used in modeling that are not examined here, such as elevated terrain, urban effects, and background concentrations. Higher impacts may result when plume rise is insufficient to clear nearby terrain. As discussed in EPA's AERMOD Implementation Guide (March 19, 2009), plumes emitted or entrained into an urban air mass would be affected by the dispersive nature of the "convective-like" boundary layer that forms during nighttime conditions due to the urban heat island effect. Contributors to ambient air concentration for determining compliance with AAQS are impacts from the source of interest and nearby sources, and the background concentration. Even though impacts are just above modeling significance levels or only a small fraction of the AAQS, a complete compliance demonstrate must also take existing air pollutant concentration levels into account. This may mean that, in addition to adding a background concentration, nearby sources with strong concentration gradients should be included in the modeling. Since it's not reasonable to model all sources, it is necessary to add a background concentration to account for the emissions from all sources that have not been explicitly included in the modeling. Background concentrations vary by geographic area. For areas with high background concentrations (and/or strong concentration gradients from nearby sources) near the AAQS, a source impact that is greater than the modeling significance levels, but still a relatively small percentage of the AAQS, can result in a modeled violation of the AAQS.

8. Conclusion

The results in the January 2002 study demonstrate that a point source emitting 40 tons per year of nitrogen oxides (NO_X), sulfur dioxide (SO_2), or fine particulate matter (PM_{10}) or 15 tons per year of PM_{10} could have a significant impact in ambient air, and in certain stack and building configurations, exceed ambient air quality standards by itself. Lead (Pb) modeling was not investigated as part of this study. When compounding factors such as the presence of nearby sources and existing air pollution levels are considered, it is reasonable to conclude that even sources with relatively small emission rates (much lower than those in Table 1 of the Modeling Guideline) could cause or contribute to modeled violations of ambient air quality standards.

The results in the April 2010 study demonstrate that a point source emitting 0.46 pounds per hour of NO_X, 5 tons per year of $PM_{2.5}$, 11 pounds per day of $PM_{2.5}$, or 25 pounds per 3-months of Pb could have a significant impact in ambient air, and in certain stack and building configurations, exceed ambient air quality standards by itself.

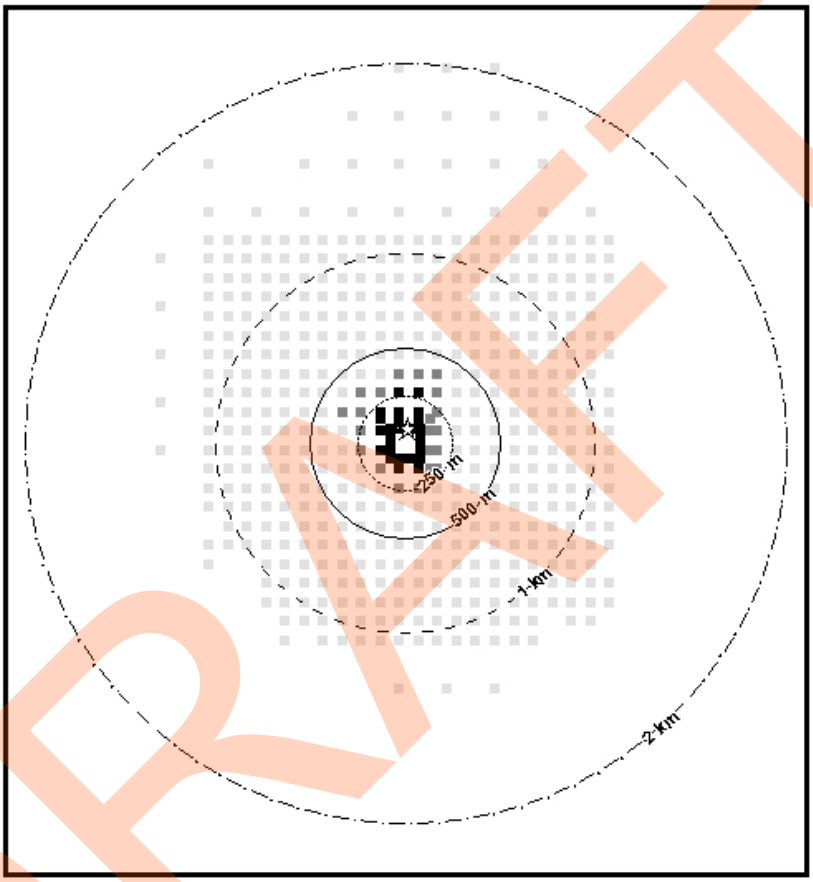
Clearly, these studies show that it is problematic to use only emission rates to determine when modeling is warranted. Many factors (including dispersion characteristics of the proposed source) should be considered in the decision to perform modeling. Consequently, the Division opposes the adoption of bright line exemptions from modeling that are based solely on emission rates. Furthermore, due to the complexity of pollution dispersion in the atmosphere, it is not realistic to develop a simple look-up table that adequately accounts for all of the important factors that affect air pollution dispersion.

The study shows that, in cases where a source has good dispersion characteristics and the existing air quality is well below ambient air quality standards, there is a low probability that the source will cause or contribute to a modeled violation of ambient air quality standards. Thus, it is reasonable to conclude that modeling is not warranted for minor sources and minor modifications with good dispersion at emission rates below the thresholds in Table 1 of the Colorado Modeling Guideline.

Appendix

Air Dispersion Modeling Analysis of Fugitive Sources

Magnitude and Location of Impacts from an Area Source
1 Square Acre and Release Height of 0 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 613 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

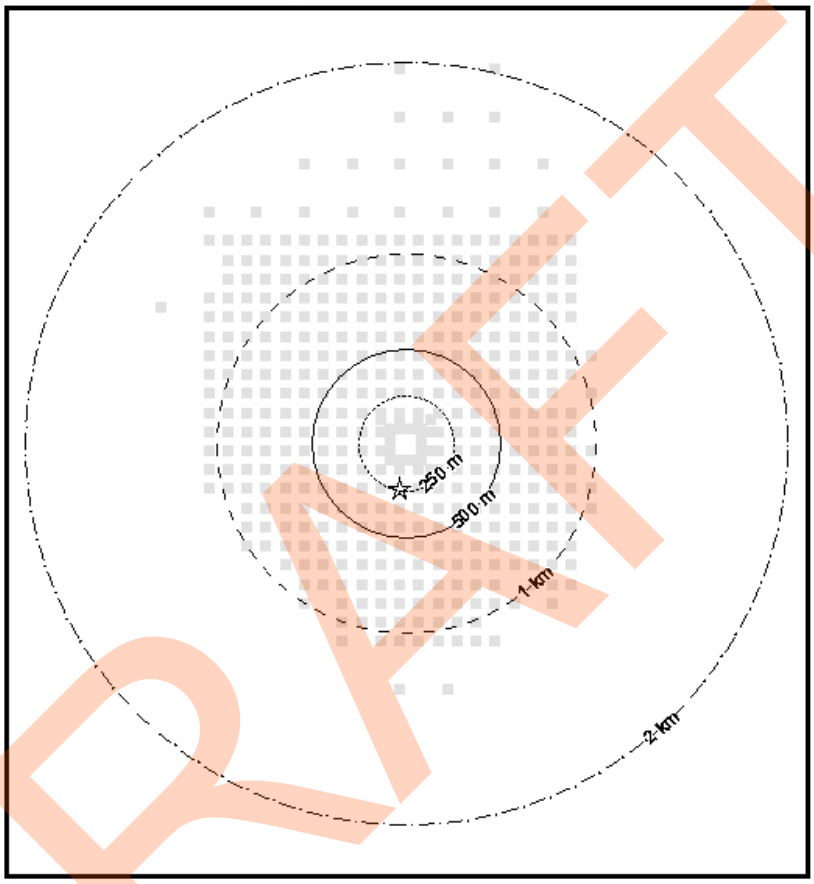
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
1 Square Acre and Release Height of 10 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 35 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

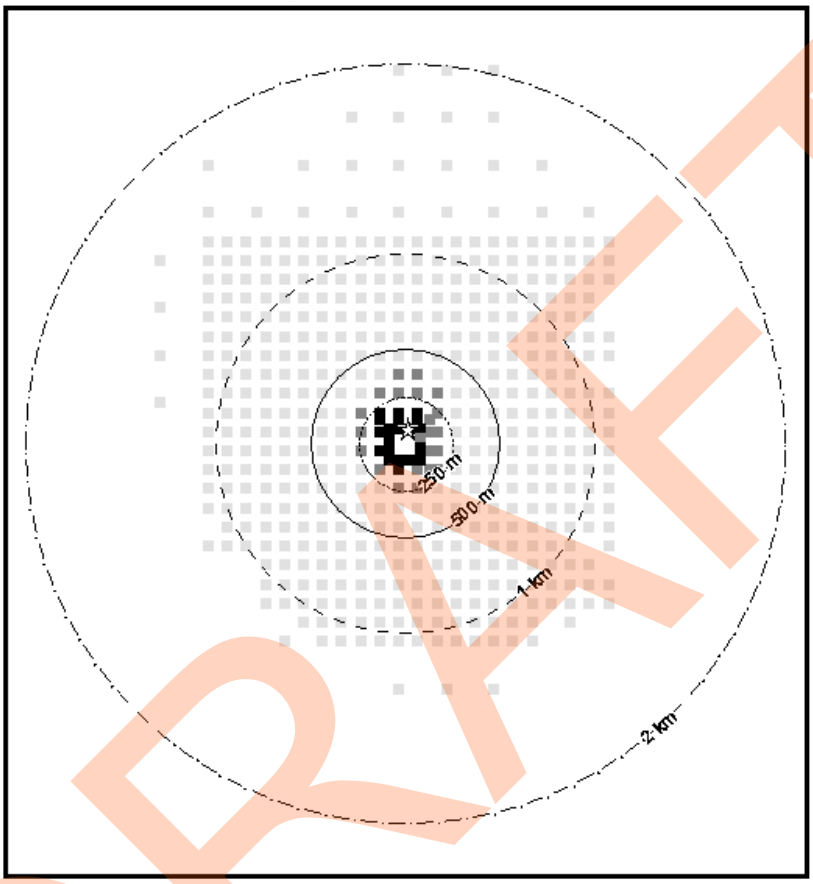
>100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
1 Square Acre and Release Height of 2.5 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 313 ug/m3

6th-Highest Concentration

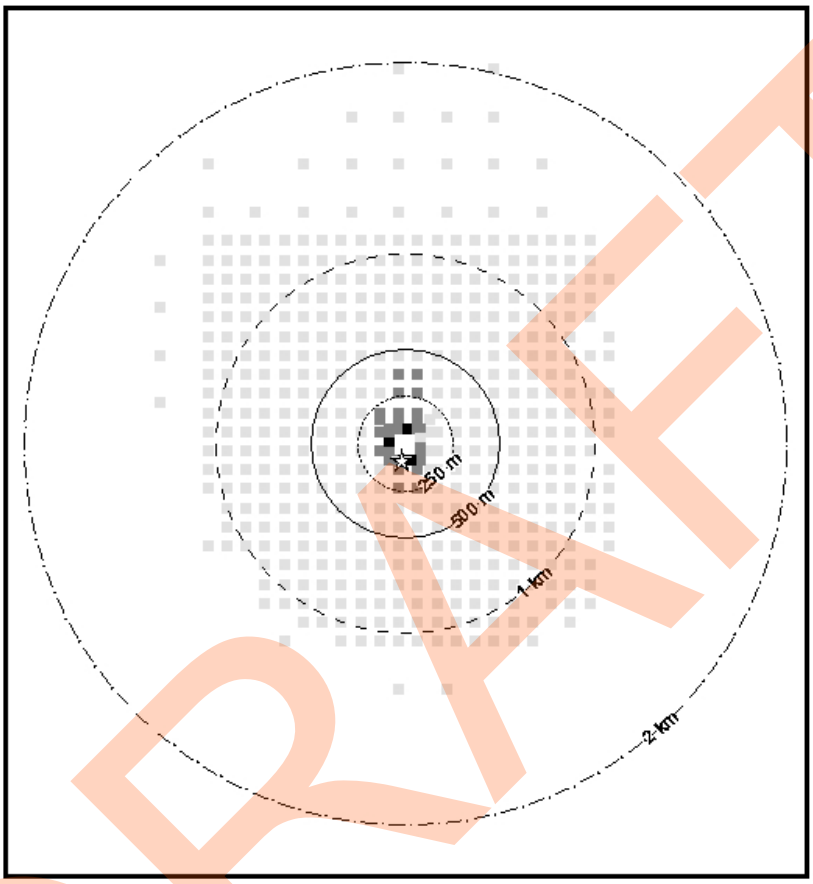
- 5 - 50 ug/m3
- 51 - 100 ug/m3
- > 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
1 Square Acre and Release Height of 5 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 124 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

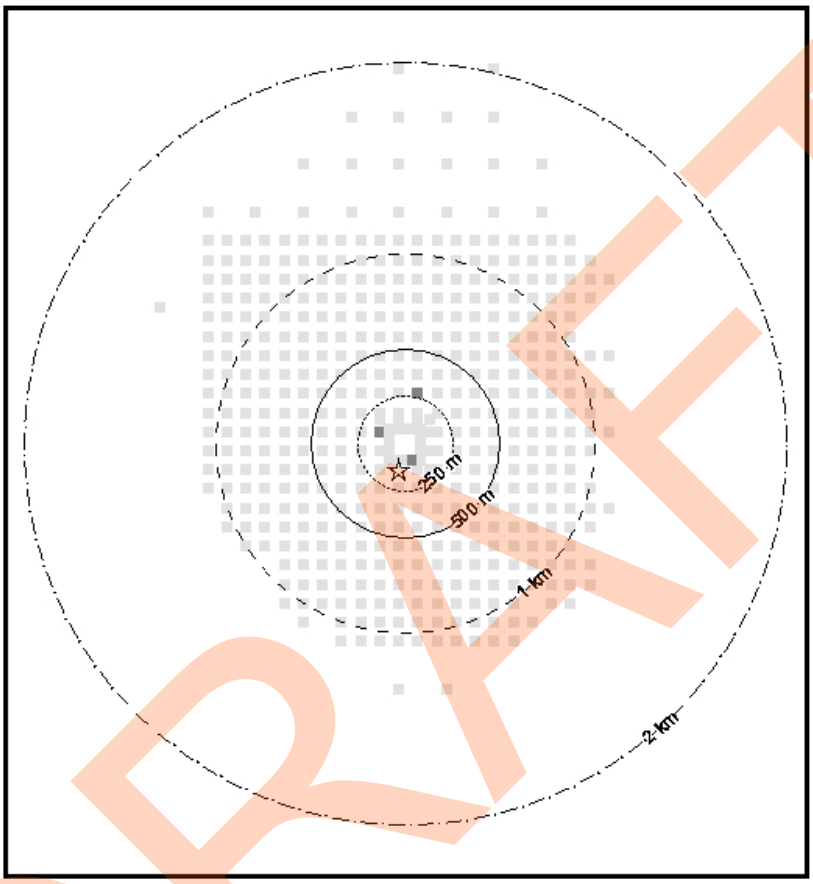
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
1 Square Acre and Release Height of 7.5 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 59 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

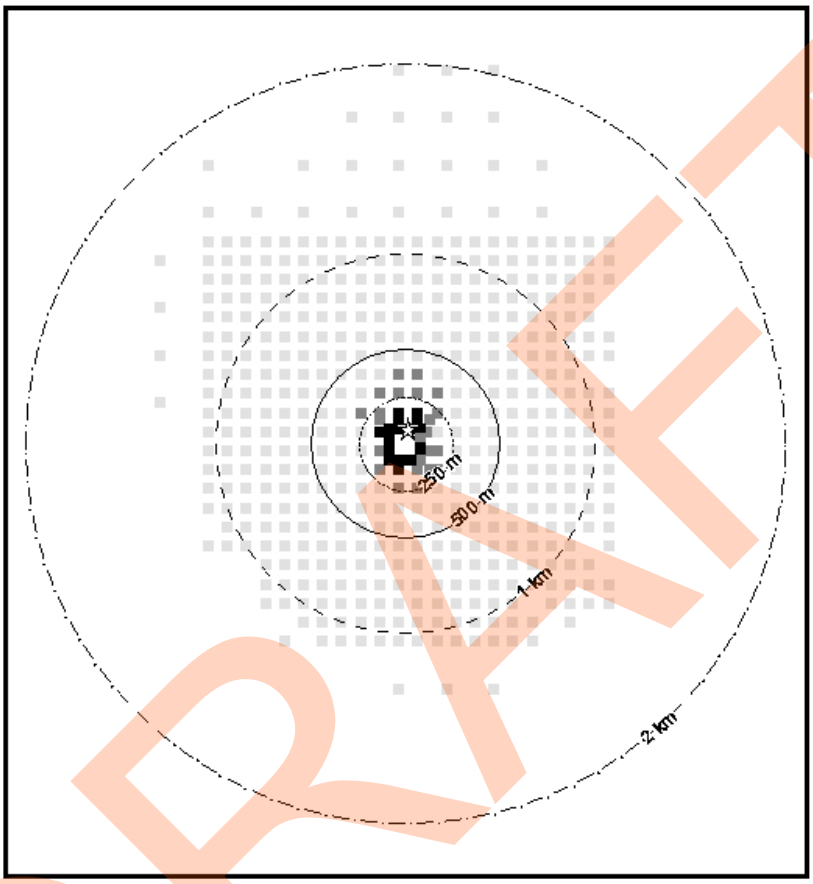
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
1 Square Acre, Release Height of 2 m, and
Initial Vertical Dispersion of 3 m at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 324 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

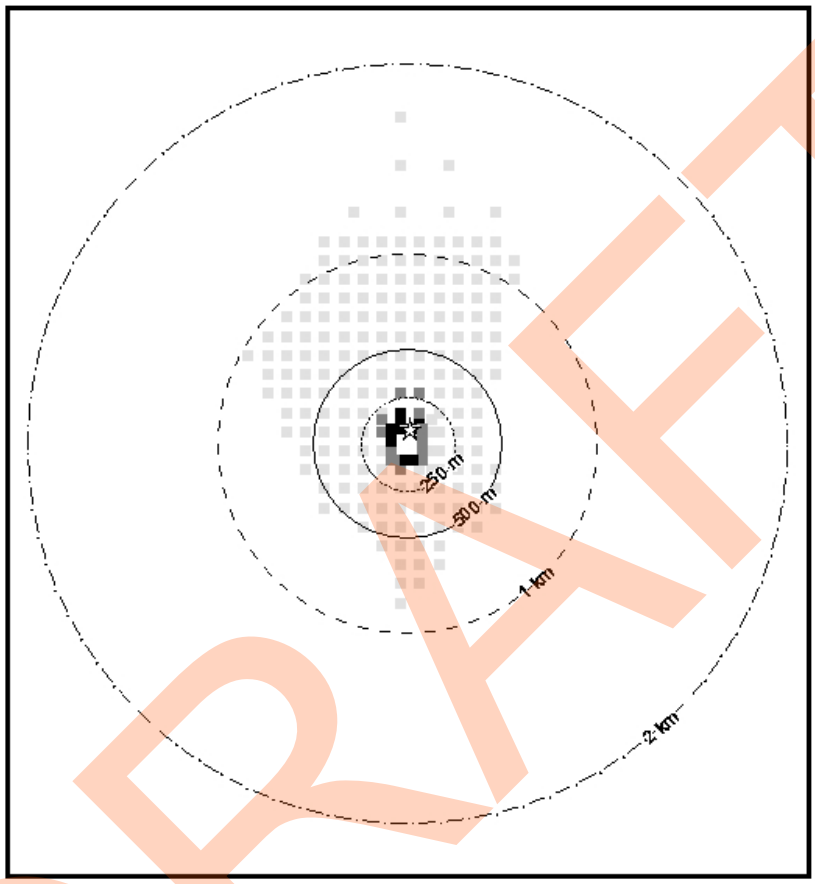
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
1 Square Acre, Release Height of 2 m, and
Initial Vertical Dispersion of 3 m at 15 tpy Emission Rate
Annual Average Concentration
(micrograms per cubic meter)



LEGEND

Maximum Annual Concentration

☆ 98 ug/m3

Annual Concentration

1 - 15 ug/m3

16 - 30 ug/m3

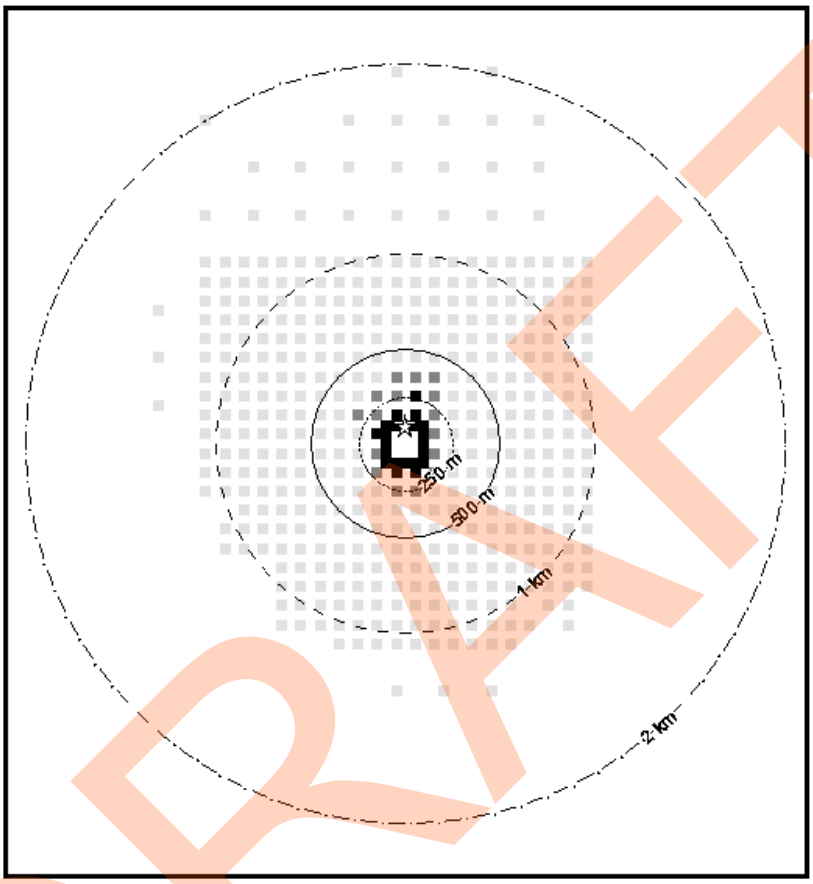
> 30 ug/m3

Modeling Significance Level:	1 ug/m3
NO2 NAAQS:	100 ug/m3
SO2 NAAQS:	80 ug/m3
PM10 NAAQS:	50 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
2 Square Acres and Release Height of 0 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 468 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

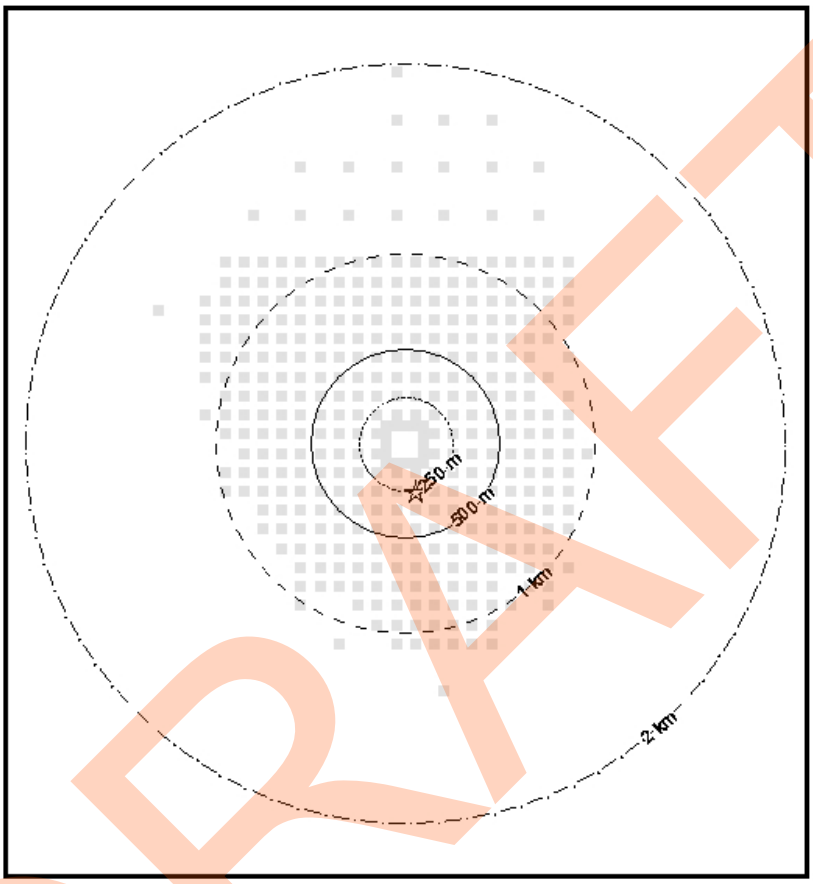
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
2 Square Acres and Release Height of 10 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 31 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

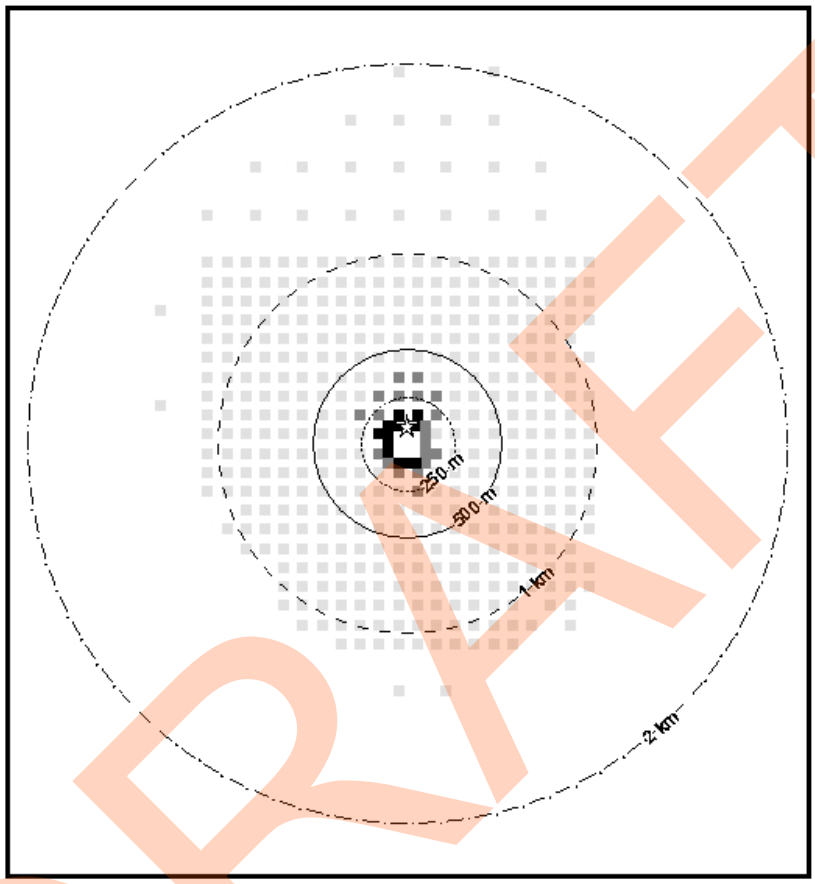
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
2 Square Acres and Release Height of 2.5 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 245 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

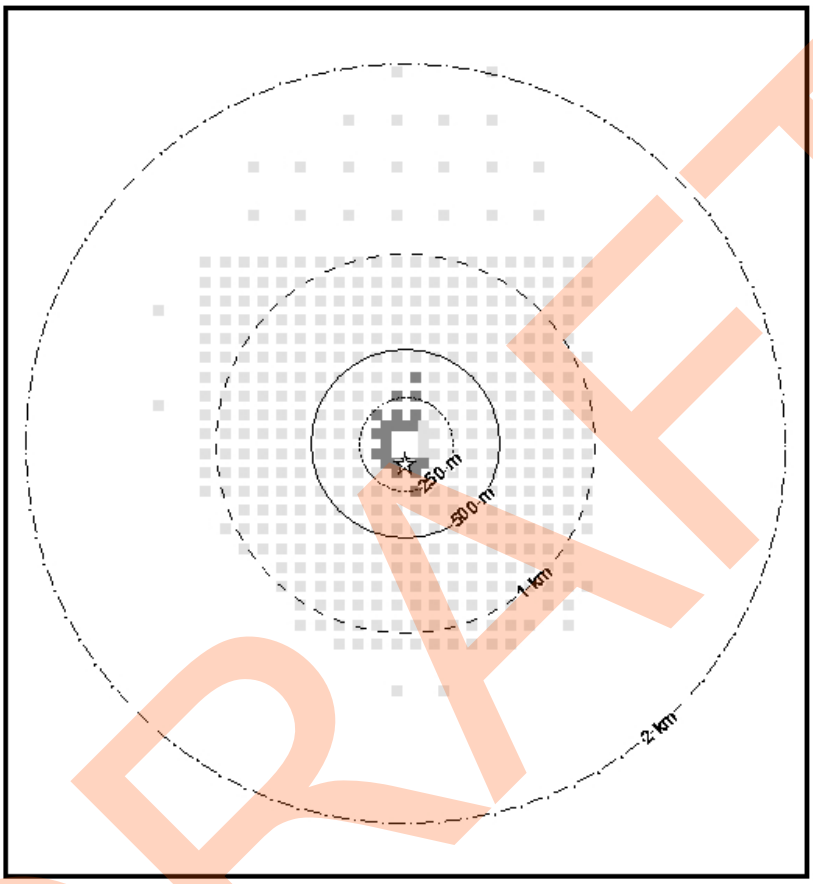
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
2 Square Acres and Release Height of 5 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 111 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

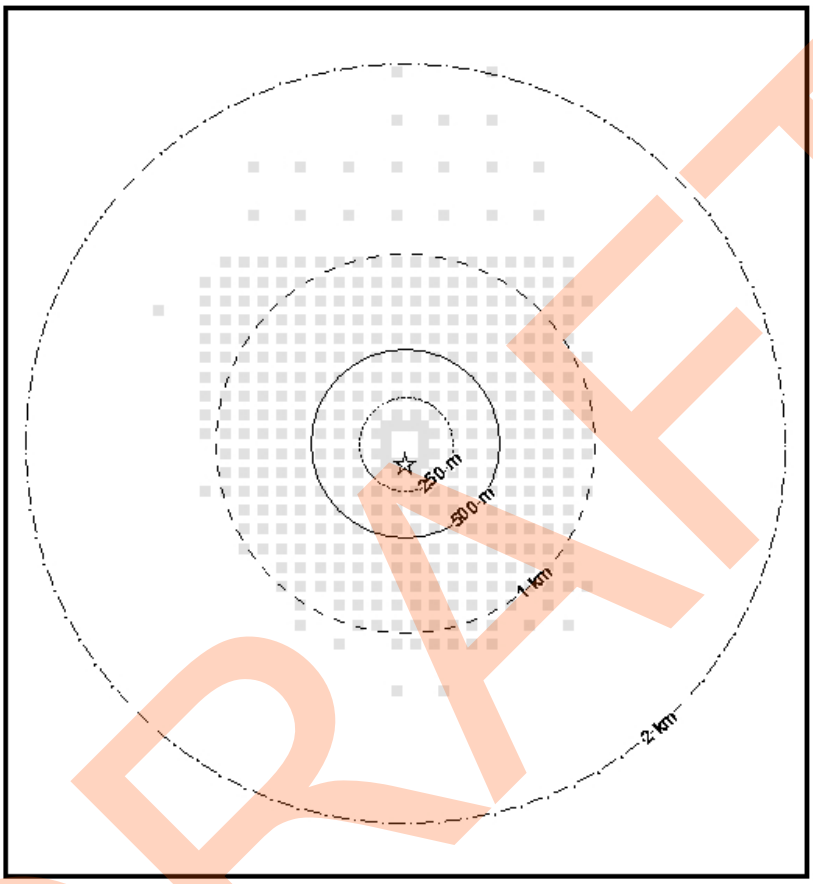
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
2 Square Acres and Release Height of 7.5 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 49 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

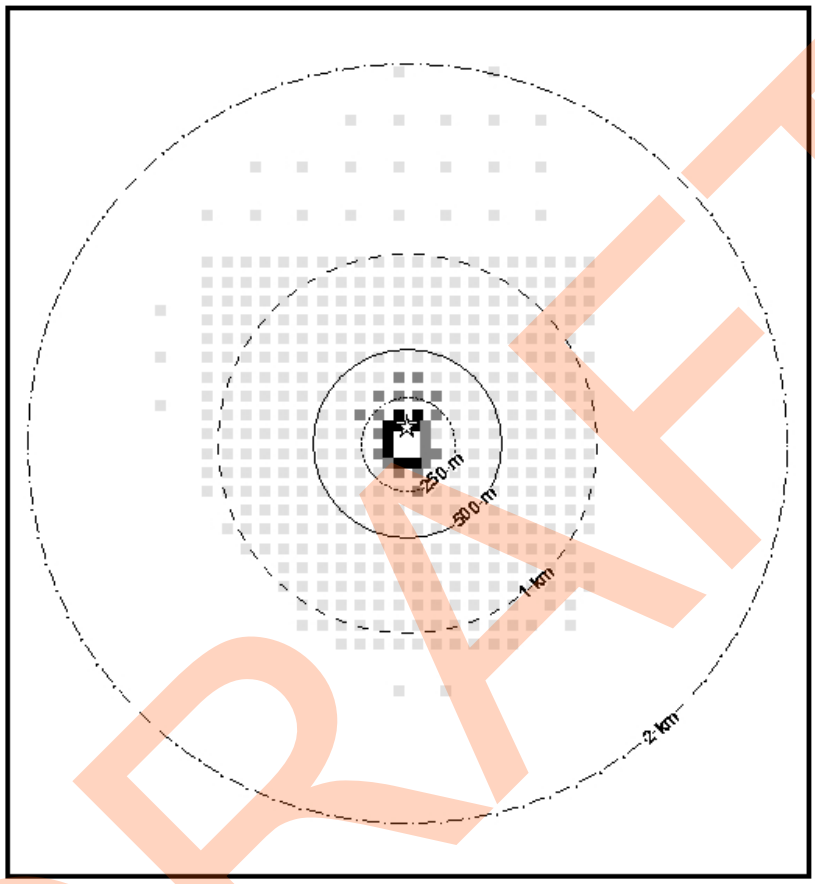
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
2 Square Acres, Release Height of 2 m, and
Initial Vertical Dispersion of 3 m at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 248 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

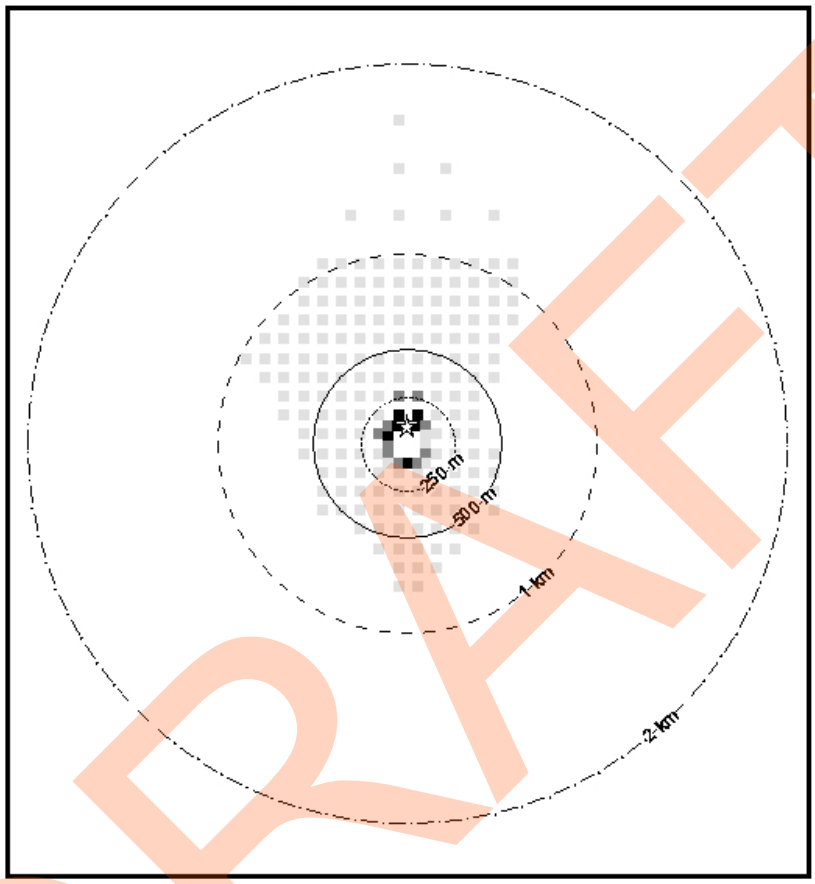
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
2 Square Acres, Release Height of 2 m, and
Initial Vertical Dispersion of 3 m at 15 tpy Emission Rate
Annual Average Concentration
(micrograms per cubic meter)



LEGEND

Maximum Annual Concentration

☆ 78 ug/m3

Annual Concentration

1 - 15 ug/m3

16 - 30 ug/m3

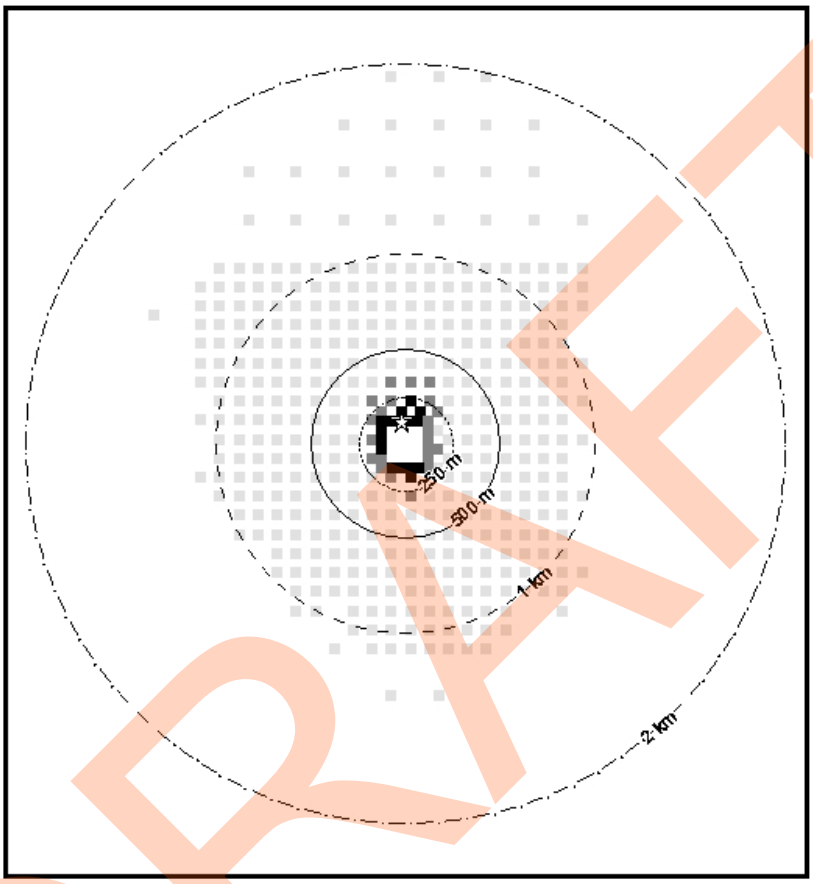
> 30 ug/m3

Modeling Significance Level:	1 ug/m3
NO2 NAAAQS:	100 ug/m3
SO2 NAAQS:	80 ug/m3
PM10 NAAQS:	50 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
5 Square Acres and Release Height of 0 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 263 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

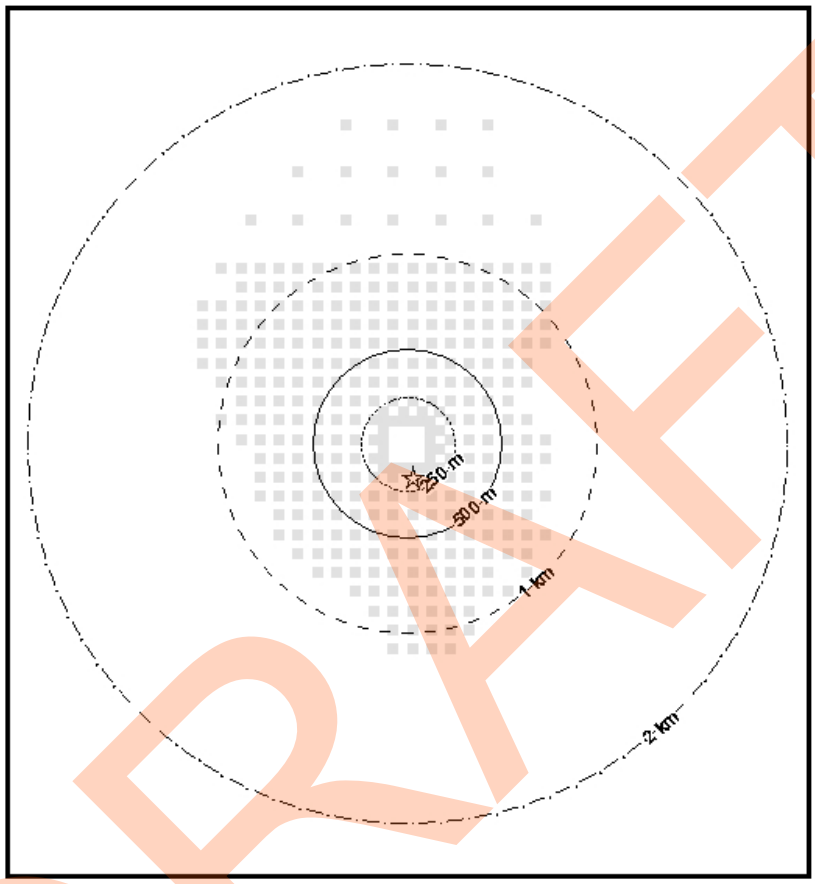
>100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
5 Square Acres and Release Height of 10 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 32 ug/m3

6th-Highest Concentration

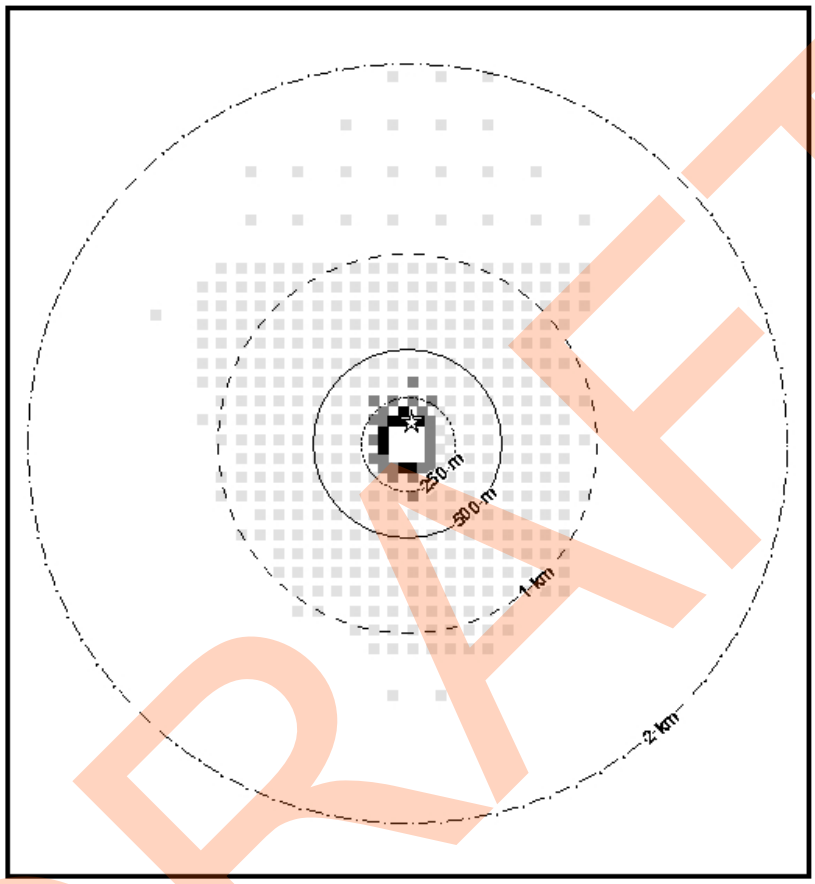
- 5 - 50 ug/m3
- 51 - 100 ug/m3
- > 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
5 Square Acres and Release Height of 2.5 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 158 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

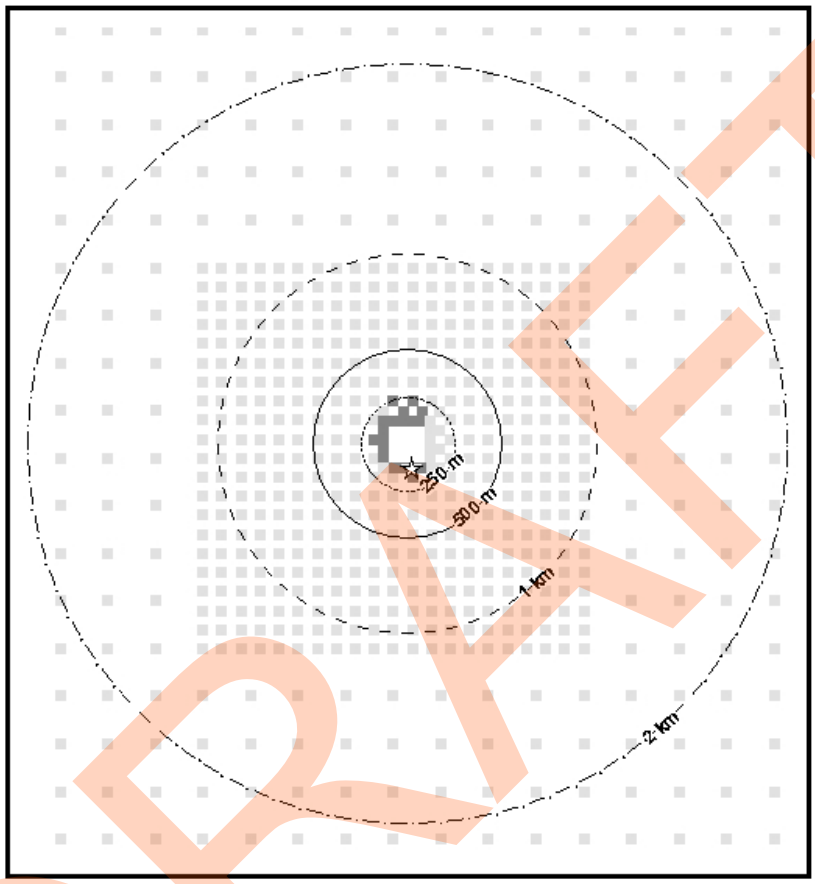
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
5 Square Acres and Release Height of 5 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 76 ug/m3

6th-Highest Concentration

0 - 50 ug/m3

51 - 100 ug/m3

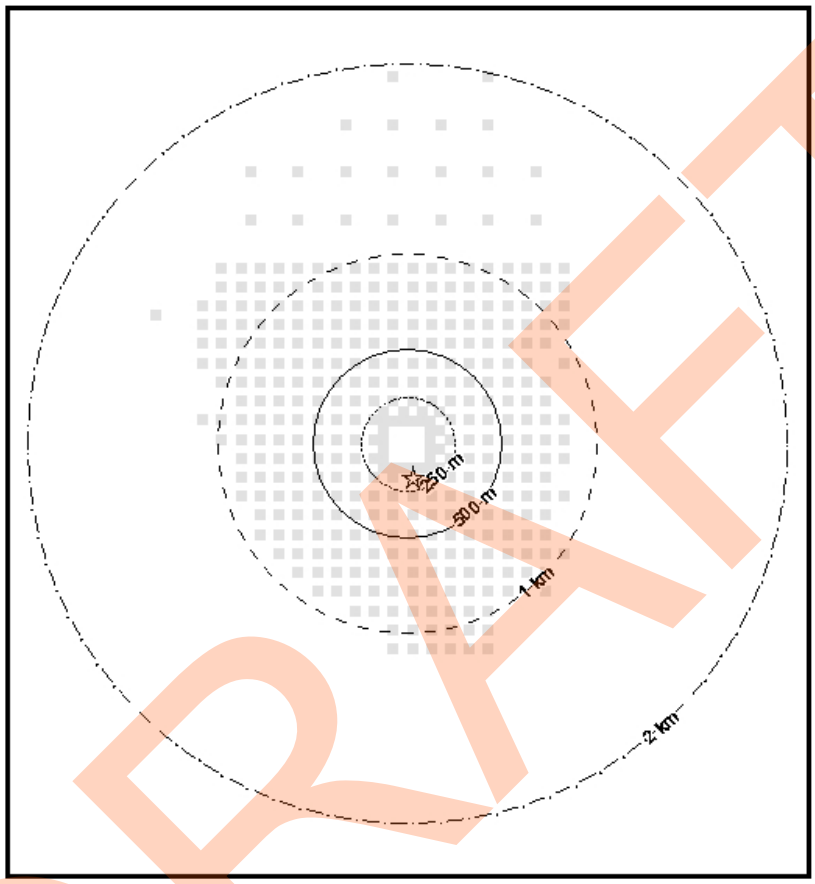
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
5 Square Acres and Release Height of 7.5 m
at 15 tpy Emission Rate
24-hr Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 49 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

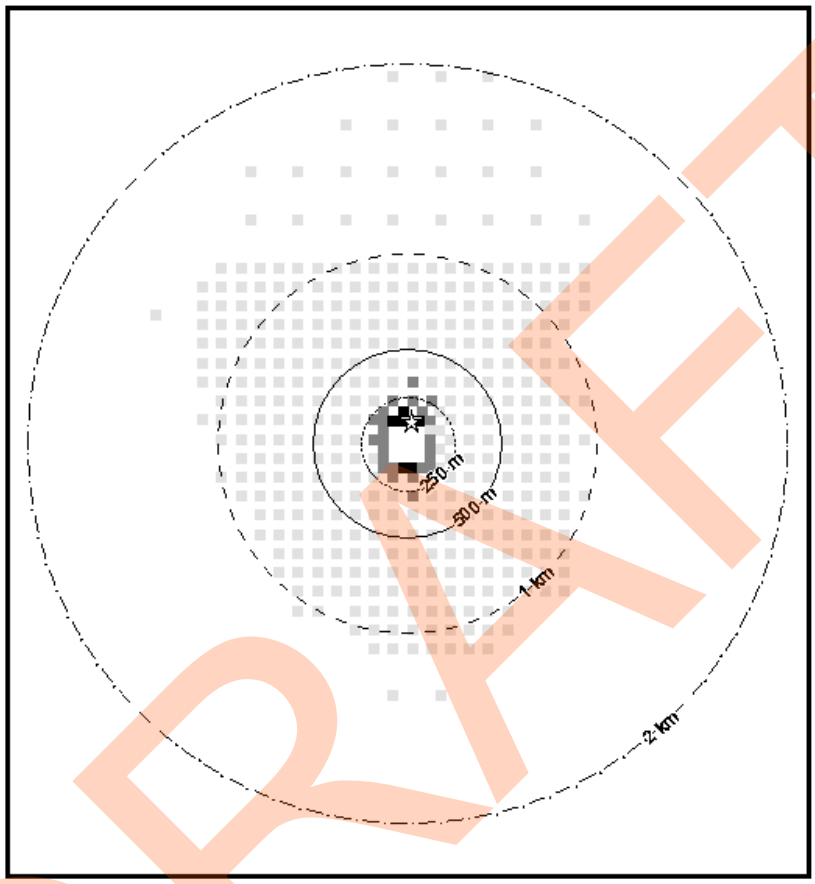
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
5 Square Acres, Release Height of 2 m, and
Initial Vertical Dispersion of 3 m at 15 tpy Emission Rate
Annual Average Concentration
(micrograms per cubic meter)



LEGEND

Highest-6th-Highest Concentration

☆ 153 ug/m3

6th-Highest Concentration

5 - 50 ug/m3

51 - 100 ug/m3

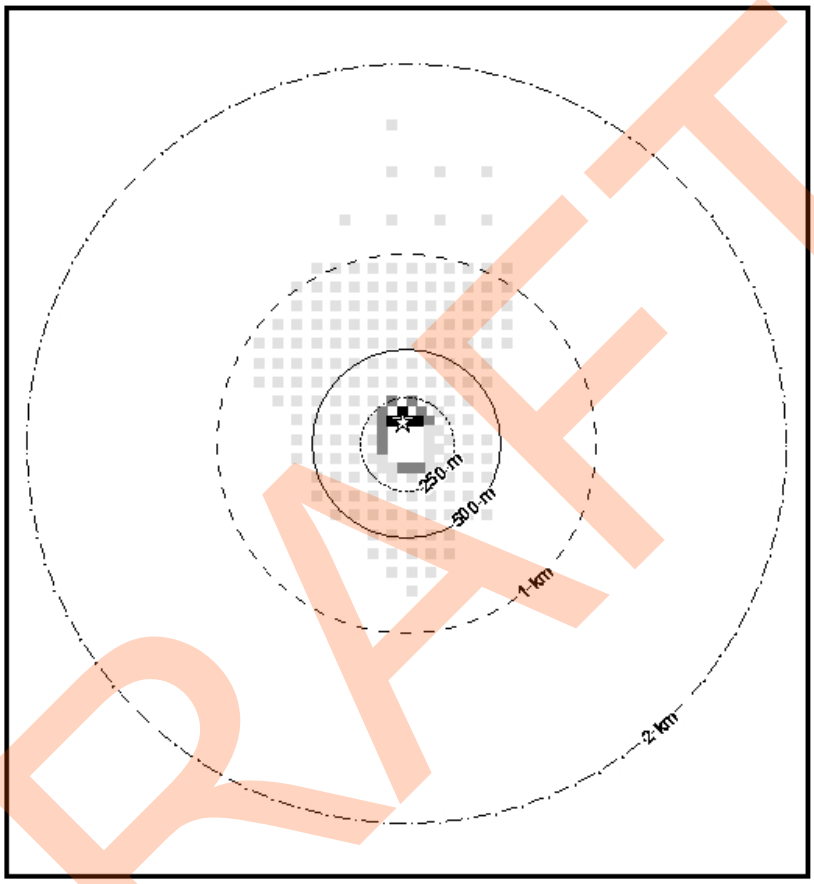
> 100 ug/m3

Modeling Significance Level:	5 ug/m3
SO2 NAAQS:	365 ug/m3
PM10 NAAQS:	150 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

Magnitude and Location of Impacts from an Area Source
5 Square Acres, Release Height of 2 m, and
Initial Vertical Dispersion of 3 m at 15 tpy Emission Rate
Annual Average Concentration
(micrograms per cubic meter)



LEGEND

Maximum Annual Concentration

☆ 52 ug/m3

Annual Concentration

1 - 15 ug/m3

16 - 30 ug/m3

> 30 ug/m3

Modeling Significance Level:	1 ug/m3
NO2 NAAQS:	100 ug/m3
SO2 NAAQS:	80 ug/m3
PM10 NAAQS:	50 ug/m3

These results are based on 1986-1990 Denver Stapleton Airport Meteorological Data. Using different meteorological data will result in different impact estimates.

N

APPENDIX B

LETTER FROM ROSENDO MAJANO, DEVONDRIA REYNOLDS, & BRADLEY RINK TO U.S. ENVIRONMENTAL PROTECTION AGENCY OFFICE OF INSPECTOR GENERAL SEAN W. O'DONNELL, *REQUEST FOR REVIEW OF INTENTIONAL NON-ENFORCEMENT OF NATIONAL AMBIENT AIR QUALITY STANDARDS BY COLORADO DEPARTMENT OF PUBLIC HEALTH & ENVIRONMENT PURSUANT TO STATE IMPLEMENTATION PLAN UNDER THE CLEAN AIR ACT, 42 U.S.C. § 7401 ET SEQ.* (MAR. 30, 2020)

PUBLIC EMPLOYEES FOR ENVIRONMENTAL RESPONSIBILITY
962 Wayne Ave • Suite 610 • Silver Spring, MD 20910

March 30, 2021

U.S. Environmental Protection Agency
Office of Inspector General Sean W. O'Donnell
1200 Pennsylvania Avenue, N.W. (2410T)
Washington, DC 20460

RE: Request for Review of Intentional Non-Enforcement of National Ambient Air Quality Standards by Colorado Department of Public Health & Environment Pursuant to State Implementation Plan Under the Clean Air Act, 42 U.S.C. § 7401 *et seq.*

Dear Inspector General O'Donnell:

We, the undersigned, are employees of the Colorado Department of Public Health & Environment (CDPHE), which is responsible for the State Implementation Plan (SIP) incorporated by the U.S. Environmental Protection Agency (EPA) in its implementation of the Clean Air Act (CAA).[1] We are employed by CDPHE's Air Pollution Control Division (APCD), which has specific responsibility for the enforcement of Colorado's duties under the National Ambient Air Quality Standards (NAAQS) program.[2]

On March 15, 2021, CDPHE issued a blanket prohibition on air quality modeling staff from reviewing NAAQS compliance for hourly Nitrogen Dioxide (NO_2) and Sulfur Dioxide (SO_2) limits, 3-hour standards for SO_2, and daily standards for particulate matter smaller than 2.5 micrometers ($PM_{2.5}$). The undersigned are the staff-level employees with responsibility for conducting modeling of emissions from new or modified stationary sources of NAAQS criteria pollutants and have been ordered by our management to not perform certain of those legally required duties. We request that your office review the following alleged instances of violations of law, mismanagement, and abuse of authority by CDPHE, particularly a new policy set by the office which prohibits employees from conducting legally mandated modelling of air pollution from new stationary sources of air pollution.

Unlawful acts and omissions by CDPHE include –

[1] 42 U.S.C. § 7401 et seq.
[2] 42 U.S.C. § 7410 (also known as "section 110" for the section of the Clean Air Act it corresponds to)

- Suppressing information demonstrating that pending permits would lead to modeled violations of NAAQS;
- Approving air quality permits which violate NAAQS; and
- Ordering modeling staff to ignore modeled NAAQS violations which would conflict with nonbinding agency guidance documents.

I. Applicable Federal Law

The CAA requires states to establish and implement SIPs for "implementation, maintenance, and enforcement" of primary and secondary National Ambient Air Quality Standards (NAAQS).[3] Each SIP must, among other requirements include:

- "enforceable emission limitations" and "appropriate devices, methods, systems, and procedures necessary to monitor, compile, and analyze data on ambient air quality"[4]
- "adequate personnel, funding, and authority under State (and, as appropriate, local) law to carry out such implementation plan"[5]
- "provide for the performance of such air quality modeling as the Administrator may prescribe for the purpose of predicting the effect on ambient air quality of any emissions of any air pollutant for which the Administrator has established a national ambient air quality standard."[6]

In addition to the statute, EPA has promulgated a sophisticated regulatory scheme governing the requirements of SIPs.[7] Specifically:

"Each plan must set forth legally enforceable procedures that enable the State or local agency to determine whether the construction or modification of a facility, building, structure or installation, or combination of these will result in… interference with attainment or maintenance of a national standard in the State in which the proposed source (or modification) is located or in a neighboring State."[8]

A SIP must include means for a state to prevent the construction or modification of a new stationary source if it "will interfere with the attainment or maintenance of a national standard."[9]

Regarding air quality modeling, the procedures in a SIP "must discuss the air quality data and the dispersion or other air quality modeling used to meet the requirements of this subpart. All

[3] 42 U.S.C. § 7410(a)(1).
[4] § 7410(a)(2)
[5] § 7410(a)(2)(E)
[6] § 7410(a)(2)(K)
[7] 40 C.F.R. § 51.160
[8] § 51.160(a)(2)
[9] § 51.160(b)(2)

applications of air quality modeling involved in this subpart shall be based on the applicable models, data bases, and other requirements specified in appendix W of this part (Guideline on Air Quality Models)."

EPA has issued NAAQS for six "criteria pollutants" which are measured by averaging the concentration of a given pollutant over a given period of time to determine whether it exceeds primary or secondary standards. Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The NAAQS standards are:[10]

Pollutant [links to historical tables of NAAQS reviews]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 µg/m^3	annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m^3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

[10] Taken from https://www.epa.gov/criteria-air-pollutants/naaqs-table (last visited Mar. 22, 2021).

I.A. State Law Incorporated into EPA Air Quality Program

In Colorado, authority under the CAA and Colorado's relevant SIP is delegated to the APCD of CDPHE.[11] As part of its SIP, Colorado's permitting program includes Colorado Air Quality Control Commission (AQCC) Regulation 3.[12] Part D of AQCC Regulation 3 addresses the requirements for Major Stationary Sources within the NSR/PSD permitting program, and Part B addresses the requirements for construction permits for all sources, major and minor, unless a specific reference is made to Part D for major sources.

Regulation 3, Part B § III.B.5 states:

> Except for applications for sources subject to the requirements of Section VI. of Part D of this regulation (Prevention of Significant Deterioration), the Division shall prepare its preliminary analysis within sixty calendar days after receipt of a complete permit application. The preliminary analysis allows the Division to determine whether the new source will, at date of commencement of operation, comply with: … Any applicable ambient air quality standards and all applicable regulations. . . . The preliminary analysis shall indicate what impact, if any, the new source will have (as of the projected date of commencement of operation) on all areas (attainment, attainment/maintenance, nonattainment, unclassifiable), within the probable area of influence of the proposed source... When the preliminary analysis includes modeling, the model used shall be an appropriate one given the topography, meteorology and other characteristics of the region that the source will impact. Use of any non-guideline model requires U.S. EPA approval under Section VIII.A. of Part A of this regulation.

Part B § III.D.1 states:

> The Division shall grant the permit if it finds that: [. . .]
>
> (c) The proposed source or activity will not cause an exceedance of any National Ambient Air Quality Standards;
>
> (d) The source or activity will meet any applicable ambient air quality standards and all applicable regulations;

Part B § III.F.1 states:

> If the Division determines that a source cannot comply with the provisions of Part B, Section III.D., of this regulation, the Division shall issue its written denial of the permit application stating the reasons for such denial.

Finally, regarding modeling, **Part A § VIII.A.1** states:

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[11] *See* https://www.epa.gov/caa-permitting/caa-permitting-colorado.
[12] 5 CCR 1001-5 (containing the entire text of Regulation 3); *see also* 40 C.F.R. § 52.320–354 (discussing Colorado SIP).

> All estimates of ambient concentrations required under this Regulation Number 3 shall be based on the applicable air quality models, databases, and other requirements generally approved by U.S. EPA and specifically approved by the Division.

In short, CDPHE is required to verify through air quality modeling that a new major or minor stationary source, or a modification to an existing source, will not cause or contribute to a NAAQS exceedance. Issuing an air permit for a minor source without verifying NAAQS compliance violates the requirements of the New Source Review permitting program outlined in the EPA-approved SIP: Colorado's AQCC Regulation 3.

II. Violations of Law

CDPHE'S PROPOSED POLICY

On March 15, 2021 CDPHE's Air Pollution Control Division (APCD) Director Garry Kaufman informed the air quality modeling unit that it was now the policy of the APCD that NAAQS compliance in air permit applications will no longer be verified for the 1-hr NO_2, 1-hr SO_2, 3-hr SO_2, and 24-hr $PM_{2.5}$ NAAQS.

This policy was set during a meeting that day between Director Kaufman, APCD Chief Strategy Officer Robyn Wille, APCD Technical Services Program Manager Gordon Pierce, and APCD Modeling and Emissions Inventory Unit Manager Emmett Malone.[13]

Instructions were provided via email from Gordon Pierce to Emmett Malone.[14] These instructions were conveyed verbally by Emmett Malone to CDPHE's two active permit modelers, DeVondria Reynolds and Bradley Rink, on March 16, 2021.

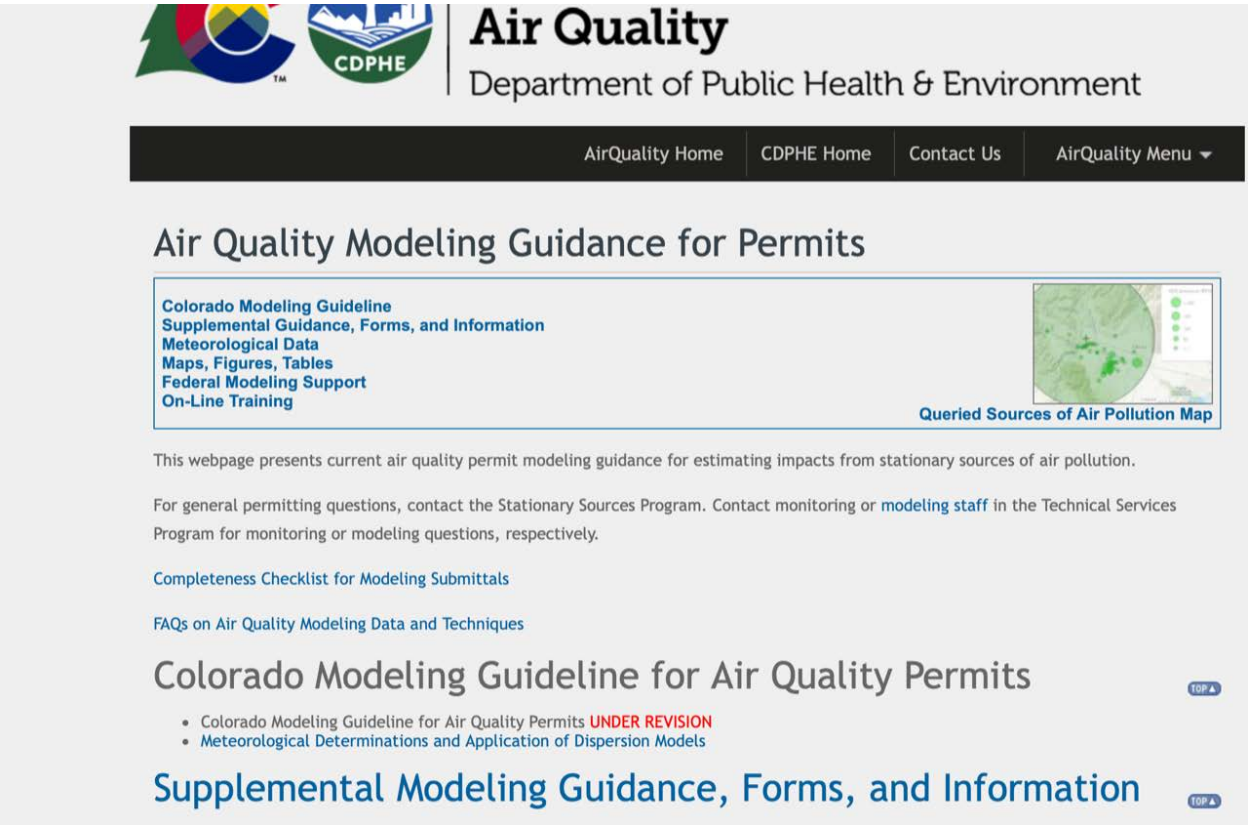
The instructions relayed to Malone by Pierce state:

> Per the meeting we had today 3/15/21 with Garry and Robyn, Garry specifically stated that, effective immediately, the short-term thresholds in the Modeling Guideline will not be used and that modeling only be performed using the following thresholds:
>
> - 40 tpy for NO_2 and SO_2
> - 82 lbs/day for PM_{10}
> - 5 tpy for $PM_{2.5}$
> - 23 lbs/hr for CO
> - 25 lbs/3-mo for Pb

[13] Emmett Malone is the current supervisor of complainants DeVondria Reynolds and Bradley Rink and had been the supervisor of Rosendo Majano until his transfer to another unit in 2020.
[14] See App'x 1-4.

> He will allow exceptions based on agreement between the modelers and permit engineers, and his specific approval.
>
> Garry also requested that the Modeling Guideline also be removed from the website, pending further discussions and revisions. I will ask Ivan to pull it. Attached is a copy of the current version that is on the website.[15]

That day, the modeling guidance document on CDPHE's AIR QUALITY MODELING GUIDANCE FOR PERMITS website was removed, and a note was added next to the removed hyperlink stating "UNDER REVISION."[16]



A discrepancy between what was discussed verbally in the March 15 meeting and Pierce's email was noted by Malone, who requested clarification:

> One question that came up and if you or Garry could respond I would appreciate it. What I took from the meeting was that we are not to address the short term standards. The way you worded your email is slightly different, are we to address the short term standards?[17]

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[15] App'x 3-4.
[16] See https://www.colorado.gov/airquality/permits.aspx (last accessed Mar. 22, 2021). A version of the guidelines as they existed prior to March 15, 2021 is attached as Appendix B.
[17] App'x 3. The line "2 years, 7 months, and 15 days" in Malone's email is believed to refer to the length of time before he can retire.

Pierce responded unequivocally:

> No, we are not to address the short-term standards... "the short-term thresholds in the Modeling Guideline will not be used."[18]

Reynolds and Rink forwarded these instructions via email to CDPHE's third permit modeler, Rosendo Majano, who four months earlier transferred to a different unit, but continues to provide training and guidance to the active permit modelers. The response by the modelers was unequivocal: this is a violation of the law.[19]

It is not a great leap to demonstrate that a state which purposefully disregards NAAQS standards is not complying with those NAAQS standards. This new policy violates Colorado AQCC Regulation 3, Part B §III.B.5[20] and §III.D.1,[21] and it would also violate Colorado's EPA-approved SIP and NSR Minor Source Permitting Program established per Title I, Part A, § 110 of the CAA[22] and 40 CFR § 51.160, as it exempts new stationary sources and modifications from demonstrating compliance with short term NAAQS by simply not considering them. This violation of the law is also contributing directly to chronic health problems, premature deaths, and severe injury to the environment by permitting ever more dangerous emissions.

Through this policy, CDPHE is attempting a reversal of federalism: voiding in Colorado the three most recent and most stringent ambient air standards promulgated by EPA, the 1-hr NO_2,[23] 1-hr SO_2,[24] and 24-hr $PM_{2.5}$ NAAQS;[25] all of which were put in place to protect human health and the environment after a thorough regulatory review and reaffirmed in 2018 and 2020.

In short, under this policy, permit applicants in Colorado no longer have to demonstrate that their proposed sources or modifications comply with these standards in order to get an air permit from CDPHE. In fact, numerous permits have already been issued over our objections that the new or modified sources did not comply with one or more NAAQS.[26]

It is also worth noting that NO_2 is one of the two main precursors of ozone, and that the Denver-North Front Range ozone nonattainment area has deteriorated from a designation of "Marginal" nonattainment in 2012 for the 2008 ozone NAAQS, to a designation of "Serious" nonattainment

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[18] Id. (emphasis and ellipses in original).
[19] Both Reynolds and Rink sent separate emails declaring their intent to blow the whistle about this new policy. App'x 24-28.
[20] Requiring that any preliminary analysis demonstrate that the proposed new source "will, at date of commencement of operation, comply with [. . . a]ny applicable ambient air quality standards and all applicable regulations."
[21] requiring that permits be granted only upon a finding that the proposed new source would not cause exceedance of any NAAQS and would comply with applicable air quality standards.
[22] 42 U.S.C. § 7410.
[23] 75 Fed. Reg. 6,474 (Feb 9, 2010).
[24] 75 Fed. Reg. 35,520 (Jun 22, 2010).
[25] 78 Fed. Reg. 3,085 (Mar. 18, 2013).
[26] Described *infra*.

in 2020, and soon to deteriorate to a designation of "Severe." This new policy will enable unfettered growth of NO_2 sources in the nonattainment area and elsewhere in the state at precisely the time when CDPHE should be making efforts to achieve exactly the opposite.

In addition to violating the aforementioned regulatory provisions, this policy is also being implemented essentially in secret. This policy was not brought to the Air Quality Control Commission, has not received public scrutiny, was implemented internally without notice, and as such violates Colorado's Administrative Procedure Act.[27]

Pattern of Unlawful Conduct

The March 15, 2021 policy reduces to writing a longstanding informal practice of the APCD of approving permits at all costs even where modeling has demonstrated NAAQS violations. Evidence demonstrating this history of unlawful conduct in implementing EPA programs under the CAA is too plentiful to reproduce in full here and can be provided upon request, but certain illustrative examples deserve note.

On September 20, 2010 CDPHE instituted a minimum threshold policy under PS Memo 10-01[28] in which all sources with NO_2 or SO_2 emissions of 40 tons per year or less are exempted from demonstrating compliance with the corresponding 1-hr National Ambient Air Quality Standards (NAAQS), even if they actually exceed that standard many times over. This exemption enabled unfettered growth of NO_2 emissions in the ozone nonattainment area from sources which have been able to obtain air pollution permits without any verification or modeling of their impacts on air quality or public health. The memo, despite being labelled as nonbinding guidance, was interpreted to "supersede statutory/regulatory requirements" of the CAA in April 2011 and has been applied as such ever since.[29]

In December 2011, Memo 10-01 was applied when the modeling unit informed the permitting unit that a facility that they were preparing to approve a permit for would emit more than ten times the hourly allowed rate of SO_2 emissions. The permitting unit told the modeler that they did not request SO_2 modeling because the facility would emit less than 40 tons per year of SO_2 so the hourly limits would not be considered per the memo. Ultimately management decided that despite being ten times over the hourly limit, a demonstration of modeling compliance would not be needed.[30]

In November 2012, a hard rock mine submitted an application in which it claimed to be exempt from demonstrating compliance with $PM_{2.5}$ emissions. The same application had been rejected in 2009 for failure to properly demonstrate modeled compliance with particulate matter emissions

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[27] C.R.S. § 24-4-106.
[28] App'x 5-6, *also available at* https://environmentalrecords.colorado.gov/HPRMWebDrawer/RecordView/901901.
[29] App'x 50-52 (2011); 53-54 (2013)
[30] App'x 7-9.

limits, and this time was approved with no substantial changes based on a management decision that the facility should not have to demonstrate compliance.[31]

The next month, APCD Scientist and then-Modeling Unit Supervisor, Chuck Machovec documented a conversation with APCD Deputy Director Garry Kaufman, who later become Division Director, his current position. Machovec states that

> [Kaufman] also mentioned that at some point he wants to have a meeting to reach an understanding on "policy" versus "technical" aspects of modeling. I told him that as long as their [sic] is unwritten policy whereby management asks staff verbally to not follow language in the rule, there will be issues. Any requests from management for staff to not follow the requirements of the rule should be in writing.[32]

In July 2015, CDPHE employee Doris Jung described the process which led to Memo 10-01's formation and the motivation for CDPHE's management to suppress inconvenient modeling reports. In short, the permitting unit did not believe that their applicants could demonstrate that they complied with the NAAQS but wanted to issue permits regardless:

> In addition to discussing $PM_{2.5}$ in this meeting, we (modelers) were told to raise the modeling thresholds because compliance with NAAQS could not be demonstrated or they would just issue permits without considering NAAQS compliance.
>
> We (modelers) argued that their approach would be inconsistent with regulatory requirements and raising thresholds when NAAQS are more stringent was not technically justified but ultimately we were ignored. Consequently, since the modelers wouldn't cooperate, permitting came out with he *[sic]* 40 tpy threshold for 1-hr NO_2 and SO_2 NAAQS on September 20, 2010.
>
> The circumstances and the permitting personnel involved have not changed since the 2010 meeting/decision. While I agree concerns for NAAQS attainment remain, there is nothing that indicates to me that permitting is willing to change their practice.[33]

This explanation was given in response to concerns raised by modeling staff that CDPHE was issuing permits to facilities that had small annual emissions rates but still caused a disproportionately severe impacts on local air quality, particularly regarding the hourly NAAQS.[34]

Multiple times over the years CDPHE made it clear to the modeling unit that Memo 10-01, despite being issued informally as "guidance," was controlling and, at least for CDPHE, even overrode

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[31] App'x 10-11; 12-14.
[32] App'x 15.
[33] App'x 16-20.
[34] App'x 16.

state and federal law regarding NAAQS compliance.[35] An incomplete list of permits issued despite modeled violations of one or more NAAQS is included at the end of this section.

This policy has had dangerous consequences for the culture of compliance among industry in Colorado. In a March 2020 email exchange between a CDPHE permit engineer and an industry consultant, the consultant explains their reasons for not submitting a NAAQS compliance demonstration for the 24-hr $PM_{2.5}$ standard, stating:

> I've received guidance from multiple non-oil & gas permit engineers in the last year or so that the agency only looks at the 5 tpy threshold for $PM_{2.5}$, unless there are special circumstances (e.g., high expectation of comments from nearby residents).[36]

The response from CDPHE's permit engineer confirms this understanding and paints a chilling portrait of official complicity with this unlawful conduct:

> After consulting with some higher-ups, I agree that modeling for the 24-hour $PM_{2.5}$ standard will not be required in this case. Unfortunately, we don't have a specific written policy I can point to that says "you can always ignore the daily $PM_{2.5}$ modeling threshold," but we do it on more of a case-by-case basis.[37]

CDPHE is enforcing compliance with the 24-hr $PM_{2.5}$ NAAQS only when there is a possibility that the permit will be subject to public scrutiny, and finds it "unfortunate" that the legal threshold exists at all. Public scrutiny is the only criteria that CDPHE is concerned about when enforcing, or abstaining from, the NAAQS, not legal obligations or concern for public health and the environment.

Despite attempts by environmental and conservation groups in Colorado to alert CDPHE leadership and management of the gravity of the situation, the agency has only buried its head deeper in the sand to avoid evidence that they are issuing unlawful permits.

A close review of permit applications approved by CDPHE would demonstrate that a very large number of those permits were issued without any attempt to determine whether a proposed new facility or modification would interfere with the attainment or maintenance of hourly and daily NAAQS. In many cases, permits were issued with actual knowledge that the proposed facilities may have modeled NAAQS violations, or even with knowledge of clear and conclusive evidence of such violations.

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[35] App'x 21 ("PS memo 10-01 makes it very clear that we cannot require [an applicant] to do modeling to the 1 hour NO_x standard since emissions of NO_x will be less than 40 tons per year.").
[36] App'x 22.
[37] Id.

Visual Example of the Cumulative Impacts of Exempting "Minor" Facilities from Regulation

The consequences of PS Memo 10-01 and the culture of permitting at all costs at the CDPHE APCD are best illustrated by example. The Martin Marietta Highway 34 Facility (the "Highway 34 Facility"), an asphalt and concrete plant, was permitted by the Air Pollution Control Division (APCD) inside the ozone non-attainment area despite exhibiting modeled violations of the 1-hr NO_2 NAAQS.[38] It was exempted from demonstrating compliance with this standard based on the PS Memo 10-01.

About three miles from the Highway 34 Facility, the Extraction Oil & Gas Johnson's Corner Production Facility (the "Johnson's Corner Facility") started operation in March of 2018 and applied for a permit based on Colorado Reg. 3 § II.D.1.iii. This facility operated without a permit for a long time and, like the Highway 34 Facility, has been exempted from demonstrating compliance with the NAAQS based on the PS Memo 10-01.[39] In addition to the violations of the 1-hr NO_2 standard already caused by the nearby Highway 34 Facility, it is likely that the Johnson's Corner facility is amplifying and making worse an already existing violation with negative implications for air quality and public health.

These are only two small facilities located in an area saturated with hundreds of other facilities, all inside the ozone non-attainment area, and jointly emitting thousands of tons per year of one of the main ozone precursors, NO_2. Using the CDPHE mapping site we can see the huge number of facilities operating.[40]

The graphic below shows that in a radius of 25 kilometers around the Johnson's Corner Facility and Highway 34 Facility, there are 777 sources emitting a total of 5009.01 tons per year of NO_2. Almost half of that total --48%--comes from facilities with individual emissions below the level set in PS Memo 10-01 and the general permit's threshold of 40 tons per year. This means that these facilities have likely been permitted without any assessment of the cumulative impact of their NO_2 emissions.

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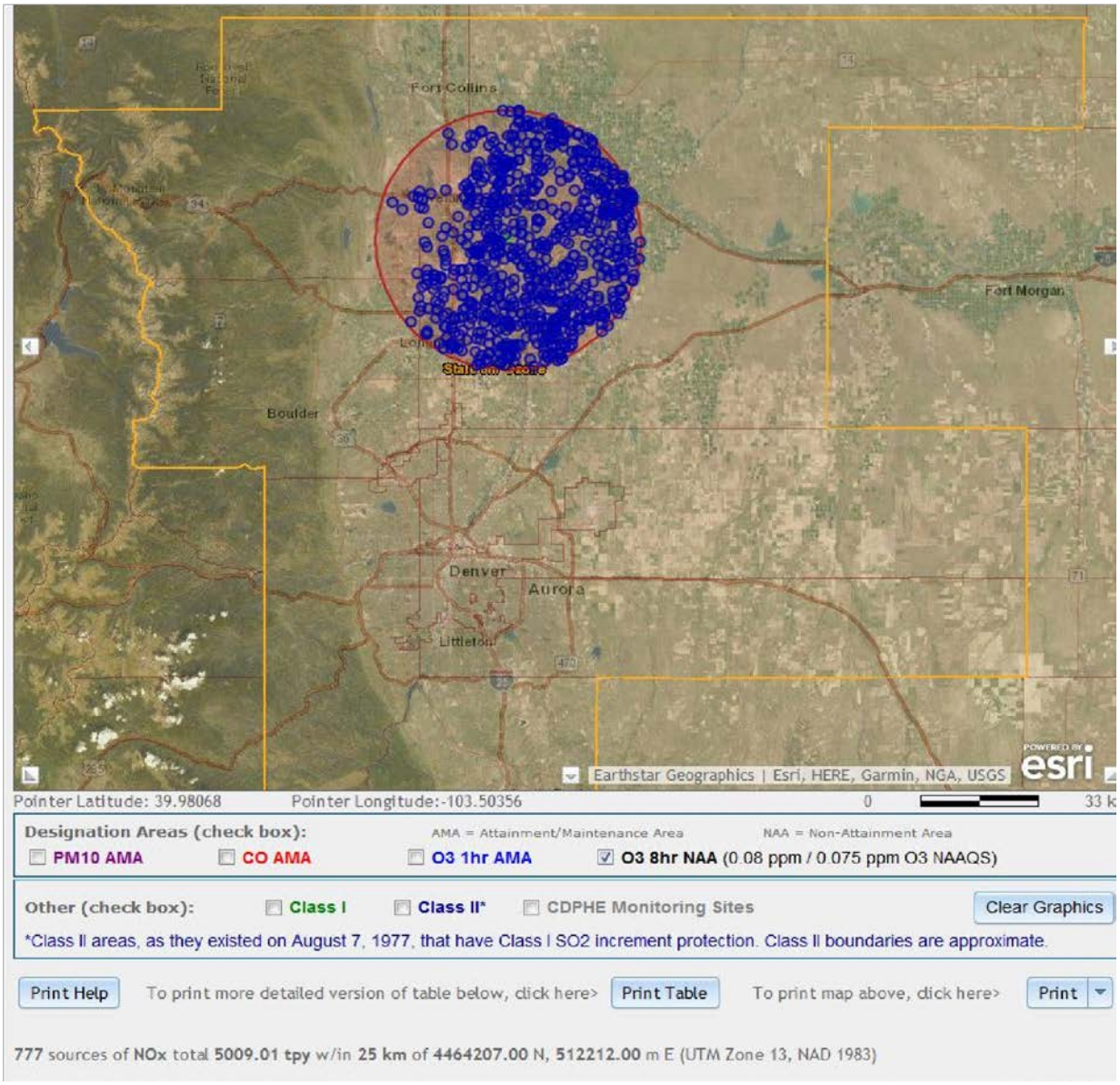
[38] Permit Numbers 16WE0688, 16WE0689. AIRS ID 123-9E8B. NKA Rock & Rail Highway 34 Facility.

[39] CDPHE email response of 10/16/19 to PEER public record request. Interoffice email states that there is no CDPHE air permit modeling report for Johnson's Corner. AIRS ID 123-9FCC.

[40] https://www.colorado.gov/airquality/ss_map_wm.aspx



Had these sources been permitted in compliance with regulatory requirements, the corresponding facilities would have been required to implement control measures, use better technology, or downsize their projects. This is turn would have the final effect of reducing the NO_2 emissions to comply with the 1-hr NO_2 NAAQS and in turn reducing the formation of ozone.

It is also possible that the area is so saturated that no more NO_2 sources would have been permitted at all, which would have at least slowed down the continuing deterioration of the ozone problem. Determining the actual status of the air quality in that area is part of CDPHE's job, but that duty has been neglected for years, leading to the current crisis and the downgrading of Colorado's NAAQS non-attainment status to "serious" from "moderate."

Unlawfully Issued Permits

An incomplete list of permits issued with potential or actual modeled NAAQS violations includes:

- Williams Willow Creek Gas Plant, in Rio Blanco County, CO. AIRS ID 103-0360. Issued with modeled violations of the 1-hr SO_2 NAAQS.[41]
- ColoWyo Coal Mine, in Moffat and Rio Blanco Counties, CO. AIRS ID 103-0327. Issued with 1-hr NO_2 NAAQS modeled violations.[42]
- Asphalt Specialties Central Plant in Weld County, CO. AIRS ID 123-A023. Issued with modeled violations of the 1-hr NO2 NAAQS and with suspected violations of the PM_{10}, and both $PM_{2.5}$ NAAQS.[43]
- Martin Marietta Monaghan Facility in Adams County, CO. AIRS 001-2193. Issued with modeled violations of the 1-hr NO_2 NAAQS.[44]
- Aggregate Industries Oxford Asphalt Plant in Arapahoe County, CO. AIRS ID 005-0116. Issued with modeled violations of the 1-hr NO2 NAAQS.[45]
- Cripple Creek & Victor Gold Mine in Teller County, CO. AIRS ID 119-001. Issued with modeled violations of the 1-hr NO_2 NAAQS and with suspected violations of the PM_{10}, and both $PM_{2.5}$ NAAQS. **A CDPHE modeler was ordered to falsify data in a modeling report regarding this facility to ensure that no modeled violation would be reported**.[46] The modeler explained as much in writing to his supervisor, Emmett Malone:

  > "As you know, officially there aren't any modeled violations at the CC&V Mine. That's because of the 01/14/19[47] and 01/28/19[48] emails from Gordon Pierce requesting to remove the concentration exceeding the NAAQS from the report and to replace them with a value that was lower and that was based on incorrect data. Therefore officially the highest modeled concentration is of 187.7 ug/m3 (99.77 ppb). The NAAQS is of 100 ppb. Reality however, is very different.
  >
  > [. . .]

---

[41] *See also* App'x 16-17 (discussing how Williams Willow Creek Plant was approved despite "clear potential" to violate the 1-hr SO_2 and NO_2 NAAQS).
[42] App'x 55-57.
[43] App'x 29 ("the facility submitted a NAAQS compliance demonstration only for carbon monoxide despite having emissions rates of PM_{10}, $PM_{2.5}$, SO_2 and NO_x, that exceed the corresponding short-term modeling thresholds").
[44] App'x 30-33 (correspondence between modeling and permitting units regarding this facility).
[45] App'x 34-35 (correspondence indicating violations of NAAQS and use of outdated software by applicant to demonstrate modeling compliance).
[46] App'x 36.
[47] App'x 40-46
[48] App'x 47-49

Those results above beg the question, if the Division is now acknowledging the modeled NAAQS violations, why would the permit be issued?

Wouldn't that create the exact same situation as the ColoWyo Mine permit that was challenged in court for being issued with a NAAQS modeled violation?

- Bighorn Pad in Jackson County, CO. AIRS ID 057-0051. Issued with modeled violations of the 1-hr NO_2 NAAQS.
- Martin Marietta Materials Highway 34 Facility in Weld County, CO. Issued with modeled violations of the 1-hr NO_2 NAAQS.
- JBS Swift Beef Company in Weld County, CO. AIRS ID 123-0018. Issued with modeled violations of the 1-hr NO_2 NAAQS.
- McCormick Asphalt Plant in Yuma County, CO. Issued with modeled violation of the 1-hr NO_2 and 1-hr SO_2 NAAQS.[49]
- Asphalt Specialties Co., Inc. / 62nd Ave. Asphalt Plant in Adams County, CO. Issued with modeled violation s of the 1-hr NO_2 NAAQS and high potential for violation of PM_{10} and $PM_{2.5}$ NAAQS.[50]

These cases are a small sample demonstrating CDPHE's ongoing failure to enforce its SIP and its minor source permitting program. The March 15, 2021 policy prohibiting modeling of these NAAQS is the latest and most concrete instance of a pattern of unlawful conduct which is directly responsible for Colorado's precipitous decline in air quality in the last decade. Consequently, we request that EPAOIG take immediate action to investigate the CDPHE NAAQS program and permits issued under it.

Sincerely,

Rosendo Majano

DeVondria Reynolds

Bradley Rink

March 30, 2021

Counsel:

Kevin H. Bell, Staff Counsel
Chandra Rosenthal, Rocky Mountain Director

Public Employees for Environmental Responsibility

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[49] App'x 37-39 (correspondence).
[50] App'x 37-39 (correspondence).

962 Wayne Ave., Ste 610
Silver Spring, MD 20910
(202) 265-7337

STATE OF COLORADO

[redacted]

Fwd: Modeling meeting outcome

1 message

Rink - CDPHE, Bradley [redacted]
To: Rosendo Majano [redacted]

Tue, Mar 16, 2021 at 7:21 AM

Bradley Rink
Technical Services Program, Air Pollution Control Division
[redacted]

fyi - we've been told to not model short term standards

blr

---------- Forwarded message ---------
From: **Malone - CDPHE, Emmett** [redacted]
Date: Tue, Mar 16, 2021 at 5:18 AM
Subject: Fwd: Modeling meeting outcome
To: Bradley Rink - [redacted]

Hi,

We can talk about this at 7
Emmett Malone
Supervisor
Modeling and Emissions Inventory Unit
Technical Services Program
Air Pollution Control Division
Colorado Department of Public Health and Environment
APCD-TS-B1
4300 Cherry Creek Drive South
[redacted]

"Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more."

---------- Forwarded message ---------
From: **Pierce - CDPHE, Gordon** [redacted]
Date: Mon, Mar 15, 2021 at 4:30 PM
Subject: Modeling meeting outcome
To: Emmett Malone [redacted]

Emmett,

Per the meeting we had today 3/15/21 with Garry and Robyn, Garry specifically stated that, effective immediately, the short-term thresholds in the Modeling Guideline will not be used and that modeling only be performed using he following thresholds:

- 40 tpy for NO2 and SO2
- 82 lbs/day for PM10
- 5 tpy for PM2.5
- 23 lbs/hr for CO
- 25 lbs/3-mo for Pb

He will allow exceptions based on agreement between the modelers and permit engineers, and his specific approval.

Garry also requested that the Modeling Guideline also be removed from the website, pending fur her discussions and revisions. I will ask Ivan to pull it. Attached is a copy of he current version hat is on the website.

Thanks,
Gordon

--

Gordon Pierce
Program Manager
Technical Services Program

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

4300 Cherry Creek Drive South, Denver, CO 80246-1530
[redacted]

[redacted]

Modeling Guideline_downloaded 20210315.pdf
5097K

EPAOIG Appendix 3

STATE OF COLORADO

[redacted]

Fwd: Modeling meeting outcome

1 message

Reynolds - CDPHE, DeVondria [redacted] Tue, Mar 16, 2021 at 11:16 AM
To: Rosendo Majano - CDPHE [redacted]

---------- Forwarded message ---------
From: **Malone - CDPHE, Emmett** [redacted]
Date: Tue, Mar 16, 2021 at 1:12 PM
Subject: Fwd: Modeling meeting outcome
To: Bradley Rink - CDPHE [redacted] DeVondria Reynolds - CDPHE [redacted]

Gordon response

Emmett Malone
Supervisor
Modeling and Emissions Inventory Unit
Technical Services Program
Air Pollution Control Division
Colorado Department of Public Health and Environment
APCD-TS-B1
4300 Cherry Creek Drive South
Denver, CO 80246-1530
[redacted]

"Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more."

---------- Forwarded message ---------
From: **Pierce - CDPHE, Gordon** [redacted]
Date: Tue, Mar 16, 2021 at 10:06 AM
Subject: Re: Modeling meeting outcome
To: Malone - CDPHE, Emmett [redacted]

No, we are not to address he short-term standards..."the short-term thresholds in the Modeling Guideline will not be used."

(Based on Brad's email, is he planning something?)

Gordon

On Tue, Mar 16, 2021 at 8:04 AM Malone - CDPHE, Emmett [redacted] wrote:

> Hi,
>
> Had a discussion with Brad and DeVondria this morning and it went much like I thought it would, badly. I feel like I have stepped back in ime and Doris and Rosendo are arguing about how this is wrong.
>
> One question that came up and if you or Garry could respond I would appreciate it. What I took from the meeting was that we are not to address the short term standards. The way you worded your email is slightly different, are we to address the short term standards?
>
> 2 years, 7 mon hs, and 15 days.
>
> Emmett Malone
> Supervisor
> Modeling and Emissions Inventory Unit
> Technical Services Program
> Air Pollution Control Division
> Colorado Department of Public Health and Environment
> APCD-TS-B1
> 4300 Cherry Creek Drive South
> Denver, CO 80246-1530
> [redacted]
>
> **"Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more."**

On Mon, Mar 15, 2021 at 4:30 PM Pierce - CDPHE, Gordon [redacted] wrote:

> Emmett,
>
> Per the meeting we had today 3/15/21 with Garry and Robyn, Garry specifically stated that, effective immediately, the short-term thresholds in the Modeling Guideline will not be used and that modeling only be performed using the following thresholds:
>
> - 40 tpy for NO2 and SO2
> - 82 lbs/day for PM10

- 5 tpy for PM2.5
- 23 lbs/hr for CO
- 25 lbs/3-mo for Pb

He will allow exceptions based on agreement between he modelers and permit engineers, and his specific approval.

Garry also requested that the Modeling Guideline also be removed from the website, pending further discussions and revisions. I will ask Ivan to pull it. Attached is a copy of the current version that is on the website.

Thanks,
Gordon

--

Gordon Pierce
Program Manager
Technical Services Program

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

4300 Cherry Creek Drive South, Denver, CO 80246-1530
[redacted]

Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more.

--

Gordon Pierce
Program Manager
Technical Services Program

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Air Pollution Control Division
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[redacted]

Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more.

--

DeVondria Reynolds, MS
Air Quality Modeler
Modeling and Emissions Inventory Unit
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Learn more about COVID-19 https://www.colorado.gov/pacific/cdphe/apcd-covid-19 .

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COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
Stationary Sources Program / Air Pollution Control Division

INTER-OFFICE COMMUNICATION

PS Memo 10-01

TO: Stationary Sources Staff, Local Agencies, Regulated Community

FROM: Kirsten King and Roland C. Hea

DATE: September 20, 2010

RE: Permit Modeling Requirements for the 1-Hour NO_2 and SO_2 NAAQS

The Division is establishing this guidance for use by minor stationary sources of nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) in evaluating whether modeling is necessary for permitting purposes to determine whether a permit applicant's emissions will comply with the new 1-hour NO_2 and/or the new 1-hour SO_2 National Ambient Air Quality Standard (NAAQS). The United States Environmental Protection Agency (EPA) published implementation guidance on June 28, 2010 and August 23, 2010 regarding demonstrating compliance with the new standards for Prevention of Significant Deterioration (PSD) sources.[1] The Division finds it useful to publish this supplemental state guidance to ensure that minor sources are addressed in a manner consistent with the EPA guidance for PSD sources.

Under federal rules, an ambient air quality impact analysis is required for each pollutant that a PSD source has the potential to emit in significant amounts. Such analysis includes modeling. The metric used by EPA to measure significant amounts is the significant emissions rate (SER). Federal rules currently define the SER for NO_X and SO_2 as 40 tons per year (tpy). (40 CFR 52.21(b)(23)(i); 40 CFR 51.166(b)(23)(i)). EPA recently evaluated and decided to apply on an interim basis the 40 tpy SER to major source permitting compliance demonstrations for the hourly NO_2 and SO_2 standards. EPA concludes and states that an ambient air quality impact analysis is not necessary for PSD sources with projected NO_2 or SO_2 emissions rates below the SER. (Wood Memoranda at p.11 and p.4)

[1] See June 28, 2010, Anna Marie Wood, Acting Director, Air Quality Policy Division, Office of Air Quality Planning and Standards Memorandum **"**General Guidance for Implementing the 1-hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour NO_2 Significant Impact Level" and August 23, 2010 Memorandum "General Guidance for Implementing the 1-hour SO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour SO_2 Significant Impact Level" ("Wood Memoranda").

The Division has evaluated EPA's rationale for establishing NO_2 and SO_2 SERs for modeling the 1-hour NO_2 and SO_2 standards. The Wood Memoranda guidance set forth EPA's reasoning that its SER for SO_2 (a pollutant with shorter-term 3-hour and 24-hour averaging times) is 40 tpy, and, for this pollutant, ambient air quality impact analyses have not been necessary at levels below the SER. EPA has concluded that this reasoning applies to the one-hour NO_2 and SO_2 standards on an interim basis. EPA states it intends to conduct an evaluation of screening tools available to permitting agencies. In the interim, it recommends the continued use of the existing SER for NO_x and SO_2 emissions with respect to the 1-hour NO_2 and SO_2 standards, and thus ambient air quality impact analyses are not necessary for either NO_2 or SO_2 emissions below the 40 tpy SER.

EPA's Wood Memoranda guidance address PSD sources. The Division believes that the same principles apply to minor sources, in part, to ensure consistency of treatment in permitting and to ensure that it is not imposing different requirements on minor sources than those to which PSD sources are subject. The Division is aware of no factual basis to impose more stringent requirements on minor sources than EPA would impose on the largest air pollution sources. Therefore, the Division will apply EPA's SERs for NO_X and SO_2 to the 1-hour NO_2 and 1-hour SO_2 standards for all stationary source permitting activities, including determining when ambient air quality impact analyses are necessary for permitting, pending the consideration of any further guidance issued by EPA on this subject.

Majano, Rosendo

From: Majano, Rosendo
Sent: Thursday, December 08, 2011 3:02 PM
To: Money, Carissa D.
Subject: RE: Enterprise CTF - SO2 emissions
Attachments: ENTERPRISE CTF - NE TERRAIN ELEVATION PROFILE.jpg

Thanks Carissa for this information. I just reviewed the memo you are referring to in your email, and I have a couple of questions/comments:

1- The memo seems to apply only to 1-hr NO2 and 1-hr SO2, but the SO2 NAAQS/CAAQS also include the 24-hr/3-hr averaging periods.
2- Where does this memo leave the short-term modeling thresholds indicated in the CO Modeling Guideline? Should I assume that the memo supersedes the Modeling Guideline in this matter?

Anyhow, regardless of these questions and comments, there is a strong technical reason why, despite the guidance provided by the memo, I recommend that the SO2 modeling be required in this particular case: There are complex terrain situations all around the CTF facility, which means that the elevation of the surrounding terrain is higher than the elevation of the highest stack at CTF. The consequence of this is that the plume of gases will impact the higher terrain causing higher concentrations than what you would normally see with simple terrain situations. How much higher these concentrations will be will depend on the distance at which the elevated terrain is located since this will in turn determine how much the plume of gases will have traveled and how much dispersion of the pollutants will have occurred. You can better visualize this situation by looking at the attached file. This is showing the terrain elevation profile in the north-east direction from the CTF site, and as you can see, the elevation of the surrounding terrain starts being higher than the highest stack at approximately 5 km and from there you can expect higher concentrations. This is only one direction, and the CTF facility is surrounded by higher terrain in almost every direction. The yellow dots represent the receptors where the concentrations are being modeled and a big portion of them will be located in complex terrain.

For the specific case of the CTF facility, you have to consider also the fact that the 1-hr NO2 modeling is already showing violations of the corresponding NAAQS. As I explained to you yesterday, these violations are not necessarily being caused by CTF, but that is something that is still pending to be determined. And although the SO2 emissions are much lower, the dispersion conditions and terrain characteristics are the same, so if there are high concentrations for 1-hr NO2, the possibility of getting high 1-hr SO2 concentrations is real and shouldn't be ignored.

So, I'm not saying that the short term SO2 NAAQS will be exceeded, but the fact that the SO2 emissions are below 40 tpy is not by itself sufficient technical evidence to prove the contrary, at least not in the particular case of the CTF facility. In this case I think that the Division should ask the applicant to submit modeling to demonstrate compliance with the SO2 NAAQS.

Let me know your thoughts about this.

Thanks,

Rosendo.

From: Money, Carissa D.
Sent: Thursday, December 08, 2011 12:02 PM
To: Majano, Rosendo
Subject: RE: Enterprise CTF - SO2 emissions

Rosendo,

I did not request modeling of SO2 since per PS Memo 10-01 modeling is only required if SO2 emissions exceed 40 tpy. Please let me know if you have additional questions about this determination. (Here is the link to PS memo in case you have not seen it before)
http://www.cdphe.state.co.us/ap/down/PS10-01.pdf

Thank you!
Carissa

From: Majano, Rosendo
Sent: Thursday, December 08, 2011 11:34 AM
To: Money, Carissa D.
Subject: Enterprise CTF - SO2 emissions

Carissa,

While looking at the APENs I noticed that the facility has about 22 tpy of SO2 emissions (approximately 5 lb/hr). This would exceed the short term modeling threshold of 0.46 lb/hr and they would need to submit modeling to verify compliance with the short-term SO2 NAAQS, specially with the 1-hr standard.

Do you know if this issue has been previously discussed with the applicant?

Thanks,

Rosendo.

Majano, Rosendo

From: Money, Carissa D.
Sent: Tuesday, December 13, 2011 9:35 AM
To: Majano, Rosendo
Subject: RE: Enterprise - CTF and Meeker

Rosendo,

I have not yet heard back about the flares so I will follow up with Enterprise today.

Also, I talked with my supervisor yesterday about the SO2 issue (my guidance so no modeling required and your guidance says that SO2 should be modeled) . We then followed up with Kirsten and I think she has already talked with Gordon this morning about the issue. Ultimately I am leaving it up to management to decide but please let me know if you have any questions/concerns for me.

I also agree with getting back to Enterprise quickly about the modeling issues since it is quite a bit of work for them so thank you for moving everything along!

Thanks,
Carissa

From: Majano, Rosendo
Sent: Monday, December 12, 2011 5:53 PM
To: Sebesta, Jacob C.; Money, Carissa D.
Subject: Enterprise - CTF and Meeker

Hi Carissa and Jacob,

I just wanted to check if you had a chance to discuss the flare emissions for both facilities with the applicant. I don't mean to rush you, I just want to know where is the situation at for the purpose of planning my workload.

For CTF, I'm done reviewing the modeling analysis and I'm ready to send Enterprise an email with all the modeling issues they need to address, so once I get confirmation if the flare's emissions are OK or will change, then I'll send the email.

For Meeker, it looks like the consulting company is already working on the new modeling, so my concern here is that if the flare's emissions change, they will have to re-do whatever work they have completed, and it will be worse if the re-submit the modeling and then we have to tell them the repeat it. So I was thinking that it might be a good idea to contact the consulting company and applicant and tell them to hold the re-submittal until this issue is solved. Jacob, please let me know if you are OK with doing that.

Also, since both facilities are about 12 kilometers apart, they have to include each other in their respective off-site emissions inventory. Therefore, I will ask them to do that taking into account all the corrections that are currently being made. This means that CTF will have to model Meeker as an off-site source with all the recent corrections, and Meeker will have to do the same with CTF. This request shouldn't be a problem for them considering that we are talking about the same applicant and same consulting company. The only problem is that I need to notify them of the corrections for both plants, and I haven't done that yet for CTF. So for that reason it also makes sense to tell them to hold the re-submittal for Meeker.

Thanks,

Rosendo.-

State of Colorado

[redacted]

Re: Bowie Mine

1 message

Jung, Doris [redacted] Tue, Nov 27, 2012 at 6:46 AM
To: Rosendo Majano [redacted]
Cc: Chuck [redacted]

Rosendo,

I completely disagree with permitting on how they are handling Bowie with regards to PM2.5 and, on a more basic level, how they are handling impact analyses and NAAQS compliance demonstrations.

I had conveyed to permitting in March of this year that Bowie's modeling should include PM2.5. See attached PDF.

At this point, permitting has already told the consultant to ignore PM2.5 (per Chuck Pray) and it's not the first time they have done so. The modeling/impact analysis review report can discuss how PM2.5 has not been addressed and include any data/results/concerns relating to PM2.5 attainment.

Doris

On Mon, Nov 26, 2012 at 3:24 PM, Rosendo Majano [redacted] wrote:

> Doris,
>
> I was reviewing the comments that Jon Torizzo made to the consulting company related to the modeling submitted prior to 2009, and there were all sort of issues ranging from incorrect emission rates to incorrect source characterization and definition of ambient air. I don't think this would fall under the explanation described in the memo of "applications that exceeded the normal permit processing timeframes."
>
> This one did not exceed the normal time frame. The applicant just failed to demonstrate compliance with the NAAQS through no fault of the Division. In my opinion it is completely wrong to exempt them from PM2.5 modeling based on that 2008 application.
>
> How many years can they keep resubmitting the modeling analysis and still consider it the same application?
>
> Are you completely ruling out the possibility of requesting the applicant to submit PM2.5 modeling?
>
> Rosendo
>
> On Mon, Nov 26, 2012 at 12:58 PM, Jung, Doris [redacted] wrote:
>
> > Rosendo,
> >
> > After CC&V lobbied up the management chain in 2010 to relieve themselves of submitting a PM2.5 impact analysisfor their current permit, the previous Division director (Paul Tourangeau) decided that applications in-house prior to 2009 would not need to submit PM2.5 modeling (as reflected in the memo, although his name does not appear anywhere).
> >
> > The application originally submitted by Bowie prior to 2009 had not been completed due to delays on the

applicant/consultant side. Thus, such uncooperative behavior is rewarded by not assessing attainment with PM2.5 standards.

I agree that EPA's surrogate policy does not apply but, according to permitting, they are relying on the attached memo. The memo does not reference the surrogate policy. By the date of the memo, case law had ruled/clarified the limited use of the surrogate policy (a demonstration needs to be made). At this time, there is no technical reason for not assessing PM2.5.

As with the 1-hr NO2 and SO2 standards, the modeling/impact analysis review report can discuss how PM2.5 has not been addressed and include any data/results/concerns relating to PM2.5 attainment.

I believe Bowie is the last of the pre-2009 applications.

Doris

---------- Forwarded message ----------
From: **Rosendo Majano** [redacted]
Date: Wed, Nov 21, 2012 at 3:03 PM
Subject: Bowie Mine
To: Doris Jung [redacted]
Cc: Chuck Machovec [redacted]

Doris,

I started reviewing the Bowie Mine application - received at the SSP on 02/29/2012 - and noticed that the applicant is claiming to be exempt from conducting PM2.5 modeling (please see the attached file). I talked to Chuck Pray about this and he confirmed it. According to him, this is exactly the same application that had been submitted several years ago, with no changes, and therefore the PM10 surrogate policy would still apply.

However, from what I have seen, it is not that the application has been sitting on someone's desk waiting for review, it looks like the modeling was rejected and resubmitted several times. I don't know the details but I don't think this could be considered as the same application submitted prior to 2009.

Given that you have more knowledge of what happened with the previous submittals, you might be in a better position to determine if the PM10 surrogate policy would still apply. I don't think it does and I would request PM2.5 modeling to be submitted.

Let me know your thoughts about this.

Thanks,

Rosendo.

RE_ Bowie Mining.pdf
67K

EPAOIG Appendix 12

State of Colorado

[redacted]

Re: Bowie Mine

1 message

Pray - CDPHE, Charles [redacted] Tue, Feb 19, 2013 at 12:56 PM
To: Rosendo Majano [redacted]
Cc: "Jung, Doris" [redacted], Chuck Machovec - CDPHE [redacted]

Rosendo:

Yes, the decision to allow Bowie, and three other sources, to not be required to model the PM2.5 was made by upper management. I haven't been told it has been rescinded. I think they get a pass until this permit action is completed.

The APEN the Division received in January was not for this purpose. It was to expand the existing GOB pile to allow the mine to continue to operate, again until this permit process is complete for the newly located GOB pile and associated haul. The expansion of GOB pile #2 has been allowed under "enforcement discretion" to keep the mine open, but at only half the volume requested to cmply with the DRMS permitting.

BLM's lease arrangements do allow a lessee to prevent access under certain circumstances, while not requiring fencing to allow for animal migration. How a company enforces this is probably up to them, but I'm certain that the mine would be trying to prevent access to any operations which could potentially create a lawsuit situation. It's easier in open pit mining, you fence everything you can and let terrain take care of the rest. The deer, elk and antelope (and occasionally black bear) always seemed to find a way in and out.

I didn't receive a copy of the diagram mentioned in Aaron's e-mail, so I can't review that.

Chuck

On Tue, Feb 19, 2013 at 12:33 PM, Rosendo Majano [redacted] wrote:

> Chuck,
>
> FYI, please see the email below. Specifically, see the last paragraph. It is saying that they will submit a revised modeling analysis to account for changes in several sources. An APEN related to these changes was apparently submitted in January, 2013 and if I understand correctly, you will also receive revised emissions calculations.
>
> Under these circumstances I can't do absolutely anything with the modeling review until I receive the new files, so I will put this application on hold in the meantime.
>
> Also, in this new resubmittal, will the SSP continue to exempt this facility from demonstrating compliance with the PM2.5 NAAQS?
>
> The email below is describing violations of the 24-hr PM10 NAAQS, so there is reason for concern about the PM2.5 NAAQS.
>
> Let me know what you decide.
>
> Thanks,
>
> Rosendo

---------- Forwarded message ----------
From: **Aaron Martinkus** [redacted]
Date: Fri, Feb 15, 2013 at 12:37 PM
Subject: Re: Bowie Resources
To: Rosendo Majano [redacted]

Rosendo,

I have conducted a modeling analysis of the Bowie operations without excluding any receptors. The model results show some predicted exceedances of the 24-hour and annual PM-10 NAAQS, but they only occur in areas that are physically controlled by Bowie. I have attached a diagram showing the receptor locations where the model predicted an exceedance. As you can see, these receptors are located near the facility wash plant, and at the top of the mine. There is one predicted exceedance at the Terror Creek Site, but that area is surrounded by fencing, and not publically accessible. This analysis includes the assumed 24-hour and annual background concentrations of 29 ug/m3 and 16 ug/m3, respectively.

I have also attached a diagram with the locations of the gates that keep the public from accessing the roads north of the mine. Installation of fencing around the entire mine property would not be possible; the lease agreement between Bowie and the Bureau of Land Management would not allow for this type of activity. Consideration must be made when there are competing interests amongst regulatory agencies; installation of fencing would cause land disturbances that are not permitted, and there are also considerations regarding wildlife migration and habitat protection.

While Bowie does not have a complete physical barrier around the entire mine, public access to the areas where an exceedance is predicted to occur is controlled due to these gates, the topography, and because the general public will not be able to reach these active mine areas without the permission of Bowie. With permission to be on-site, any visitors (e.g. contractors) are no longer considered by EPA to be the general public. MSHA regulations also require that people coming onsite must register with the mine upon arrival, they must be accompanied by mine personnel, and that they do not allow general public access to the mine. However, this requirement does not insist on fencing or physical barriers; it is understood that the actions of mine personnel is sufficient to preclude public access to active mining areas. Bowie personnel have been trained to approach any unfamiliar persons onsite, and to escort them off-site as necessary. Again, EPA does not define preclude as making public access absolutely impossible; rather that the likelihood of such access is small.

In addition, APCD has approved this approach for other permitting/modeling actions for other coal mines in the North Fork Valley, such as Oxbow Mining, LLC and Mountain Coal Company, LLC. APCD has previously understood the unique aspects of the siting of these mines requires different rationale to be applied in the permitting process, and has used discretion and judgement when reviewing and approving permit applications for these sources. This is not the first time this approach has been proposed, nor the first time it has been approved by the Division for permitting. Bowie is just asking for a fair and consistent application of regulatory interpretations.

Please note, the dispersion modeling has been updated to account for an APEN submitted in January to expand Gob Pile #2; additional "area-poly sources" have been added (NEWGOB2 and NEWGOB2DOZ), a volume source for the dropping of gob onto the pile (GOBPILENEW2), and an on-site haul road route has been modified (CYN001-062) to account for where this expansion of the stockpile will occur. In addition, the size of the area-poly source Gob Pile #3 (NEWGOB) was expanded to more accurately reflect the size of the proposed pile, and as such the haul road (GRN001-029) associated with this stockpile was lengthened. I will send you the revised input files in a separate email, and will forward the associated emission inventory to Chuck Pray.

Thanks for your help.

Regards,

Aaron

--

Chuck Pray, P.E.-P.L.S.
Permit Engineer, Air Pollution Control Division
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1530
[redacted]

www.colorado.gov/cdphe

My office hours are 7:30 AM to 4:00 PM.

Please be aware that any information submitted to the Air Division regarding emissions of pollutants is potentially subject to the Colorado Open Records Act.

State of Colorado

[redacted]

LEAN meeting

1 message

Machovec - CDPHE, Chuck [redacted] Wed, Dec 5, 2012 at 10:19 AM
To: Doris Jung [redacted], Rosendo Majano - CDPHE [redacted]

Garry wants to schedule a status update LEAN meeting on Dec 17, 18, or 19th.

I don't get the impression he is expecting that we are "done," rather, he wants to just make sure the process continues moving to implementation.

He seemed fine with the progress so far.

He also discussed metrics. For example, a year from now he/we need to be able to show how LEAN has or hasn't helped. I told him that we'll need to careful with metrics because other variables are at work such as decreased workloads (i.e., although I didn't quite say this... I suggested that a finding of an association between better "turnaround time" of modeling reviews and LEAN implementation does not necessarily establish a "causal" relationship because of the other variables at play).

He also mentioned that at some point he wants to have a meeting to reach an understanding on "policy" versus "technical" aspects of modeling. I told him that as long as their is unwritten policy whereby management asks staff verbally to not follow language in the rule, there will be issues. Any requests from management for staff to not follow the requirements of the rule should be in writing. He agrees that there should be more discussion.

On a side discussion, he mentioned that he isn't convinced that the modeling completeness language should be included in the letter sent by the engineer (i.e., he seemed to be suggesting that the modeling completeness letter and permit engineer completeness letter are separate things... but that said, he said that he is open to discussion). My two cents... which I didn't share with Garry... is that if we are issuing a completeness letter on modeling alone, then it would need a disclaimer that another letter may or may not be sent by the engineer... and that a "complete" modeling analysis does not indicate a complete application, etc.

Chuck Machovec
Scientist/Supervisor
Modeling, Meteorology, and Emission Inventory Unit
Technical Services Program, Air Pollution Control Division
Colorado Department of Public Health and Environment
APCD-TS-B1
4300 Cherry Creek Drive South
Denver, CO 80246-1530
[redacted]

Colorado Department of Public Health and Environment

STATE OF COLORADO

[redacted]

Re: Brief Survey - Minor Source Modeling

1 message

Jung - CDPHE, Doris [redacted] Mon, Jul 6, 2015 at 10:43 AM
To: Rosendo Majano - CDPHE [redacted]
Cc: "gordon.pierce@state.co.us" [redacted]

Rosendo,

The issues you have brought to Roland's attention in the email below are among the many we (Chuck, Jon, and I) had informed permitting about in the August 18, 2010 meeting hat was organized to discuss PM2.5 modeling.

Attendees included Chuck, Jon, me, Gordon, Roland Hea, Jim King (operating permit supervisor at the time), Chip Hancock, Mark McMillan, and Chris Laplante.

In addition to discussing PM2.5 in this meeting, we (modelers) were told to raise the modeling thresholds because compliance with NAAQS could not be demonstrated or they would just issue permits without considering NAAQS compliance.

We (modelers) argued that their approach would be inconsistent with regulatory requirements and raising hresholds when NAAQS are more stringent was not technically justified but ultimately we were ignored. Consequently, since the modelers wouldn't cooperate, permitting came out with he 40 tpy hreshold for 1-hr NO2 and SO2 NAAQS on September 20, 2010.

The circumstances and the permitting personnel involved have not changed since the 2010 meeting/decision. While I agree concerns for NAAQS attainment remain, there is nothing that indicates to me that permitting is willing to change their practice.

At this time, dialogue on this subject with permitting is beating a dead horse. Our resources are better spent elsewhere.

Doris

---------- Forwarded message ----------
From: **Rosendo Majano** [redacted]
Date: Mon, Jul 6, 2015 at 9:13 AM
Subject: Fwd: Brief Survey - Minor Source Modeling
To: Doris Jung - CDPHE [redacted]

FYI. I should have CCd you. I apologize for not doing it.

---------- Forwarded message ----------
From: **Hea - CDPHE, Roland** [redacted]
Date: Mon, Jul 6, 2015 at 8:53 AM
Subject: Re: Brief Survey - Minor Source Modeling
To: Rosendo Majano [redacted]
Cc: Gordon Pierce - CDPHE [redacted]

Rosendo,

Thanks for your additional thoughts. I do believe that we will need to continue these discussions over time to find the right balance between workloads, resources, outcomes, etc. From a permitting perspective, we need to find solutions that balance environmental and public health protection, available staff resources, our permit timeliness requirements, applicants' capacities and abilities to provide detailed technical information (especially small businesses), etc. I look forward to continuing the discussion and have given Mark McMillan a heads-up as well.

Roland

On Tue, Jun 30, 2015 at 1:10 PM, Rosendo Majano [redacted] wrote:

> Thanks Roland for your response.
>
> My opinion is that the broader internal discussion is long overdue. The workable set of thresholds/criteria that you talk about establishing, already exist in the CO Modeling Guideline. Table 1 of his document establishes long-term and short-term thresholds (0.46 lb/hr for NO2 and SO2) and also a list of criteria (footnotes of Table 1) for when modeling could be warranted even when the emissions rates are below the short and/or long-term hresholds.
>
> Those thresholds and criteria to determine when modeling is required were developed by the APCD modeling experts and I never understood why the SSP has chosen to ignore them all these years.
>
> I can't take credit for any content of the CO Modeling Guideline since it was developed before I started working here at the APCD, but I can perfectly see and understand the logic in he content of Table 1 and its footnotes, considering the clear requirement in AQCC Regulation 3 to verify compliance with the NAAQS as condition to issue permits, and the unique situation of Colorado with most of its emission sources located in complex terrain (i.e. surrounding terrain elevations above the height of the stack).
>
> Under these circumstances it is perfectly feasible to have sources with small annual emission rates cause very high impacts on air quality, specially on the short-term NAAQS, because of the unique meteorological conditions created by complex terrain. I think that looking at the annual emissions alone to determine when modeling is warranted is a big mistake, as it is ignoring the expert advise of those who have a better understanding of the dispersion modeling process, and the corresponding regulations and guidance issued by the EPA.
>
> By doing this, the Division might be issuing permits to facilities that are causing or contributing to modeled violations of the NAAQS, which I think is something we should all be concerned about.
>
> I agree with you that this discussion is way beyond the scope of the NACAA survey, and I never intended to suggest otherwise, but the questions in the survey reminded me of this unresolved issue at the APCD: the requirement in AQCC Regulation 3 to verify compliance with the NAAQS before issuing a permit, and the question of what kind of demonstration of compliance with the NAAQS has been performed for all those applications with emissions below the annual thresholds (e.g. 40 tpy for NO2 and SO2) that were never required to submit modeling, but hat have emissions above the short-term thresholds or that meet other criteria that would warrant a modeling analysis.
>
> I have made this same question to several people at the APCD before, including Will, and just like in your case now, the question has always been left unanswered. And I'm not referring to those hundreds of applications with VOC-only emissions or ownership change applications, I'm referring to applications like Williams Willow Creek or Williams

Crawford Trail, and many other that despite the clear poten ial to cause modeled violations of the 1-hr NO2 or SO2 NAAQS, were never required to submit a quan itative demonstration of compliance with those NAAQS.

Anyway, I can see that under the current circumstances my questions are mostly rhetorical, and I admit that all this discussion is way above my pay grade. But as technical staff constantly dealing with this issue, I thought the NACAA survey was a good opportunity to, once again, bring this problem to the attention of decision makers like you, who have steered the Division all these years and are ultimately responsible for defining how hings work at he APCD.

I appreciate your taking the time to reply to my email and address my concerns.

Rosendo

Rosendo Majano
Air Quality Scientist
Modeling, Meteorology and Emission Inventory Unit
Air Pollution Control Division
Colorado Department of Public Health and Environment
[redacted]

On Mon, Jun 29, 2015 at 4:57 PM, Hea - CDPHE, Roland [redacted] wrote:

> Rosendo,
>
> Thanks for your thoughts. You raise some very good questions that warrant a broader internal discussion.
>
> For purposes of responding to the New Mexico NACAA survey request, I tried to keep my responses as brief as possible. On Questions 1 and 2, they were simply asking for a yes/no response. The only reason I included some additional discussion was to convey hat in Colorado we require modeling analysis for some of our minor source permit applications based on a set of hresholds/criteria that we have established over ime.
>
> The 40 tpy NOx and SO2 threshold I cited was simply an example of one of the criteria we use. The New Mexico questions appear to be geared to how other agencies are addressing modeling (or not modeling) for he 1-hour NO2 and SO2 standards. I responded N/A for Ques ion 3 because for some applications we do model to demonstrate compliance with the 1-hour standards. We typically receive several housand minor source permit applications per year and the vast majority do not trigger our modeling thresholds/criteria based either on their level of requested emissions or because of he pollutant involved, e.g., we gets lots of oil and gas E&P site applications that only have reportable VOC emissions.
>
> For me, the questions regarding which of these applications we do require quantitative modeling analysis for and how we establish a workable set of thresholds/criteria were way beyond the scope of the response back to New Mexico. We should be discussing these questions internally between SSP, TSP, P&P, etc. if we feel there are issues with our approach.
>
> Roland
>
> On Mon, Jun 29, 2015 at 9:53 AM, Rosendo Majano [redacted] wrote:
>
> > Roland,
> >
> > This email was forwarded to me and I wanted to ask you a couple of things given that your response doesn't seem to completely address the requirements in AQCC Regulation 3.
> >
> > 1- The requirement in Reg 3 is not to do modeling, but to verify compliance with the NAAQS (AQCC Regulation 3, Part B, III.D.1.c and d).
> >
> > 2- My understanding is that dispersion modeling is the only mechanism approved by the EPA to quantify impacts on air quality. Per AQCC Regulation 3, Part B, III.B.5 the Division needs to prepare a preliminary analysis that will indicate what impact, if any, the new source will have. Such preliminary analysis will allow the Division to determine, among other requirements, whether the new source will comply with he NAAQS.
> >
> > 3- So according to your response to questions 1 and 2 below the SSP does not require modeling for sources with proposed permitted emissions below the 40 tpy threshold for NO2 and SO2. So in those cases, how does he SSP verify compliance wi h the 1-hr NO2 and 1-hr SO2 NAAQS? That's question 3 below that was left unanswered.
> >
> > According to your email that's the case for the vast majority of minor source applications, so I'm curious to know for those applications with NO2 and/or SO2 emissions below the 40 tpy threshold, if the impacts on ambient air are not quantified through dispersion modeling, what kind of demonstration of compliance with the NAAQS has been performed that has allowed he SSP to issue these permits all hese years?
> >
> > I will appreciate your response.
> >
> > Rosendo
> >
> > ---
> > **Rosendo Majano**
> > Air Quality Scientist
> > Modeling, Meteorology and Emission Inventory Unit
> > Air Pollution Control Division
> > Colorado Department of Public Health and Environment
> > [redacted]
> >
> > ---------- Forwarded message ----------
> > From: **Hea - CDPHE, Roland** [redacted]
> > Date: Fri, Jun 26, 2015 at 4:46 PM
> > Subject: Fwd: Brief Survey - Minor Source Modeling
> > To: William Allison - CDPHE [redacted], Chris Colclasure - CDPHE [redacted], Gordon Pierce - CDPHE [redacted] Christopher Laplante - CDPHE [redacted] Stefanie Rucker - CDPHE [redacted], Mark McMillan - CDPHE [redacted]
> >
> > All,
> >
> > FYI - Here is a response I sent to Rita Bates with the State of New Mexico as a result of a request from NACAA. It was straightforward, so I just went ahead and replied.
> >
> > Thanks and have a nice weekend,
> > Roland

---------- Forwarded message ----------
From: **Hea - CDPHE, Roland** [redacted]
Date: Fri, Jun 26, 2015 at 4:29 PM
Subject: Re: Brief Survey - Minor Source Modeling
To: [redacted], Karen Mongoven [redacted]

Rita,

Here are Colorado's responses to your questions:

Does your state require facility modeling analysis for minor source permitting?

Yes, for some of our minor source permit applica ions. We have developed a set of hresholds and criteria for when modeling is required for minor source applications. For example, new sources whose proposed permitted emissions are equal to or greater than 40 tons per year of NOx or SO2, or existing sources who are proposing to increase their permit limits by 40 tons per year or more of NOx or SO2 are required to model for that pollutant. As a matter of practice, the vast majority of our minor source applications do not require modeling analysis because they don't trigger the modeling hresholds or criteria.

If you require modeling analysis for minor sources do you require modeling demonstration of compliance with 1-hr NO2 and 1-hr SO2 NAAQS?

Yes, if they trigger our modeling thresholds or criteria for NOx or SO2.

If you do not require a modeling analysis, do you show compliance with the NO2 and SO2 1-hour standards in another way? If yes, how?

Not applicable based on our responses to Questions 1 and 2.

Please let me know if you have any questions or would like to discuss in greater detail.

Best regards,
Roland

On Fri, Jun 26, 2015 at 10 00 AM, Karen Mongoven [redacted] wrote:

> TO: NACAA NEW SOURCE REVIEW COMMITTEE
>
> NACAA EMISSIONS AND MODELING COMMITTEE
>
> Rita Bates (New Mexico) asked me to circulate he following brief survey questions to committee members and would appreciate it if you could take a few moments to respond. This email is formatted so that responses will be addressed to both Rita and me. Thank you in advance for your assistance.
>
> **Does your state require facility modeling analysis for minor source permitting?**
>
> Yes or No
>
> **If you require modeling analysis for minor sources do you require modeling demonstration of compliance with 1-hr NO2 and 1-hr SO2 NAAQS?**
>
> Yes or No
>
> **If you do not require a modeling analysis, do you show compliance with the NO2 and SO2 1-hour standards in another way? If yes, how?**
>
> Rita Bates
>
> Planning Section Chief
>
> Air Quality Bureau – New Mexico Environment Department
>
> 525 Camino de los Marquez, Suite 1
>
> Santa Fe, New Mexico 87505
>
> [redacted]
>
> [redacted]
>
> [redacted]
>
> * * *
>
> Karen K. Mongoven

[redacted]

Senior Staff Associate

National Association of Clean Air Agencies

444 North Capitol Street, NW, Suite 307

Washington, DC 20001

[redacted]

--

Roland C. Hea, P.E.
Permitting Section Supervisor

[redacted]

--

Roland C. Hea, P.E.
Permitting Section Supervisor

[redacted]

--

Roland C. Hea, P.E.
Permitting Section Supervisor

[redacted]

--

Roland C. Hea, P.E.
Permitting Section Supervisor

[redacted]

EPAOIG Appendix 20

[redacted]

STATE OF COLORADO

[redacted]

Excel Denver Steam Plant

1 message

R K Hancock III [redacted] Tue, Sep 6, 2016 at 11:00 AM
To: Rosendo Majano - CDPHE [redacted]
Cc: Emmett Malone - CDPHE [redacted] Gordon Pierce - CDPHE [redacted], Roland Hea - CDPHE [redacted], Mark McMillan - CDPHE [redacted]

Rosendo,

In your e-mail to Xcel you made some excellent arguments why impact modeling to the 1 hour NOx standard would be a good idea for he proposed new boiler at the existing steam plant. However, PS memo 10-01 makes it very clear that we cannot require Xcel to do modeling to the 1 hour NOx standard since emissions of NOx will be less than 40 tons per year.

I will let Gary Magno know that we will not be requiring modeling to the 1 hour NOx standard for the new boiler so long as emissions are limited to less than 40 tons per year.

Chip

R K "Chip" Hancock III, P.E.
Construction Permit Unit Supervisor
Stationary Sources Program
Air Pollution Control Division

[redacted]

NOTE: As of January 1, 2014, the Colorado Air Pollution Control Division no longer accepts blank or incomplete APENs. Additional fees may apply if an APEN is submitted without the necessary information. An application with missing information may result in longer processing times. Please note that all APEN submissions should be completed using forms currently supplied by the Division (See Reg. 3, Part A, Section II.A). Current APEN forms can be found at: https://www.colorado gov/cdphe/APENforms.

EPAOIG Appendix 22

STATE OF COLORADO

[redacted]

Fwd: MMM Monaghan - air modeling status

1 message

Rink - CDPHE, Bradley [redacted] Wed, Mar 11, 2020 at 1:51 PM
To: Rosendo Majano [redacted], Emmett Malone [redacted], "Reynolds - CDPHE, DeVondria" [redacted]

fyi

Bradley Rink
Technical Services Program, Air Pollution Control Division
emailsig.png
[redacted]

---------- Forwarded message ---------
From: **Brickey - CDPHE, Jonathan** [redacted]
Date: Wed, Mar 11, 2020 at 1:45 PM
Subject: Re: MMM Monaghan - air modeling status
To: Anna Unruh [redacted]
Cc: Hanna Warlick [redacted], Erin Kunkel [redacted], Bradley Rink - CDPHE [redacted]

Anna,

After consul ing with some higher-ups, I agree that modeling for the 24-hour PM2.5 standard will not be required in this case.

Unfortunately, we don't have a specific written policy I can point to that says "you can always ignore the daily PM2.5 modeling hreshold", but we do it on more of a case-by-case basis. In the case of Monaghan, it's nearly a half mile from the nearest residential area (and predominant wind patterns in the area are in the opposite direction), the topography of the area is very flat, and I haven't heard any community objections, so I don't have an issue with overlooking this particular PM2.5 modeling.

Thanks,

Jonathan Brickey, PE
Permit Engineer
Construction Permits Unit

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

P 303.691.4093 | F 303.782.0278
[redacted]

Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more.

On Wed, Mar 11, 2020 at 12:09 PM Anna Unruh [redacted] wrote:

> Hi Jonathan,
>
> I've received guidance from multiple non-oil & gas permit engineers in the last year or so that the agency only looks at the 5 tpy threshold for PM2.5, unless there are special circumstances (e.g., high expectation of comments from nearby residents). The first time I heard it, I was surprised, so I've brought it up with other permit engineers (basically anytime I've had the chance) and was told the same thing. Based on this guidance, we did not submit daily PM2.5 modeling.
>
> Thanks,
>
> Anna
>
> **Anna Unruh**
> Senior Consultant
>
> **Trinity Consultants**
>
> 1391 N Speer Blvd Suite 350 | Denver, CO 80204
>
> [redacted]
>
> **From:** Brickey - CDPHE, Jona han [redacted]
> **Sent:** Wednesday, March 11, 2020 10:06 AM
> **To:** Anna Unruh [redacted]
> **Subject:** MMM Monaghan - air modeling status

Anna,

I was going over the Monaghan modeling with Bradley, and I wanted to give you a quick update.

All the emission factors/calculations look good. Bradley was going to make some slight changes to how the emission types were binned, but he said any changes to the final outcome will be minimal, nothing to worry about.

However, your analysis doesn't seem to address he 24-hour PM2.5 standard. Table 7-1 notes that the annual PM2.5 emissions are below the modeling threshold, but makes no mention of the short term PM2.5 NAAQS (35 ug/m3). Considering the facility-wide daily PM10 emissions in Table D-1 show 321.63 ppd of emissions, it's unlikely that facility-wide daily PM2 5 emissions will be below the modeling threshold of 11 ppd, but I don't see any daily total calculated. What was your reasoning for leaving out daily PM2.5 from he modeling?

Thanks,

Jonathan Brickey, PE
Permit Engineer
Construction Permits Unit

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

P 303.691.4093 | F 303.782.0278
[redacted]

Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more.

STATE OF COLORADO

Fwd: Modeling meeting outcome

1 message

Reynolds - CDPHE, DeVondria Tue, Mar 16, 2021 at 1:39 PM
To: Matt Burgett - CDPHE, Rosendo Majano - CDPHE

fyi
DeVondria Reynolds, MS
Air Quality Modeler
Modeling and Emissions Inventory Unit
Technical Services Program

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

Learn more about COVID-19 https://www.colorado.gov/pacific/cdphe/apcd-covid-19 .

Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more.

---------- Forwarded message ---------
From: **Reynolds - CDPHE, DeVondria**
Date: Tue, Mar 16, 2021 at 3:38 PM
Subject: Re: Modeling meeting outcome
To: Kaufman - CDPHE, Garrison
Cc: Gordon Pierce - CDPHE, Emmett Malone, Bradley Rink - CDPHE

Hello Gary,

Based on the above communication that took place during the uncompromising meeting Emmett encountered yesterday with Gordon, Robyn and yourself, It is unclear how Regulation 3, Part B, Sections III.B.5.d and III.D.1.c will be satisfied.

As stated in the Clean Air Act and per my job description it is my duty to determine compliance or noncompliance with the National Ambient Air Quality Standards, the Colorado Ambient Air Quality Standards, PSD Increments, and Air Quality Related Values, for major and minor sources of air pollution. It is my understanding that you are instructing me to turn a blind eye to the work that we are supposed to do in order to protect and improve the health of Colorado's citizens and the quality of its environment.

I refuse to sign my name on any fur her modeling reports under your mandate without a written documented memo (or likewise) that has your signature of approval that is dictating this direct violation of law and regulations. Considering the lawsuits that have been presented to our division I do not want litigation brought upon myself seeing that it is your direction that has led us down this path (you are more than welcome to sign off on all modeling reports going forward, not something I would recommend seeing that you did not do the work but that choice is yours).

I do want to make you aware that if this email remains unresponsive by you I will forward his correspondence and your lack of reply to the Environmental Program Manager, a general assembly, EPA and environmental groups if need be.

I would like for it to also be noted that I do not appreciate being bullied and forced into a situation that is in direct violation of federal regulations. As much as you and your higher official peers assume modeling is a meaningless unit, resources should not be taken away nor should our job responsibilities be reduced. Your push should be to only add resources to this unit not take away.

DeVondria Reynolds, MS
Air Quality Modeler
Modeling and Emissions Inventory Unit
Technical Services Program

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

4300 Cherry Creek Drive South, Denver, CO 80246-1530

Learn more about COVID-19 https://www.colorado.gov/pacific/cdphe/apcd-covid-19 .

Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more.

On Tue, Mar 16, 2021 at 2:43 PM Rink - CDPHE, Bradley wrote:

> yep
>
> **Bradley Rink**
> **Technical Services Program, Air Pollution Control Division**
> CO 80246
>
> ---------- Forwarded message ---------
> From: **Malone - CDPHE, Emmett**

Date: Tue, Mar 16, 2021 at 11:12 AM
Subject: Fwd: Modeling mee ing outcome
To: Bradley Rink - CDPHE, DeVondria Reynolds - CDPHE

Gordon response

Emmett Malone
Supervisor
Modeling and Emissions Inventory Unit
Technical Services Program
Air Pollution Control Division
Colorado Department of Public Health and Environment
APCD-TS-B1
4300 Cherry Creek Drive South
Denver, CO 80246-1530

"Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more."

---------- Forwarded message ---------
From: **Pierce - CDPHE, Gordon**
Date: Tue, Mar 16, 2021 at 10:06 AM
Subject: Re: Modeling meeting outcome
To: Malone - CDPHE, Emmett

No, we are not to address the short-term standards..."the short-term thresholds in the Modeling Guideline will not be used."

(Based on Brad's email, is he planning something?)

Gordon

On Tue, Mar 16, 2021 at 8:04 AM Malone - CDPHE, Emmett wrote:

> Hi,
>
> Had a discussion with Brad and DeVondria this morning and it went much like I thought it would, badly. I feel like I have stepped back in time and Doris and Rosendo are arguing about how this is wrong.
>
> One question that came up and if you or Garry could respond I would appreciate it. What I took from the mee ing was hat we are not to address the short term standards. The way you worded your email is slightly different, are we to address the short term standards?
>
> 2 years, 7 months, and 15 days.
>
> Emmett Malone
> Supervisor
> Modeling and Emissions Inventory Unit
> Technical Services Program
> Air Pollution Control Division
> Colorado Department of Public Heal h and Environment
> APCD-TS-B1
> 4300 Cherry Creek Drive South
> Denver, CO 80246-1530
>
> **"Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more."**
>
> On Mon, Mar 15, 2021 at 4:30 PM Pierce - CDPHE, Gordon wrote:
>
> > Emmett,
> >
> > Per the meeting we had today 3/15/21 with Garry and Robyn, Garry specifically stated that, effec ive immediately, the short-term thresholds in the Modeling Guideline will not be used and that modeling only be performed using the following thresholds:
> >
> > - 40 tpy for NO2 and SO2
> > - 82 lbs/day for PM10
> > - 5 tpy for PM2.5
> > - 23 lbs/hr for CO
> > - 25 lbs/3-mo for Pb
> >
> > He will allow exceptions based on agreement between the modelers and permit engineers, and his specific approval.
> >
> > Garry also requested that the Modeling Guideline also be removed from the website, pending further discussions and revisions. I will ask Ivan to pull it. Attached is a copy of the current version that is on the website.
> >
> > Thanks,
> > Gordon
> >
> > --
> >
> > **Gordon Pierce**
> > **Program Manager**

Technical Services Program

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

4300 Cherry Creek Drive South, Denver, CO 80246-1530
[redacted]

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--

Gordon Pierce
Program Manager
Technical Services Program

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

4300 Cherry Creek Drive South, Denver, CO 80246-1530
[redacted]

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EPAOIG Appendix 27

STATE OF COLORADO

[redacted]

Re: Modeling meeting outcome

1 message

Rink - CDPHE, Bradley [redacted] Tue, Mar 16, 2021 at 1:31 PM
To: Gordon Pierce - CDPHE [redacted], Emmett Malone [redacted], "Reynolds - CDPHE, DeVondria" [redacted]
Cc: "Simpson - CDPHE, Joi" [redacted], "Garrison W. Kaufman" [redacted], "Burgett - CDPHE, Matt" [redacted], Rosendo Majano [redacted]

FYI - these actions undertaken by APCD management, et al., are in viola ion of the law defined by the Clean Air Act, and rules defined by APCD and he AQCC. I object to hese directions by my management as they are in violation of Federal Law and State Rule; I am requesting whis leblower status.

regards

blr

Bradley Rink
Technical Services Program, Air Pollution Control Division
[redacted]
4300 Cherry Creek Dr. South, Denver, CO 80246
[redacted]

On Tue, Mar 16, 2021 at 12:42 PM Rink - CDPHE, Bradley [redacted] wrote:

> yep
>
> **Bradley Rink**
> **Technical Services Program, Air Pollution Control Division**
> [redacted]
>
> ---------- Forwarded message ---------
> From: **Malone - CDPHE, Emmett** [redacted]
> Date: Tue, Mar 16, 2021 at 11:12 AM
> Subject: Fwd: Modeling mee ing outcome
> To: Bradley Rink - CDPHE [redacted] DeVondria Reynolds - CDPHE [redacted]
>
> Gordon response
>
> Emmett Malone
> Supervisor
> Modeling and Emissions Inventory Unit
> Technical Services Program
> Air Pollution Control Division
> Colorado Department of Public Health and Environment
> APCD-TS-B1
> 4300 Cherry Creek Drive South
> Denver, CO 80246-1530
> [redacted]
>
> **"Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more."**
>
> ---------- Forwarded message ---------
> From: **Pierce - CDPHE, Gordon** [redacted]
> Date: Tue, Mar 16, 2021 at 10:06 AM
> Subject: Re: Modeling meeting outcome
> To: Malone - CDPHE, Emmett [redacted]
>
> No, we are not to address the short-term standards..."the short-term thresholds in the Modeling Guideline will not be used."
>
> (Based on Brad's email, is he planning something?)
>
> Gordon
>
> On Tue, Mar 16, 2021 at 8:04 AM Malone - CDPHE, Emmett [redacted] wrote:
>
> > Hi,
> >
> > Had a discussion with Brad and DeVondria this morning and it went much like I thought it would, badly. I feel like I have stepped back in time and Doris and Rosendo are arguing about how this is wrong.
> >
> > One question that came up and if you or Garry could respond I would appreciate it. What I took from the mee ing was hat we are not to address the short term standards. The way you worded your email is slightly different, are we to address the short term standards?
> >
> > 2 years, 7 months, and 15 days.
> >
> > Emmett Malone
> > Supervisor
> > Modeling and Emissions Inventory Unit

Technical Services Program
Air Pollution Control Division
Colorado Department of Public Heal h and Environment
APCD-TS-B1
4300 Cherry Creek Drive South
Denver, CO 80246-1530
[redacted]

"**Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more.**"

On Mon, Mar 15, 2021 at 4:30 PM Pierce - CDPHE, Gordon [redacted] wrote:

> Emmett,
>
> Per the meeting we had today 3/15/21 with Garry and Robyn, Garry specifically stated that, effec ive immediately, the short-term thresholds in the Modeling Guideline will not be used and that modeling only be performed using the following thresholds:
>
> - 40 tpy for NO2 and SO2
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> - 5 tpy for PM2.5
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> - 25 lbs/3-mo for Pb
>
> He will allow exceptions based on agreement between the modelers and permit engineers, and his specific approval.
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> Garry also requested that the Modeling Guideline also be removed from the website, pending further discussions and revisions. I will ask Ivan to pull it. Attached is a copy of the current version that is on the website.
>
> Thanks,
> Gordon
>
> --
>
> **Gordon Pierce**
> **Program Manager**
> Technical Services Program
>
> COLORADO
> Air Pollution Control Division
> Department of Public Health & Environment
>
> 4300 Cherry Creek Drive South, Denver, CO 80246-1530
> [redacted]
>
> Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more.

--

Gordon Pierce
Program Manager
Technical Services Program

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

4300 Cherry Creek Drive South, Denver, CO 80246-1530
[redacted]

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STATE OF COLORADO

[redacted]

Re: Asphalt Specialties - Central Plant

1 message

Moseley - CDPHE, Aaron [redacted] Thu, Oct 10, 2019 at 4:53 PM
To: Rosendo Majano [redacted]
Cc: "Reynolds - CDPHE, DeVondria" [redacted], Emmett Malone [redacted], Chip Hancock - CDPHE [redacted]

Rosendo,

Per Chip's guidance, for this facility, SSP is only asking for a demonstration of compliance with the carbon monoxide 1-hr and 8-hr NAAQS.

Thanks, stay warm!

Aaron Moseley
Permit Engineer

Stationary Sources Program

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

[redacted]

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On Thu, Oct 10, 2019 at 2:12 PM Rosendo Majano [redacted] wrote:

> Hi Aaron,
>
> We have started the review of the subject application and found that the facility submitted a NAAQS compliance demonstration only for carbon monoxide despite having emissions rates of PM10, PM2.5, SO2 and NOx, that exceed the corresponding short-term modeling thresholds.
>
> Could you please confirm for which pollutants-averaging periods did the Stationary Sources Program request a NAAQS compliance demonstration?
>
> Thanks!
>
> Rosendo
>
> ---
> **Rosendo Majano**
> [redacted]

STATE OF COLORADO

[redacted]

Fwd: MMM Monaghan - air modeling status

1 message

Rosendo Majano [redacted] Thu, Mar 12, 2020 at 8:28 AM
To: "Brickey, Jonathan" [redacted]
Cc: Emmett Malone [redacted]
Bcc: Bradley Rink - CDPHE [redacted], "Reynolds - CDPHE, DeVondria" [redacted]

Jonathan,

Your email below was forwarded to me. I know that you are following instructions from your supervisors when not requesting a 24-hr PM2.5 NAAQS compliance demonstration, but I would fail to do my job if I don't inform you that the Martin Marietta Monaghan facility submitted a screening modeling analysis for CO, PM10, and PM2.5 last year (see the attached modeling review report) and that such analysis resulted in a modeled viola ion of the 24-hr PM2.5 NAAQS.

Because the previous results are from a screening analysis, the next recommended step should be to request a refined modeling analysis to verify NAAQS compliance per CO Regulation 3, Part B §III.B.5.d and §III.D.1.c. That's what I would suggest.

Once again, I understand the constraints of your situation, but my role in this permit application is to verify NAAQS compliance, so I feel compelled to inform you of the pre-existing PM2.5 NAAQS compliance issue at this facility.

Thanks,

Rosendo Majano
Permit Modeling Work Lead
Modeling and Emissions Inventory Unit

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

[redacted]

---------- Forwarded message ---------
From: **Rink - CDPHE, Bradley** [redacted]
Date: Wed, Mar 11, 2020 at 1:51 PM
Subject: Fwd: MMM Monaghan - air modeling status
To: Rosendo Majano [redacted], Emmett Malone [redacted] Reynolds - CDPHE, DeVondria [redacted]

fyi

Bradley Rink
Technical Services Program, Air Pollution Control Division
emailsig.png
[redacted]

---------- Forwarded message ---------
From: **Brickey - CDPHE, Jonathan** [redacted]
Date: Wed, Mar 11, 2020 at 1:45 PM
Subject: Re: MMM Monaghan - air modeling status
To: Anna Unruh [redacted]
Cc: Hanna Warlick [redacted], Erin Kunkel [redacted], Bradley Rink - CDPHE [redacted]

Anna,

After consul ing with some higher-ups, I agree that modeling for the 24-hour PM2.5 standard will not be required in this case.

Unfortunately, we don't have a specific written policy I can point to that says "you can always ignore the daily PM2.5 modeling hreshold", but we do it on more of a case-by-case basis. In the case of Monaghan, it's nearly a half mile from the nearest residential area (and predominant wind patterns in the area are in the opposite direction), the topography of the area is very flat, and I haven't heard any community objections, so I don't have an issue with overlooking this particular PM2.5 modeling.

Thanks,

Jonathan Brickey, PE
Permit Engineer
Construction Permits Unit

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

[redacted]

Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more.

On Wed, Mar 11, 2020 at 12:09 PM Anna Unruh [redacted] wrote:

Hi Jonathan,

I've received guidance from multiple non-oil & gas permit engineers in the last year or so that the agency only looks at the 5 tpy threshold for PM2.5, unless there are special circumstances (e.g., high expectation of comments from nearby residents). The first time I heard it, I was surprised, so I've brought it up with other permit engineers (basically anytime I've had the chance) and was told the same thing. Based on this guidance, we did not submit daily PM2.5 modeling.

Thanks,

Anna

Anna Unruh
Senior Consultant

Trinity Consultants

1391 N Speer Blvd Suite 350 | Denver, CO 80204

[redacted]

[redacted]-

From: Brickey - CDPHE, Jona han [redacted]
Sent: Wednesday, March 11, 2020 10:06 AM
To: Anna Unruh [redacted]
Subject: MMM Monaghan - air modeling status

Anna,

I was going over the Monaghan modeling with Bradley, and I wanted to give you a quick update.

All the emission factors/calculations look good. Bradley was going to make some slight changes to how the emission types were binned, but he said any changes to the final outcome will be minimal, nothing to worry about.

However, your analysis doesn't seem to address he 24-hour PM2.5 standard. Table 7-1 notes that the annual PM2.5 emissions are below the modeling threshold, but makes no mention of the short term PM2.5 NAAQS (35 ug/m3). Considering the facility-wide daily PM10 emissions in Table D-1 show 321.63 ppd of emissions, it's unlikely that facility-wide daily PM2 5 emissions will be below the modeling threshold of 11 ppd, but I don't see any daily total calculated. What was your reasoning for leaving out daily PM2.5 from he modeling?

Thanks,

Jonathan Brickey, PE
Permit Engineer
Construction Permits Unit

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

[redacted]
jonathan.brickey@state.co.us | www.colorado.gov/cdphe/apcd

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Martin Marietta Monaghan Facility - Modeling Review Report 03082019.pdf
807K

STATE OF COLORADO

[redacted]

Re: MMM Monaghan - air modeling status

1 message

Rosendo Majano [redacted] Thu, Mar 12, 2020 at 7:47 AM
To: "Rink - CDPHE, Bradley" [redacted]
Cc: "Reynolds - CDPHE, DeVondria" [redacted], Emmett Malone [redacted]

Regarding the email thread below:

From CO Regulation 3, Part B §III.D.1.c
"... the Division shall grant the permit if it finds that: The proposed source or activity will not cause an exceedance of any National Ambient Air Quality Standards;"

From CDPHE's 03/06/2020 press release distributed among all employees:
***"Our rules and regulations exist for a reason: they protect Coloradans' health and the environment that we all cherish, so compliance is not an option; it's an imperative,"* said Garry Kaufman, director of the Colorado Air Pollution Control Division.**

The modeling analysis submitted by the Monaghan facility for this same permit application already resulted in a 24-hr PM2.5 NAAQS modeled viola ion.

Rosendo Majano
[redacted]

---------- Forwarded message ---------
From: **Brickey - CDPHE, Jonathan** [redacted]
Date: Wed, Mar 11, 2020 at 1:45 PM
Subject: Re: MMM Monaghan - air modeling status
To: Anna Unruh [redacted]
Cc: Hanna Warlick [redacted], Erin Kunkel [redacted], Bradley Rink - CDPHE [redacted]

Anna,

After consulting with some higher-ups, I agree that modeling for the 24-hour PM2.5 standard will not be required in this case.

Unfortunately, we don't have a specific written policy I can point to that says "you can always ignore the daily PM2.5 modeling threshold", but we do it on more of a case-by-case basis. In the case of Monaghan, it's nearly a half mile from the nearest residential area (and predominant wind patterns in the area are in the opposite direction), the topography of the area is very flat, and I haven't heard any community objections, so I don't have an issue with overlooking this particular PM2.5 modeling.

Thanks,

Jonathan Brickey, PE
Permit Engineer
Construction Permits Unit

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

[redacted]

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On Wed, Mar 11, 2020 at 12:09 PM Anna Unruh [redacted] wrote:

> Hi Jonathan,
>
> I've received guidance from multiple non-oil & gas permit engineers in the last year or so that the agency only looks at the 5 tpy threshold for PM2.5, unless there are special circumstances (e.g., high expectation of comments from nearby residents). The first time I heard it, I was surprised, so I've brought it up with other permit engineers (basically anytime I've had the chance) and was told the same thing. Based on this guidance, we did not submit daily PM2.5 modeling.
>
> Thanks,
>
> Anna
>
> **Anna Unruh**
> Senior Consultant
>
> **Trinity Consultants**
>
> 1391 N Speer Blvd Suite 350 | Denver, CO 80204

[redacted]

[redacted]-

From: Brickey - CDPHE, Jonathan [redacted]
Sent: Wednesday, March 11, 2020 10:06 AM
To: Anna Unruh [redacted]
Subject: MMM Monaghan - air modeling status

Anna,

I was going over the Monaghan modeling with Bradley, and I wanted to give you a quick update.

All the emission factors/calculations look good. Bradley was going to make some slight changes to how the emission types were binned, but he said any changes to the final outcome will be minimal, nothing to worry about.

However, your analysis doesn't seem to address the 24-hour PM2.5 standard. Table 7-1 notes that the annual PM2.5 emissions are below the modeling threshold, but makes no mention of he short term PM2.5 NAAQS (35 ug/m3). Considering the facility-wide daily PM10 emissions in Table D-1 show 321.63 ppd of emissions, it's unlikely that facility-wide daily PM2.5 emissions will be below the modeling threshold of 11 ppd, but I don't see any daily total calculated. What was your reasoning for leaving out daily PM2.5 from the modeling?

Thanks,

Jonathan Brickey, PE
Permit Engineer
Construction Permits Unit

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

[redacted]

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STATE OF COLORADO

[redacted]

Oxford Asphalt Plant

Rosendo Majano [redacted] Wed, Feb 19, 2020 at 8:23 AM
To: Aaron Moseley - CDPHE [redacted]
Cc: Emmett Malone [redacted], "Reynolds - CDPHE, DeVondria" [redacted]

Hi Aaron,

I was discussing with DeVondria yesterday the Oxford Asphalt Plant modeling analysis, and there are some issues that we need to bring to your attention.

1- Particulate matter modeling.
The modeling report that was submitted earlier this month has the following language:

In an email dated May 2, 2019, Mr. Moseley of the CDPHE indicated that, based on his calculations, CO and particulate matter (PM) must be modeled. He also indicated in this email communication that he would perform the SCREEN3 modeling for the particulate sources, and that Aggregate Industries would only be responsible for the CO modeling.

SCREEN3 is an outdated program that is no longer an EPA regulatory model for permitting purposes. If I'm not mistaken it was replaced by AERSCREEN in early 2011, so I would not recommend to use SCREEN3 results to support a permitting action. Moreover, both SCREEN3 and AERSCREEN are one-source models, meaning that you can only model once source at a time, so there is no way to represent at the same time all the sources of fugitive dust, which typically are responsible for a much larger fraction of the total particulate matter emissions. Hence our long standing recommendation to use AERMOD when modeling this type of facilities.

Currently the consultants have not provided the necessary information that would allow us to model the fugitive dust sources, so our recommendation is to request the applicant to submit the particulate matter modeling in AERMOD for us to review. However, this is your decision. Please let us know how you would like to proceed.

2- Stack parameters of the drum mixer.
The exhaust velocity of the drum mixer used in the modeling analysis is of 440.9 m/s, which seems quite high. Has the consultant sent you specification sheets for this unit or do you know from experience if this range of exhaust velocity is normal for a drum mixer?

3- Pb emissions.
This facility is reporting Pb emissions of 5.2 lb/day and indicating that the requested operating limit is 5000 hours per year. At this emission rate the facility will exceed EPA's 0.5 tpy Pb emissions threshold for monitoring, so we would need to notify the Division's particulate monitoring group. This daily emission rate also exceeds by far the modeling threshold in our CO Modeling Guideline, so we would also recommend that Pb modeling be submitted as well. Alternatively, we could do that modeling analysis in house, but in any case, we would ask you for confirmation if that daily emission rate is correct and if this facility will have the 5000 hrs/year restriction in the permit. Also, could you please confirm if there will be any restriction in the daily hours of operation?

4- APENs and PA.
Could you please provide us with a copy of the APENs and the preliminary analysis for this facility?

Thanks in advance for your help!

Rosendo Majano
[redacted]

STATE OF COLORADO

[redacted]

Oxford Asphalt Plant

Rosendo Majano [redacted] Thu, Feb 27, 2020 at 11:35 AM
To: "Reynolds - CDPHE, DeVondria" [redacted]

Hi DeVondria,

I talked to Aaron about the issues with the Oxford Asphalt Plant, and he said he would get back to us with the information: APENs, PA, confirmation of the Pb emissions, and high velocity of the exhaust from the drum mixer.

The one issue for which he gave me a definitive answer is the modeling of the PM emissions with SCREEN3. I explained that this is no longer a regulatory model and he told me that he was instructed to do use that model, so that's what he is going to do.

I would recommend to include a statement indicating that SCREEN3 is no longer a regulatory model and that those results can't be used for a NAAQS compliance determination. I would also recommend to include an explanation about that being a single-source model and that fugitive PM emissions can't be included in the analysis.

Finally, I recommend that you place this application on hold until you get all the necessary information from Aaron.

We can discuss this in more detail but I just wanted to let you know about these answers.

Thanks,

Rosendo Majano

[redacted]

STATE OF COLORADO

[redacted]

CC&V Modeling Results

1 message

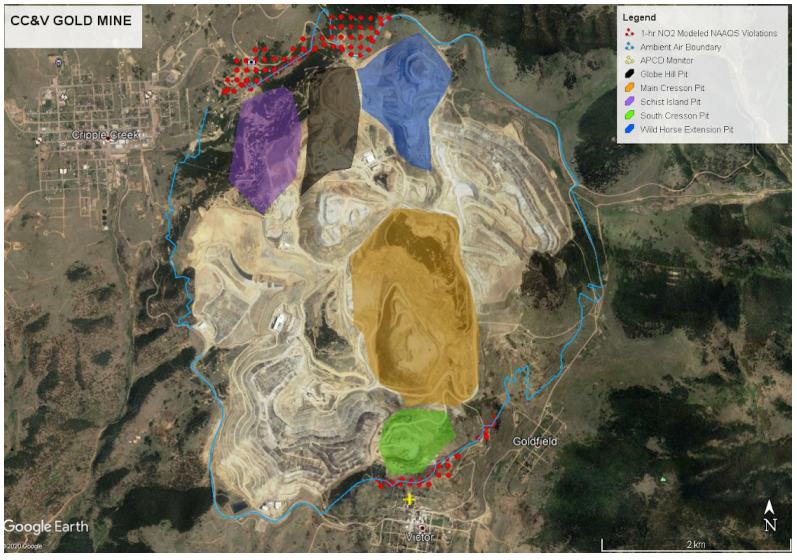
Rosendo Majano [redacted] Thu, Mar 12, 2020 at 2:33 PM
To: Emmett Malone [redacted]

Emmett,

You requested the maximum modeled concentrations on bo h the sou h and north portion of the CC&V Mine property boundary shown in the figure below and listed as 1-hr NO2 Modeled NAAQS violations.

As you know, officially there aren't any modeled violations at the CC&V Mine. That's because of the 01/14/19 and 01/28/19 emails from Gordon Pierce requesting to remove the concentration exceeding the NAAQS from the report and to replace them with a value that was lower and that was based on incorrect data. Therefore officially the highest modeled concentra ion is of 187.7 ug/m3 (99.77 ppb). The NAAQS is of 100 ppb.

Reality however, is very different. The actual highest modeled design concentration in the southern area of the mine is of 229.34 ug/m3 (121 ppb). In the northern area of the mine this concentration is of 225.78 ug/m3 (120 ppb). This is the information you are now requesting.



Those results above beg the question, if the Division is now acknowledging the modeled NAAQS violations, why would the permit be issued?

Wouldn't that create the exact same situation as the ColoWyo Mine permit that was challenged in court for being issued with a NAAQS modeled violation?

Rosendo Majano
Permit Modeling Work Lead
Modeling and Emissions Inventory Unit

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

[redacted] 1530

STATE OF COLORADO

[redacted]

H1H and McCormick

4 messages

Malone - CDPHE, Emmett [redacted] Tue, Sep 15, 2020 at 1:26 PM
To: Rosendo Majano - CDPHE [redacted], Bradley Rink - CDPHE [redacted], DeVondria Reynolds - CDPHE [redacted]
Cc: "Gordon.Pierce@state.co.us" [redacted]

Hi,

Today's meeting with management is over. It was decided to use option 3 for the H1H question. The variation of this option chosen is , when there is not representative meteorological data the two most representative meteorological data sets available for the site will be provided to the applicant/consultant. Both data sets will be modeled. The data set with the highest impacts will be used for the design concentration. The design concentration will be the form of the standard.

I will let the industry workgroup know what was decided Sep 30. If there are no major concerns raised by industry we will implement the new policy Oct 1.

On the McCormick Asphalt Plant there was no conclusive answer on how to handle this type of situation other than we will continue to talk about it in the quarterly meetings I have with management. In McCormicks case since the owner was open to raising the stacks I was asked to ask him to do so. But before doing so it was thought that we should do some quick model runs to get an idea how high the stacks would need to be raised to make sure we are not asking something that is not practical. I have asked DeVondria to do some runs to get an idea of how high the stacks need to be.

I called Steve McCormick and let him know what was going on and he was OK with the approach.

Let me know if you have any questions.

Emmett Malone
Supervisor
Modeling and Emissions Inventory Unit
Technical Services Program
Air Pollution Control Division
Colorado Department of Public Health and Environment
APCD-TS-B1
4300 Cherry Creek Drive South
Denver, CO 80246-1530
[redacted]

"Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more."

Rosendo Majano [redacted] Tue, Sep 15, 2020 at 3:15 PM
To: "Malone - CDPHE, Emmett" [redacted]
Cc: Bradley Rink - CDPHE [redacted], DeVondria Reynolds - CDPHE [redacted], "Gordon.Pierce@state.co.us" [redacted]

I was taking a look at all the information and it seems to me that the issues with the McCormick plant are not only with its design, but also with its location. There is an ethanol plant located about a kilometer away that is causing modeled violations of the 24-hr PM2.5 NAAQS and that might also be causing high 1-hr NO2 impacts. If that's the case raising the stacks at McCormick might not solve the problem.

My recollection is that no nearby sources were included in the 1-hr NO2, and if that's the case the impacts from McCormick don't have to be that high to contribute to modeled violations of these standards.

There is also the problem that the modeling for PM did not include any fugitive emissions. McCormick submitted modeling for Carbon Monoxide only, which means that they only modeled point sources, so they did not provide any information that would allow us to model fugitives (e.g. haul road traffic, materials handling, etc.).

What has been modeled so far is the PM emissions from the stacks, and the 24-hr PM2.5 impacts from those emissions alone were fairly high, although still below the corresponding NAAQS. That's why the draft table of results includes the following conclusion: *Although a complete analysis could not be completed for PM fugitive emissions it is possible that the facility will contribute to a model violation of the PM2.5 NAAQS standard if additional fugitive emissions are added to the modeling including background.*

In my opinion, raising the stacks might be a solution only for the 1-hr and 3-hr SO2 NAAQS modeled violations (unless the ethanol plant is burning coal or other fuel with high sulfur content), but for 1-hr NO2 and 24-hr PM2.5 I think that full cumulative analyses would be needed for to determine if the McCormick plant would contribute to modeled violations.

The test runs with different stack heights will give us only partial answers and will leave us with the uncertainty of what the cumulative impacts will be, so it might be better if we request from the applicant to submit full modeling analyses for all the troubled pollutants and averaging periods. That way we will have certainty of where this facility stands in terms of NAAQS compliance.

Rosendo Majano
[redacted]
[Quoted text hidden]

Reynolds - CDPHE, DeVondria [redacted] Tue, Sep 15, 2020 at 5:16 PM
To: Rosendo Majano [redacted]
Cc: "Malone - CDPHE, Emmett" [redacted], Bradley Rink - CDPHE [redacted], [redacted]

All,

Please see the attached document with my findings.

Please let me know if you have any questions or comments.

Rosendo,

I requested nearby source inventory from David and both the previous modeling results and these include nearby sources for all pollutants, you will see that if the 'HMA' stack is raised to 20m then cumulative modeling is no longer required for CO (the only pollutant they were instructed to model, but all other pollutants that they were not instructed to model will require cumulative modeling *ironic I know...)

I do agree that a complete analysis should be done especially for PM emissions but I do not think we should be doing it for them, at all. The applicant should resubmit their own modeling for testing out raising stacks, additional PM emissions, etc.

Thanks.

DeVondria Reynolds, MS
Air Quality Modeler
Modeling and Emissions Inventory Unit
Technical Services Program

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

[redacted]
4300 Cherry Creek Drive South, Denver, CO 80246-1530
[redacted]

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[Quoted text hidden]

McCormick Asphalt NAAQS Analysis Summary-raised stack.docx
23K

Reynolds - CDPHE, DeVondria [redacted]
To: Rosendo Majano [redacted] >
Cc: "Malone - CDPHE, Emmett" [redacted], Bradley Rink - CDPHE [redacted] "Gordon.Pierce@state.co.us" [redacted]

Tue, Sep 15, 2020 at 5:45 PM

DeVondria Reynolds, MS
Air Quality Modeler
Modeling and Emissions Inventory Unit
Technical Services Program

COLORADO
Air Pollution Control Division
Department of Public Health & Environment

[redacted]

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[Quoted text hidden]

STATE OF COLORADO

[redacted]

McCormick Asphalt Plant

Malone - CDPHE, Emmett [redacted] Wed, Aug 26, 2020 at 2:57 PM
To: Matt Burgett - CDPHE [redacted]
Cc: DeVondria Reynolds - CDPHE [redacted] Bradley Rink - CDPHE [redacted] , [redacted] Rosendo Majano - CDPHE [redacted]

Hi Matt,

I wanted to give you a heads up. McCormick Asphalt Plant was told to only model CO. When the permit modelers reviewed the application they became concerned about other pollutants because of the nearby sources, low stack heights, and the dirty fuel the plant plans on using.

As I understand it the plant causes or contributes to exceedances of the NAAQS for:
PM2.5 24hr
SO2 8hr
SO2 1hr
NO2 1hr
They are using representative meteorological data so these exceedances are using the form of the standard not the H1H. I have attached tables DeVondria has created showing the results. PM was not modeled with fugitive emissions therefore a refined analysis may have even higher impacts. The tables shows that the exceedances are significantly over the NAAQS.

My question becomes do we (Air Division) want to have the source address these impacts or have DeVondria to write her report saying the source was only required to model CO but the source contributes to or causes modeled exceedances of the NAAQS for
PM2.5 24hr
SO2 8hr
SO2 1hr
NO2 1hr

Attached are some tables showing the modeling results.

Let me know what you think.
Emmett Malone
Supervisor
Modeling and Emissions Inventory Unit
Technical Services Program
Air Pollution Control Division
Colorado Department of Public Health and Environment
APCD-TS-B1
4300 Cherry Creek Drive South
Denver, CO 80246-1530
[redacted]

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McCormick Asphalt NAAQS Analysis Summary-2.docx
4810K

STATE OF COLORADO

[redacted]

CC&V

Pierce - CDPHE, Gordon [redacted] Mon, Jan 14, 2019 at 2:24 PM
To: Rosendo Majano [redacted]
Cc: Emmett Malone [redacted]

Rosendo,

Please see below for my requested edits in red. The primary one involves the 1-hour NO2. While I agree that the use of OLMGROUP ALL is incorrect (per the June Modeler's Workshop), that was an error on our part as we told CC&V to model it that way (as you mention in the writeup). As we have done for other applicants when there is an error on our part, we do not request it be fixed unless there is a need to re-model. Thus, the report summary table should reflect the values without that error being corrected. I do believe that this error should be discussed in the writeup following the summary table, as you have done. If you could please send a revised version for review, I would appreciate it.

Thanks,
Gordon

The Division's Modeling and Emissions Inventory Unit (MEIU) received on April 23, 2018 a dispersion modeling analysis submitted by Cripple Creek & Victor Gold Mining Company (CC&V) as part of the application to modify the Construction Permit No.98TE0545 and implement the Mine Life Extension #2 Cresson Project in Teller County, CO.

Review of that modeling analysis was finalized on June 2018 and a final report was written on 06/26/2018 concluding that the proposed project at the Cripple Creek & Victor facility will cause modeled violations of the 1-hr NO_2 NAAQS. In addition, it was concluded that there were several critical errors in the modeling analysis that should require correction before it could be determined whether the proposed project will or will not cause and/or contribute to modeled violations of the rest of applicable NAAQS.

After fulfilling administrative requirements of gathering all the communications records for the project, entering all the application information into the Modeling Unit's database, generating a review checklist report, and creating a billing report, the final modeling review report was provided to the permit engineer, Jonathan Brickey, on 07/09/2018.

On 08/13/2018 the ~~Modeling Unit~~ MEIU manager, Emmett Malone, forwarded two emails from the Air Pollution Control Division (APCD) director, Garry Kaufman, in which he provided arguments to reject the main findings and conclusions of the CC&V final modeling review report in what pertains to the engine loads and NO_2/NO_x in-stack ratios for the non-road diesel engines, and also provided instructions to review the modeling analysis with the originally submitted emission rates and to accept the originally submitted NO_2/NO_x in-stack ratios for the non-road diesel engines. All the aforementioned emails are included in Appendix 1 of this document.

In compliance with the APCD director's instructions, CC&V's 04/23/18 modeling submittal has been reviewed for a second time leaving intact the original emission rates and in-stack ratios of the non-road diesel engines. In addition, an analysis of the APCD director's arguments to approve CC&V's data has also been conducted to determine if they are supported by sound scientific principles and applicable regulations and guidance. Such analysis is included in a subsequent section of this document. The results of this new review are provided below.

There are NAAQS and CAAQS currently in effect for the following pollutants and averaging periods: CO (1-hr and 8-hr), Pb (3-month rolling average), NO_2(1-hr and annual), PM10 (24-hr), PM2.5 (24-hr and annual), SO_2 (1-hr and 3-hr), and ozone (8-hr). For this permit application, quantitative impact analyses are warranted to demonstrate compliance with the NAAQS/CAAQS for the following pollutants and averaging periods: NO_2 (1-hr and Annual), PM2.5 (24-hr and Annual), PM10; CO (1-hr and 8-hr); and SO_2 (1-hr and 3-hr).

The applicant submitted modeling analyses for all required pollutants and averaging periods, and the results of the modeling analyses are summarized below:

Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM2.5	24-hr	19.72	12.7	32.42	35
PM2.5	Annual	5.36	6.0	11.36	12
PM10	24-hr	124.03	24.0	148.03	150
SO_2	1-hr	34.5	86.4	120.9	196.5
SO_2	3-hr	19.6	62.8	82.4	700
NO_2	1-hr	~~229.34~~ (use values with OLMGROUP ALL) with background	Seasonal-hourly profile	~~229.34~~ (use values with OLMGROUP ALL)	188.34
NO_2	Annual	37.4	28.22	65.62	100
CO	1-hr	8,509.3	4580	13,089.3	40,000
CO	8-hr	628.3	2290	2918.3	10,000

The meteorological data used was adequately representative of the dispersion conditions at the mine and therefore the design concentrations of the results listed above match the original form of the corresponding NAAQS.

For 24-hr PM2.5 the modeled design concentrations is the highest eighth high 24-hr concentration averaged across the 3 years of meteorological data.

For annual PM2.5 the modeled design concentration is the maximum annual concentration averaged across the 3 years of meteorological data.

For 24-hr PM10 the modeled design concentration is the highest fourth high 24-hr concentration of the 3-year period of meteorological data.

For 1-hr SO_2 the modeled design concentration is the highest fourth high maximum daily 1-hr concentration averaged across the 3 years of meteorological data.

For 3-hr SO_2 the modeled design concentration is the highest second high 3-hr concentration of the 3-year period of meteorological data.

For 1-hr NO_2 the modeled design concentration is the highest eighth high maximum daily 1-hr concentration averaged across the 3 years of meteorological data.

For annual NO_2 the modeled design concentration is the highest annual concentration of the 3-year period of meteorological data.

For 1-hr CO the modeled design concentration is the highest second high 1-hr concentration of the 3-year period of meteorological data.

For 8-hr CO the modeled design concentration is the highest second high 8-hr concentration of the 3-year period of meteorological data.

It is noted that the meteorological data was reprocessed with AERMET v18081, and AERMOD v18081 was used to conduct all the final runs. This version of AERMET includes a correction in the Bulk Richardson algorithm when using on-site meteorological data, a situation that applies directly to the CC&V case. CC&V submitted this modeling analysis using meteorological data processed with the previous version, V16216r, which was correctly the latest version available at the time of submittal.

~~After review of the information submitted by the applicant with revisions by the MEIU, it is concluded that the CC&V gold mine will cause modeled violations of the 1-hr NO2 NAAQS.~~ After review of the information submitted by the applicant, and requested by the Division Director, with revisions by the MEIU, it is concluded that the CC&V gold mine will/will not cause modeled violations of the 1-hr NO2 NAAQS/any pollutants.

The 1-hr NO_2 analysis that CC&V submitted was performed with the Ozone Limiting Method and the "OLMGROUP ALL" option by grouping the representation of multiple operating scenarios into single AERMOD runs through the use of source groups.

The applicant has indicated that blasts do not occur in more than one pit at the same time, consequently, CC&V was instructed by the MEIU to model this activity as taking place in each pit at a time. MEIU further indicated that this could be accomplished with separate model runs per scenario or by using source groups in AERMOD[1].

However, during the June, 2018 EPA Regional/State/Local Modelers Workshop, James Thurman from EPA's OAQPS office did a presentation on the use of source groups in AERMOD and explicitly indicated that source groups should not be used when modeling NO_2 with the Ozone Limiting Method using the OLMGROUP ALL option because the model would underestimate impacts.

After this presentation, AERMOD's documentation was reviewed and it was verified that in fact, the Ozone Limiting Method when using the OLMGROUP ALL option will distribute the available ambient ozone equally among all of the emission sources declared in the AERMOD input file, without any regard for which sources are included or not included in the different source groups. The consequence of this situation is that the background ozone concentration provided in the input file would in practice be diluted, thus resulting in less conversion of NO_x to NO_2 and therefore in lower modeled NO_2 concentrations.

~~Consequently,~~ If this error was corrected by the MEIU by separating the different operating scenarios and reviewing them by conducting a separate, individual AERMOD run per each individual scenario~~. This allowed~~ , then the available ozone ~~to~~ would be distributed only among those sources that are active on each operating scenario. Applying this correction, modeled 1-hour NO2 concentrations would be in excess of 225 $\mu g/m^3$, well above the NAAQS.

In addition to this problem, the design concentration for the 1-hr NO_2 NAAQS involves doing a receptor-specific average across the different years of meteorological data used. This average is generally done as post-processing after the AERMOD runs, but CC&V did not provide any evidence of doing such average, so it was performed by the MEIU on all the final 1-hr NO_2 runs during the review process.

~~The modeled results for 1-hr NO_2 are above the corresponding standard, but it is noted that they are expected to be even higher if the issues discussed below were to be corrected.~~

Although the engine loads used by CC&V have been approved by the APCD director, they were calculated using statistical techniques that are inadequate and that have skewed the results. If these calculations were corrected, it is expected that the emission rates will increase and so would the resulting modeled concentrations. More details on this topic are provided in a subsequent section of this document.

Also, the NO_2/NOx in-stack ratios used for some of the non-road diesel engines are of 0.2 and 0.01; values that are not technically supported for the type of engines in question. While these values were approved by the APCD director, the Division's subject matter experts have not been able to find any scientific literature or technical documentation to support them. Values as low as 0.22 have been documented for on-road engines only, and the 0.01 value ~~simply defies logic~~ is highly suspect for any type of mobile source diesel engine, with or without emission control devices.

EPA recommends the use of a NO_2/NOx in-stack ratio value of 0.5 for any case for which a different value cannot be adequately justified.

For the rest of the pollutants and averaging periods the following conclusions have been reached:

- 24-hr and annual PM2.5.
While the results are numerically below the corresponding NAAQS, compliance with such standards cannot be determined.
The emission rates used by CC&V are based on emission factors that have not been adjusted with a deterioration factor to account for the increase in emissions resulting from usage as the engine ages, and also with a transient adjustment factor to account for the change in emissions due to transient demands of the engine.

Both adjustment factors are included in the data base of EPA's mobile sources emissions model MOVES, and the resulting emission rates are higher after they are applied. However, CC&V did not use MOVES and instead used what appear to be only zero-hour steady state factors, thus adding another layer of error in the calculation of mobile engine emissions. More details on this topic can be found in Appendix 2 of this document.

Considering that the modeled concentrations for 24-hr and annual PM2.5 are at 92.6% and 94.6% respectively of their corresponding NAAQS, it is very feasible that once these adjustments are applied, the resulting concentrations could reach or exceed the standards.

- 24-hr PM10.
While the results are numerically below the corresponding NAAQS, compliance with such standards cannot be determined.
Similar to the case of PM2.5, the emission rates used by CC&V are based on emission factors that have not been adjusted with a deterioration factor to account for the increase in emissions resulting from usage as the engine ages, and also with a transient adjustment factor to account for the change in emissions due to transient demands of the engine.

Both adjustment factors are included in the data base of EPA's mobile sources emissions model MOVES, and the resulting emission rates are higher after they are applied. However, CC&V did not use MOVES and instead used what appear to be only zero-hour steady state factors, thus adding another layer of error in the calculation of mobile engine emissions. More details on this topic can be found in Appendix 2 of this document.

Considering that the modeled concentration is at 98.7% of the NAAQS, it is likely that once these adjustments are applied, the resulting concentration could reach or exceed the standards.

- Annual NO2.
While the results are numerically below the corresponding NAAQS, compliance with such standards cannot be determined.
Although the engine loads used by CC&V have been approved by the APCD director, they were calculated using statistical techniques that are inadequate and that have skewed the results. If these calculations were corrected it is expected that the emission rates will increase and so would the resulting modeled concentrations. More details on this topic are provided in a subsequent section of this document.

In addition, the NO_2/NOx in-stack ratios used for some of the non-road diesel engines are of 0.2 and 0.01, values that are not technically supported for the type of engines in question. While these values were approved by the APCD director, the Division's subject matter experts have not been able to find any scientific literature or technical documentation to support them. Values as low as 0.22 have been documented for on-road engines only, and the 0.01 value ~~simply defies logic~~ is highly suspect for any type of mobile source diesel engine, with or without emission control devices.

EPA recommends the use of a NO2/NOx in-stack ratio value of 0.5 for any case for which a different value cannot be adequately justified.

Currently the modeled concentration is at 65.8% of the NAAQS, and it is impossible to predict how much it would increase after applying these corrections.

- 1-hr and 8-hr CO.
While the results are numerically below the corresponding NAAQS, compliance with such standards ~~cannot be determined~~ is likely demonstrated.
Similar to the case of NO2, although the engine loads used by CC&V have been approved by the APCD director, they were calculated using statistical techniques that are inadequate and that have skewed the results. If these calculations were corrected it is expected that the emission rates will increase and so would the resulting modeled concentrations. However, considering that the current results are at 29.2% and 32.7% for the 8-hr and 1-hr standards respectively, it is unlikely that the corrections would cause increases in modeled concentrations such that these NAAQS would be reached or exceeded.

- 1-hr and 3-hr SO2.
Compliance with these NAAQS has been demonstrated.
While the engine loads were calculated incorrectly as described above for the NO2 and CO cases, SO2 emissions are primarily a function of the sulfur content in the fuel, and the influence of the engine load is insignificant. Considering that the current results are at 11.8% and 61.5% of the 3-hr and 1-hr NAAQS respectively, applying the corrections will not raise the emissions enough to cause modeled violations of these standards.

Non-road engine loads and emissions.

With regards to the non-road engine loads and emissions, the APCD director's emails (See Appendix 1) require some clarifications.

When discussing non-road engine loads and emissions the director's emails described the estimation of actual worst-case emissions from non-road engines as an extremely complex challenge, referring to CC&V's methodology as a fairly simplified approach and to the corrections applied by the MEIU as a more sophisticated approach.

CC&V's approach consisted in estimating engine loads based on fuel consumption and engine usage data for a period of 3 years. This methodology is in principle scientifically sound, but CC&V failed to use basic statistical techniques in the handling of the raw data thus skewing the resulting calculations of the engine loads.

The MEIU ~~on the other hand,~~ did not propose a different methodology for estimating emissions, but only proposed to use the correct statistical techniques to organize and analyze the raw data. So there has never been a simplified approach or a sophisticated approach. The methodology for estimating engine loads and emission rates based on fuel consumption and engine usage is essentially the same, and the only difference has been in the statistical processing of the raw data.

Barring honest mistakes, it is a reasonable expectation that the technical analyses submitted by permit applicants comply with basic scientific and mathematical principles, and that expectation has not been met in CC&V's case when processing the raw data in the calculation of engine loads and emission rates.

NO_2/NOx in-stack ratios.

On the APCD director's emails (See Appendix 1) he indicates that CC&V submitted information from the representative for the engine manufacturer stating that in-stack ratio of between 0.15 and 0.20 would be reasonable for four of the engines and that an in-stack ratio of less than 0.01 would be reasonable for the fifth engine. This information ~~consists~~ resides in an email from a Caterpillar dealership, Wagner Equipment (www.wagnerequipment.com), which included a table in which these NO_2/NO_x in-stack ratios were listed for the specific Tier 4 engines owned by CC&V.

In general, the approval process for the NO_2/NO_x in-stack ratios starts with the permit applicant proposing source-specific values for their emission units, and providing supporting documentation to justify such values. Such supporting documentation is generally a reference to EPA's in-stack ratios database, copy of documentation prepared by federal or State regulatory agencies, reference to or copy of scientific or technical literature citing results of studies conducted on the topic, manufacturer's specification sheets, or stack test reports (tailpipe emission testing in this case).

The first and the last of this list are commonly the most reliable sources of documentation, and they are essentially the same type of data, as EPA has in the last few years undertaken the effort of collecting and validating stack testing results for different types of sources and compiling them in a database. Unfortunately for non-road diesel engines there is no such information available.

Stack tests, in the manner defined by EPA, are not performed on non-road engines or in general on mobile engines. Instead, for mobile sources emissions testing is conducted in a laboratory where the entire vehicle is placed in a dynamometer to apply load to the engine and emissions are collected and analyzed during specific driving cycles. For heavy duty engines, on-road and non-road, the engine alone, removed from the vehicle, is placed on an engine test bench where load is applied directly to the engine axle while operated at specific cycles as emissions are collected and analyzed.

Thus, as opposed to stack testing on stationary engines, emission testing on non-road engines is not something that is done by the owner or operator of the actual permitted emission unit. This type of tests are performed only by the engine manufacturer (published in specification sheets or equipment manuals), by large regulatory agencies like EPA or CARB (California Air Resources Board), or by research institutions on some emission units representative of specific engine types. And while emission factors and

limits have been developed for non-road engines with this type of tests, specific data to derive the NO_2/NO_x in-stack ratios has not been found from EPA or CARB, either because NO_x measurements were not conducted during the tests or because the data was not of interest at the time and not published.

The remaining source of data to support specific NO_2/NO_x in-stack ratios are the manufacturers or scientific literature. MEIU staff researched the manuals and specification sheets available to the public for the type of engines used by CC&V. The research also included EPA and CARB documentation, and a fair amount of scientific literature discussing this topic; and none of these documents contained any NO_2/NO_x in-stack ratio information applicable to CC&V's engines.

However, there were several of these documents discussing NOx and NO_2 emissions from mobile diesel engines, and all of them consistently explained that the operating principle of the emissions control devices that make Tier 4 diesel engines much cleaner, would also result in increased NO_2/NO_x in-stack ratios.

As explained in the 06/26/2018 final modeling review report, Diesel engines without these control devices (i.e. Tier 3 engines and below) typically have an NO_2/NO_x in-stack ratio of about 0.1, but the oxidation catalyst and the regeneration mechanism of the particulate filter will have the side effect of oxidizing a large fraction of the NO_x emissions into NO_2 therefore increasing substantially the ratio. As it also was explained in that report, there is no mechanism by which that ratio would be reversed to its original value or lower. The reduction catalyst will reduce both NO_2 and NO_x into elemental nitrogen, and there is nothing in the available literature to suggest that one chemical reaction occurs at a faster rate than the other one to alter the final NO_2/NO_x ratio significantly. On the contrary, all the available literature points to an ideal ratio of 0.5 for the final reduction reaction to be optimal and to a final ratio well above the original 0.1 that existed before the exhaust went through the emissions control devices.

Sound scientific principles and judgement support a ratio much higher than the ones proposed by CC&V, and accepting their proposed values as recommended by the APCD director is not scientifically defensible unless testing data is provided to support them. This is particularly true for the 0.01 ratio, which is not defensible even for the older Tier 1 through 3 engines.

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[1] 09/19/2014 Modeling Review Report – List of Outstanding Issues – Cripple Creek & Victor Gold Mining Company – Mine Life Extension #2 Cresson Project

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On Thu, Jan 10, 2019 at 10:22 AM Rosendo Majano [redacted] wrote:

Emmett - As you requested, below is the full content that will be included in my CC&V report.

Rosendo Majano
[redacted]

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****

The Division's Modeling and Emissions Inventory Unit (MEIU) received on April 23, 2018 a dispersion modeling analysis submitted by Cripple Creek & Victor Gold Mining Company (CC&V) as part of the application to modify the Construction Permit No.98TE0545 and implement the Mine Life Extension #2 Cresson Project in Teller County, CO.

Review of that modeling analysis was finalized on June 2018 and a final report was written on 06/26/2018 concluding that the proposed project at the Cripple Creek & Victor facility will cause modeled violations of the 1-hr NO_2 NAAQS. In addition, it was concluded that there were several critical errors in the modeling analysis that require correction before it could be determined whether the proposed project will or will not cause and/or contribute to modeled violations of the rest of applicable NAAQS.

After fulfilling administrative requirements of gathering all the communications records for the project, entering all the application information into the Modeling Unit's database, generating a review checklist report, and creating a billing report, the final modeling review report was provided to the permit engineer, Jonathan Brickey, on 07/09/2018.

On 08/13/2018 the Modeling Unit manager, Emmett Malone, forwarded two emails from the Air Pollution Control Division (APCD) director, Garry Kaufman, in which he provided arguments to reject the main findings and conclusions of the CC&V final modeling review report in what pertains to the engine loads and NO_2/NO_x in-stack ratios for the non-road diesel engines, and also provided instructions to review the modeling analysis with the originally submitted emission rates and to accept the originally submitted NO_2/NO_x in-stack ratios for the non-road diesel engines. All the aforementioned emails are included in Appendix 1 of this document.

In compliance with the APCD director's instructions, CC&V's 04/23/18 modeling submittal has been reviewed for a second time leaving intact the original emission rates and in-stack ratios of the non-road diesel engines. In addition, an analysis of the APCD director's arguments to approve CC&V's data has also been conducted to determine if they are supported by sound scientific principles and applicable regulations and guidance. Such analysis is included in a subsequent section of this document. The results of this new review are provided below.

There are NAAQS and CAAQS currently in effect for the following pollutants and averaging periods: CO (1-hr and 8-hr), Pb (3-month rolling average), NO_2 (1-hr and annual), PM10 (24-hr), PM2.5 (24-hr and annual), SO_2 (1-hr and 3-hr), and ozone (8-hr). For this permit application, quantitative impact analyses are warranted to demonstrate compliance with the NAAQS/CAAQS for the following pollutants and averaging periods: NO_2 (1-hr and Annual), PM2.5 (24-hr and Annual), PM10; CO (1-hr and 8-hr); and SO_2 (1-hr and 3-hr).

The applicant submitted modeling analyses for all required pollutants and averaging periods, and the results of the modeling analyses are summarized below:

Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM2.5	24-hr	19.72	12.7	32.42	35
PM2.5	Annual	5.36	6.0	11.36	12
PM10	24-hr	124.03	24.0	148.03	150
SO_2	1-hr	34.5	86.4	120.9	196.5
SO_2	3-hr	19.6	62.8	82.4	700
NO_2	1-hr	229.34 with background	Seasonal-hourly profile	229.34	188.34
NO_2	Annual	37.4	28.22	65.62	100
CO	1-hr	8,509.3	4580	13,089.3	40,000

CO	8-hr	628.3	2290	2918.3	10,000

The meteorological data used was adequately representative of the dispersion conditions at the mine and therefore the design concentrations of the results listed above match the original form of the corresponding NAAQS.

For 24-hr PM2.5 the modeled design concentrations is the highest eighth high 24-hr concentration averaged across the 3 years of meteorological data.

For annual PM2.5 the modeled design concentration is the maximum annual concentration averaged across the 3 years of meteorological data.

For 24-hr PM10 the modeled design concentration is the highest fourth high 24-hr concentration of the 3-year period of meteorological data.

For 1-hr SO_2 the modeled design concentration is the highest fourth high maximum daily 1-hr concentration averaged across the 3 years of meteorological data.

For 3-hr SO_2 the modeled design concentration is the highest second high 3-hr concentration of the 3-year period of meteorological data.

For 1-hr NO_2 the modeled design concentration is the highest eighth high maximum daily 1-hr concentration averaged across the 3 years of meteorological data.

For annual NO_2 the modeled design concentration is the highest annual concentration of the 3-year period of meteorological data.

For 1-hr CO the modeled design concentration is the highest second high 1-hr concentration of the 3-year period of meteorological data.

For 8-hr CO the modeled design concentration is the highest second high 8-hr concentration of the 3-year period of meteorological data.

It is noted that the meteorological data was reprocessed with AERMET v18081, and AERMOD v18081 was used to conduct all the final runs. This version of AERMET includes a correction in the Bulk Richardson algorithm when using on-site meteorological data, a situation that applies directly to the CC&V case. CC&V submitted this modeling analysis using meteorological data processed with the previous version, V16216r, which was correctly the latest version available at the time of submittal.

After review of the information submitted by the applicant with revisions by the MEIU, it is concluded that the CC&V gold mine will cause modeled violations of the 1-hr NO2 NAAQS.

The 1-hr NO_2 analysis that CC&V submitted was performed with the Ozone Limiting Method and the "OLMGROUP ALL" option by grouping the representation of multiple operating scenarios into single AERMOD runs through the use of source groups.

The applicant has indicated that blasts do not occur in more than one pit at the same time, consequently, CC&V was instructed by the MEIU to model this activity as taking place in each pit at a time. MEIU further indicated that this could be accomplished with separate model runs per scenario or by using source groups in AERMOD[1].

However, during the June, 2018 EPA Regional/State/Local Modelers Workshop, James Thurman from EPA's OAQPS office did a presentation on the use of source groups in AERMOD and explicitly indicated that source groups should not be used when modeling NO_2 with the Ozone Limiting Method using the OLMGROUP ALL option because the model would underestimate impacts.

After this presentation, AERMOD's documentation was reviewed and it was verified that in fact, the Ozone Limiting Method when using the OLMGROUP ALL option will distribute the available ambient ozone equally among all of the emission sources declared in the AERMOD input file, without any regard for which sources are included or not included in the different source groups. The consequence of this situation is that the background ozone concentration provided in the input file would in practice be diluted, thus resulting in less conversion of NO_x to NO_2 and therefore in lower modeled NO_2 concentrations.

Consequently, this error was corrected by the MEIU by separating the different operating scenarios and reviewing them by conducting a separate, individual AERMOD run per each individual scenario. This allowed the available ozone to be distributed only among those sources that are active on each operating scenario.

In addition to this problem, the design concentration for the 1-hr NO_2 NAAQS involves doing a receptor-specific average across the different years of meteorological data used. This average is generally done as post-processing after the AERMOD runs, but CC&V did not provide any evidence of doing such average, so it was performed on all the final 1-hr NO_2 runs during the review process.

The modeled results for 1-hr NO_2 are above the corresponding standard, but it is noted that they are expected to be even higher if the issues discussed below were to be corrected.

Although the engine loads used by CC&V have been approved by the APCD director, they were calculated using statistical techniques that are inadequate and that have skewed the results. If these calculations were corrected, it is expected that the emission rates will increase and so would the resulting modeled concentrations. More details on this topic are provided in a subsequent section of this document.

Also, the NO_2/NOx in-stack ratios used for some of the non-road diesel engines are of 0.2 and 0.01; values that are not technically supported for the type of engines in question. While these values were approved by the APCD director, the Division's subject matter experts have not been able to find any scientific literature or technical documentation to support them. Values as low as 0.22 have been documented for on-road engines only, and the 0.01 value simply defies logic for any type of mobile source diesel engine, with or without emission control devices.

EPA recommends the use of a NO_2/NOx in-stack ratio value of 0.5 for any case for which a different value cannot be adequately justified.

For the rest of the pollutants and averaging periods the following conclusions have been reached:

- 24-hr and annual PM2.5.
While the results are numerically below the corresponding NAAQS, compliance with such standards cannot be determined.
The emission rates used by CC&V are based on emission factors that have not been adjusted with a deterioration factor to account for the increase in emissions resulting from usage as the engine ages, and also with a transient adjustment factor to account for the change in emissions due to transient demands of the engine.

Both adjustment factors are included in the data base of EPA's mobile sources emissions model MOVES, and the resulting emission rates are higher after they are applied. However, CC&V did not use MOVES and instead used what appear to be only zero-hour steady state factors, thus adding another layer of error in the calculation of mobile engine emissions. More details on this topic can be found in Appendix 2 of this document.

Considering that the modeled concentrations for 24-hr and annual PM2.5 are at 92.6% and 94.6% respectively of their corresponding NAAQS, it is very feasible that once these adjustments are applied the resulting concentrations could reach or exceed the standards.

- 24-hr PM10.
While the results are numerically below the corresponding NAAQS, compliance with such standards cannot be determined.
Similar to the case of PM2.5, the emission rates used by CC&V are based on emission factors that have not been adjusted with a deterioration factor to account for the increase in emissions resulting from usage as the engine ages, and also with a transient adjustment factor to account for the change in emissions due to transient demands of the engine.

Both adjustment factors are included in the data base of EPA's mobile sources emissions model MOVES, and the resulting emission rates are higher after they are applied. However, CC&V did not use MOVES and instead used what appear to be only zero-hour steady state factors, thus adding another layer of error in the calculation of mobile engine emissions. More details on this topic can be found in Appendix 2 of this document.

Considering that the modeled concentration is at 98.7% of the NAAQS, it is likely that once these adjustments are applied the resulting concentration could reach or exceed the standards.
- Annual NO2.
While the results are numerically below the corresponding NAAQS, compliance with such standards cannot be determined.

Although the engine loads used by CC&V have been approved by the APCD director, they were calculated using statistical techniques that are inadequate and that have skewed the results. If these calculations were corrected it is expected that the emission rates will increase and so would the resulting modeled concentrations. More details on this topic are provided in a subsequent section of this document.

In addition, the NO_2/NOx in-stack ratios used for some of the non-road diesel engines are of 0.2 and 0.01, values that are not technically supported for the type of engines in question. While these values were approved by the APCD director, the Division's subject matter experts have not been able to find any scientific literature or technical documentation to support them. Values as low as 0.22 have been documented for on-road engines only, and the 0.01 value simply defies logic for any type of mobile source diesel engine, with or without emission control devices.

EPA recommends the use of a NO2/NOx in-stack ratio value of 0.5 for any case for which a different value cannot be adequately justified.

Currently the modeled concentration is at 65.8% of the NAAQS, and it is impossible to predict how much it would increase after applying these corrections.

1-hr and 8-hr CO.
While the results are numerically below the corresponding NAAQS, compliance with such standards cannot be determined.
Similar to the case of NO2, although the engine loads used by CC&V have been approved by the APCD director, they were calculated using statistical techniques that are inadequate and that have skewed the results. If these calculations were corrected it is expected that the emission rates will increase and so would the resulting modeled concentrations. However, considering that the current results are at 29.2% and 32.7% for the 8-hr and 1-hr standards respectively, it is unlikely that the corrections would cause increases in modeled concentrations such that these NAAQS would be reached or exceeded.

1-hr and 3-hr SO2.
Compliance with these NAAQS has been demonstrated.
While the engine loads were calculated incorrectly as described above for the NO2 and CO cases, SO2 emissions are primarily a function of the sulfur content in the fuel, and the influence of the engine load is insignificant. Considering that the current results are at 11.8% and 61.5% of the 3-hr and 1-hr NAAQS respectively, applying the corrections will not raise the emissions enough to cause modeled violations of these standards.

Non-road engine loads and emissions.

With regards to the non-road engine loads and emissions, the APCD director's emails (See Appendix 1) require some clarifications.

When discussing non-road engine loads and emissions the director's emails described the estimation of actual worst-case emissions from non-road engines as an extremely complex challenge, referring to CC&V's methodology as a fairly simplified approach and to the corrections applied by the MEIU as a more sophisticated approach.

CC&V's approach consisted in estimating engine loads based on fuel consumption and engine usage data for a period of 3 years. This methodology is in principle scientifically sound, but CC&V failed to use basic statistical techniques in the handling of the raw data thus skewing the resulting calculations of the engine loads.

The MEIU on the other hand, did not propose a different methodology for estimating emission, but only proposed to use the correct statistical techniques to organize and analyze the raw data. So there has never been a simplified approach or a sophisticated approach. The methodology for estimating engine loads and emission rates based on fuel consumption and engine usage is essentially the same, and the only difference has been in the statistical processing of the raw data.

Barring honest mistakes, it is a reasonable expectation that the technical analyses submitted by permit applicants comply with basic scientific and mathematical principles, and that expectation has not been met in CC&V's case when processing the raw data in the calculation of engine loads and emission rates.

NO_2/NOx in-stack ratios.

On the APCD director's emails (See Appendix 1) he indicates that CC&V submitted information from the representative for the engine manufacturer stating that in-stack ratio of between 0.15 and 0.20 would be reasonable for four of the engines and that an in-stack ratio of less than 0.01 would be reasonable for the fifth engine. This information consists in an email from a Caterpillar dealership, Wagner Equipment (www.wagnerequipment.com), which included a table in which these NO_2/NO_x in-stack ratios were listed for the specific Tier 4 engines owned by CC&V.

In general, the approval process for the NO_2/NO_x in-stack ratios starts with the permit applicant proposing source-specific values for their emission units, and providing supporting documentation to justify such values. Such supporting documentation is generally a reference to EPA's in-stack ratios database, copy of documentation prepared by federal or State regulatory agencies, reference to or copy of scientific or technical literature citing results of studies conducted on the topic, manufacturer's specification sheets, or stack test reports (tailpipe emission testing in this case).

The first and the last of this list are commonly the most reliable sources of documentation, and they are essentially the same type of data, as EPA has in the last few years undertaken the effort of collecting and validating stack testing results for different types of sources and compiling them in a database. Unfortunately for non-road diesel engines there is no such information available.

Stack tests, in the manner defined by EPA, are not performed on non-road engines or in general on mobile engines. Instead, for mobile sources emissions testing is conducted in a laboratory where the entire vehicle is placed in a dynamometer to apply load to the engine and emissions are collected and analyzed during specific driving cycles. For heavy duty engines, on-road and non-road, the engine alone, removed from the vehicle, is placed on an engine test bench where load is applied directly to the engine axle while operated at specific cycles as emissions are collected and analyzed.

Thus, as opposed to stack testing on stationary engines, emission testing on non-road engines is not something that is done by the owner or operator of the actual permitted emission unit. This type of tests are performed only by the engine manufacturer (published in specification sheets or equipment manuals), by large regulatory agencies like EPA or CARB (California Air Resources Board), or by research institutions on some emission units representative of specific engine types. And while emission factors and limits have been developed for non-road engines with this type of tests, specific data to derive the NO_2/NO_x in-stack ratios has not been found from EPA or CARB, either because NO_x measurements were not conducted during the tests or because the data was not of interest at the time and not published.

The remaining source of data to support specific NO_2/NO_x in-stack ratios are the manufacturers or scientific literature. MEIU staff researched the manuals and specification sheets available to the public for the type of engines used by CC&V. The research also included EPA and CARB documentation, and a fair amount of scientific literature discussing this topic; and none of these documents contained any NO_2/NO_x in-stack ratio information applicable to CC&V's engines.

However, there were several of these documents discussing NOx and NO_2 emissions from mobile diesel engines, and all of them consistently explained that the operating principle of the emissions control devices that make Tier 4 diesel engines much cleaner, would also result in increased NO_2/NO_x in-stack ratios.

As explained in the 06/26/2018 final modeling review report, Diesel engines without these control devices (i.e. Tier 3 engines and below) typically have an NO_2/NO_x in-stack ratio of about 0.1, but the oxidation catalyst and the regeneration mechanism of the particulate filter will have the side effect of oxidizing a large fraction of the NO_x emissions into NO_2 therefore increasing substantially the ratio. As it also was explained in that report, there is no mechanism by which that ratio would be reversed to its original value or lower. The reduction catalyst will reduce both NO_2 and NO_x into elemental nitrogen, and there is nothing in the available literature to suggest that one chemical reaction occurs at a faster rate than the other one to alter the final NO_2/NO_x ratio significantly. On the contrary, all the available literature points to an ideal ratio of 0.5 for the final reduction reaction to be optimal and to a final ratio well above the original 0.1 that existed before the exhaust went through the emissions control devices.

Sound scientific principles and judgement support a ratio much higher than the ones proposed by CC&V, and accepting their proposed values as recommended by the APCD director is not scientifically defensible unless testing data is provided to support them. This is particularly true for the 0.01 ratio, which is not defensible even for the older Tier 1 through 3 engines.

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[1] 09/19/2014 Modeling Review Report – List of Outstanding Issues – Cripple Creek & Victor Gold Mining Company – Mine Life Extension #2 Cresson Project

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Gordon Pierce
Program Manager
Technical Services Program
COLORADO
Air Pollution Control Division
Department of Public Health & Environment

4300 Cherry Creek Drive South, Denver, CO 80246-1530
[redacted]

Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more.

STATE OF COLORADO

[redacted]

Re: CC&V

1 message

Rosendo Majano [redacted] Tue, Jan 29, 2019 at 11:08 AM
To: "Pierce - CDPHE, Gordon" [redacted]
Cc: Emmett Malone [redacted]
Bcc: Marie Bernardo - CDPHE [redacted]

Gordon,

Just so it's clear in the record, your statement below about not catching the source group error in the June 2018 review is not accurate. I did catch that error in the June 2018 review. There is an explanation of this issue on Page 5 of the 06/26/18 report. Garry also addressed this issue on his 08/13/18 email to you.

However, per your request, I have reported in the table the results prior to the correction.

Rosendo Majano
[redacted]

On Mon, Jan 28, 2019 at 9:34 AM Pierce - CDPHE, Gordon [redacted] wrote:

> Rosendo,
>
> Thanks for your response and clarifications. You are correct that my understanding and statement on the OLMGROUP ALL was not accurate and that the way the source groups were combined into a single run is really the issue.
>
> I will stand by my statement that since we did not catch the error in our June 2018 review, it should be allowed to stand in this review. This also follows Garry's request. I do believe there is precedent based on what you listed (and I believe from GCC modeling in the past as well). As such, I would like the results reported without that correction in the table. And, as I requested (and you mention), please make sure that the results with the correction are part of the write-up in the report. As you say, and I agree, it is not correct to conceal or downplay it.
>
> For my request on the CO conclusions, it was based on the last sentence you had written in that paragraph, which I was seeing as contradictory. If the paragraph is amended, as you suggest, that would be fine.
>
> Thanks,
> Gordon
>
> On Wed, Jan 16, 2019 at 7:24 AM Rosendo Majano <rosendo.majano@state.co.us> wrote:
>
> > Gordon,
> >
> > I'm afraid you have not understood the error with the 1-hr NO2 modeling because what you describe in your email is inaccurate and what you have requested in the table of results is already there. So I want to clarify the following:
> >
> > 1- The use of OLMGROUP ALL is not incorrect, at all. I did not make any statement to the contrary, nor did EPA on the Modeler's Workshop.
> > 2- The 1-hr NO2 results that I provided on the table were already obtained using the OLMGROUP ALL option in AERMOD.
> >
> > The error in CC&V's NO2 modeling consists in representing different operating scenarios in single AERMOD runs with source groups while at the same time using the Ozone Limiting Method with the OLMGROUP ALL option. That combination of the use of source groups and OLMGROUP ALL is what has the effect of diluting the background ozone concentration thus causing lower NO2 modeled concentrations. But using either source groups or OLMGROUP ALL separately is perfectly acceptable.
> >
> > So the correction that I applied to CC&V's modeling was to not use source groups to represent different operating scenarios when modeling NO2 with the Ozone Limiting Method and OLMGROUP ALL.
> >
> > Also, the use of both source groups and OLMGROUP ALL are optional, not mandatory, and I did not tell CC&V that they had to model using either of those options, separate or combined.
> >
> > Moreover, I did not tell CC&V to do the modeling that way, combining source groups with OLMGROUP ALL. That was CC&V's choice. My mistake was to not catch this error in CC&V's modeling before. But as I explained, I became of aware of this issue until it was presented in EPA's Modeler's Workshop.
> >
> > My instructions to CC&V were related to how to represent blasting activities in the model depending on the pollutant and averaging period being modeled, and specifically to represent blasting as taking place in each pit at a time through different operating scenarios. In that context I indicated that such representation could be accomplished with separate model runs or by using source groups, one or the other.
> >
> > Those instructions are correct because I was referring to modeling blasting activities in general for all pollutants and averaging periods without any reference whatsoever to NO2, to the Ozone Limiting Method or OLMGROUP ALL. I do admit that I should have included a caveat warning CC&V of the possible conflict with source groups in case that they decided to use the Ozone Limiting Method with OLMGROUP ALL. But once again, I became of aware of this issue until it was presented in EPA's Modeler's Workshop.
> >
> > The full language of my instructions to CC&V are in the attached document, in Item 10 of Appendix A.
> >
> > So characterizing the situation as an error on our part because we told CC&V to model it that way is inaccurate, as it is also inaccurate to say that I mentioned that in my write up. The error on our part (my error to be specific) was to not catch CC&V's mistake and to not include a caveat in my instructions warning of the conflict in the two options in AERMOD.
> >
> > On the other hand, I don't recall any application undergoing modeling review in which we found an error on our part that was not required to be fixed, so I think it's inaccurate to say that we have done that with other applicants. I could be wrong though, because I don't remember the details of every application.
> >
> > I recall two applications with an error on our part: The Gypsum Ranch Pit and the Gypsum Biomass Project, for which the same meteorological data set was processed and given to the applicants by the MEIU containing large amounts of calms in excess of the 10% threshold allowed by EPA for permit modeling. When this error came to light both modeling reviews had been completed, the Biomass permit issued and the Ranch Pit application had been withdrawn because the facility was sold.
> >
> > The ColoWyo Mine is another case, in which the emissions were calculated with Mobile v6.2 at a time when MOVES was already available as EPA's preferred emissions model for mobile sources. This error was overlooked completely by the MEIU for the South Taylor Pit and when the modeling was submitted for the Collom Pit the applicant was asked to fix this issue and use MOVES. Note that this the only outstanding issue at the moment so there was no need to remodel other than to fix this problem.

My point is that I don't think there is really a precedent for not fixing an error, specially an error that when corrected would result in modeled concentrations exceeding a NAAQS. However, if you still want me to report the results without correcting the error, that is your prerogative, I just want the facts to be clear. Please let me know in writing if this is what you want to do. In that case I will state in my report that I am presenting those erroneous results following your instructions and I will attach your email to the report, just like I did with Garry's instructions.

I will also explain in the report that the NO2 modeling has been conducted with the correction described above and consequently I will provide the actual results (although not in the table per your request) as opposed to explaining this in a conditional tense, as if it hasn't been done. This is information that I do have and that I relied upon to reach my conclusion on NO2 NAAQS compliance, so I don't think it's correct to conceal it or downplay it.

I would also ask you for similar type of instructions in writing for including your conclusion that 1-hr and 8-hr CO is likely demonstrated. The emission rates for all mobile sources were not calculated correctly, and I simply have no idea how much they would increase after the correction. Rebecca Simpson's analysis focused mostly on NO2 and to a lesser extent on particulate matter, but did not provide information on CO. We do know that those emissions will increase because this pollutant is highly influenced by combustion efficiency which in turn is highly influenced by engine load, but I haven't seen any data quantifying the increase. I suspect, intuitively based on the fact that these are diesel engines and some of them have controls, that the increase might not be enough to reach the NAAQS, but I won't gamble to say or imply that NAAQS compliance has been demonstrated or likely demonstrated. Just look at the CO results for the ColoWyo case with similar type of engines and how close they are to the NAAQS.

So my conclusion as a dispersion modeling expert is that with the information available I cannot determine compliance with the CO NAAQS. If you disagree and have reached a different conclusion and want your conclusion reflected in the report, once again, that is your prerogative, but in that case I would ask you to include that conclusion under your name and not under mine.

I now realize that my write up on that topic might be contradictory by saying that I cannot determine NAAQS compliance and then saying that the corrections are unlikely to lead to a modeled violation of the NAAQS, so I will amend that paragraph and remove the latter statement.

I will await your instructions and if you have any questions please let me know.

Rosendo Majano
[redacted]

On Mon, Jan 14, 2019 at 2:25 PM Pierce - CDPHE, Gordon [redacted] wrote:

Rosendo,

Please see below for my requested edits in red. The primary one involves the 1-hour NO2. While I agree that the use of OLMGROUP ALL is incorrect (per the June Modeler's Workshop), that was an error on our part as we told CC&V to model it that way (as you mention in the writeup). As we have done for other applicants when there is an error on our part, we do not request it be fixed unless there is a need to re-model. Thus, the report summary table should reflect the values without that error being corrected. I do believe that this error should be discussed in the writeup following the summary table, as you have done. If you could please send a revised version for review, I would appreciate it.

Thanks,
Gordon

The Division's Modeling and Emissions Inventory Unit (MEIU) received on April 23, 2018 a dispersion modeling analysis submitted by Cripple Creek & Victor Gold Mining Company (CC&V) as part of the application to modify the Construction Permit No.98TE0545 and implement the Mine Life Extension #2 Cresson Project in Teller County, CO.

Review of that modeling analysis was finalized on June 2018 and a final report was written on 06/26/2018 concluding that the proposed project at the Cripple Creek & Victor facility will cause modeled violations of the 1-hr NO_2 NAAQS. In addition, it was concluded that there were several critical errors in the modeling analysis that should require correction before it could be determined whether the proposed project will or will not cause and/or contribute to modeled violations of the rest of applicable NAAQS.

After fulfilling administrative requirements of gathering all the communications records for the project, entering all the application information into the Modeling Unit's database, generating a review checklist report, and creating a billing report, the final modeling review report was provided to the permit engineer, Jonathan Brickey, on 07/09/2018.

On 08/13/2018 the ~~Modeling Unit~~ MEIU manager, Emmett Malone, forwarded two emails from the Air Pollution Control Division (APCD) director, Garry Kaufman, in which he provided arguments to reject the main findings and conclusions of the CC&V final modeling review report in what pertains to the engine loads and NO_2/NO_x in-stack ratios for the non-road diesel engines, and also provided instructions to review the modeling analysis with the originally submitted emission rates and to accept the originally submitted NO_2/NO_x in-stack ratios for the non-road diesel engines. All the aforementioned emails are included in Appendix 1 of this document.

In compliance with the APCD director's instructions, CC&V's 04/23/18 modeling submittal has been reviewed for a second time leaving intact the original emission rates and in-stack ratios of the non-road diesel engines. In addition, an analysis of the APCD director's arguments to approve CC&V's data has also been conducted to determine if they are supported by sound scientific principles and applicable regulations and guidance. Such analysis is included in a subsequent section of this document. The results of this new review are provided below.

There are NAAQS and CAAQS currently in effect for the following pollutants and averaging periods: CO (1-hr and 8-hr), Pb (3-month rolling average), NO_2(1-hr and annual), PM10 (24-hr), PM2.5 (24-hr and annual), SO_2 (1-hr and 3-hr), and ozone (8-hr). For this permit application, quantitative impact analyses are warranted to demonstrate compliance with the NAAQS/CAAQS for the following pollutants and averaging periods: NO_2 (1-hr and Annual), PM2.5 (24-hr and Annual), PM10; CO (1-hr and 8-hr); and SO_2 (1-hr and 3-hr).

The applicant submitted modeling analyses for all required pollutants and averaging periods, and the results of the modeling analyses are summarized below:

Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM2.5	24-hr	19.72	12.7	32.42	35
PM2.5	Annual	5.36	6.0	11.36	12
PM10	24-hr	124.03	24.0	148.03	150
SO_2	<span style="font-size:10pt;font-				

family:Arial,sans-serif"

EPAOIG Appendix 49

Machovec, Chuck M.

From: Hancock, Chip
Sent: Monday, April 18, 2011 3:49 PM
To: Jung, Doris W.
Cc: Fadeyi, Sunday; Machovec, Chuck M.; Hea, Roland C.; King, Kirsten L.
Subject: RE: UCD - permit 96AD234

Per Kirsten and Roland it does.

Chip

From: Jung, Doris W.
Sent: Monday, April 18, 2011 3:43 PM
To: Hancock, Chip
Cc: Fadeyi, Sunday; Machovec, Chuck M.; Hea, Roland C.; King, Kirsten L.
Subject: RE: UCD - permit 96AD234

PS memo 10-01 is only a guidance document. It does not supersede statutory/regulatory requirements.

From: Hancock, Chip
Sent: Monday, April 18, 2011 3:38 PM
To: Jung, Doris W.
Cc: Fadeyi, Sunday; Machovec, Chuck M.; Hea, Roland C.; King, Kirsten L.
Subject: RE: UCD - permit 96AD234

Doris,

Does not matter - PS memo 10-01 over-rides.

Chip

From: Jung, Doris W.
Sent: Monday, April 18, 2011 3:22 PM
To: Hancock, Chip
Cc: Fadeyi, Sunday; Machovec, Chuck M.; Hea, Roland C.; King, Kirsten L.
Subject: RE: UCD - permit 96AD234

Chip,

I think you missed it. Impacts of 1-hr NO2 and SO2 exceed the NAAQS.

Doris

From: Hancock, Chip
Sent: Monday, April 18, 2011 3:16 PM
To: Jung, Doris W.
Cc: Fadeyi, Sunday; Machovec, Chuck M.; Hea, Roland C.; King, Kirsten L.
Subject: RE: UCD - permit 96AD234

Doris,

Per PS memo 10-01, modeling for NOx and SOx are not required. The increases in PM2.5 and PM10 are very small (and the totals are small).

I reviewed the report you attached prior to our making the decision. The previous PM10 had a huge cushion in the annual impact - ratio up their impact to the new requested level gives a total impact of well less than 110 $\mu g/m^3$. Doing the same for the annual number gives well under the 50 $\mu g/m^3$ standard - and this was using the high 1st high. Total requested PM10 (not just the increase) is 7 tons per year. Therefore, PM10 modeling not necessary.

The increase in PM2.5 is less than 1.5 tons per year - way below the significance level. Short term increase also below the 11 pounds per day. So, PM2.5 modeling not necessary.

Chip

From: Jung, Doris W.
Sent: Monday, April 18, 2011 2:43 PM
To: Hancock, Chip
Cc: Fadeyi, Sunday; Machovec, Chuck M.; Hea, Roland C.; King, Kirsten L.
Subject: RE: UCD - permit 96AD234

Chip,

We evaluated the impacts associated with this facility last year (see attached e-mail). At that time it was determined that demonstrating compliance with the SO2, NO2, PM10, and PM2.5 NAAQS is necessary for this modification.

Doris

From: Hancock, Chip
Sent: Monday, April 18, 2011 2:11 PM
To: Jung, Doris W.
Cc: Fadeyi, Sunday; Machovec, Chuck M.; Hea, Roland C.; King, Kirsten L.
Subject: UCD - permit 96AD234

Doris,

After a recent meeting Roland and I had with the source, we took another look at this one. After further review the Construction Permits Unit has determined that impact modeling is not required for the current application and we will proceed with processing the permit.

This is based on the requested emission levels. The NOx increase is well below 40 tons per year. So, per PS memo 10-01 impact modeling for the NOx one hour standard is not required. All of the other pollutant increases are well below significance levels. In fact total facility emissions are below significance levels for all of the other pollutants except $PM_{2.5}$. The $PM_{2.5}$ level is fairly low and the increase is small (~1 tpy).

I also took a look at the modeling done for the 2009 application. From that it does not appear that the proposed increases will result in exceedences of the NAAQS.

Therefore, please remove this application (96AD234) from your queue of impact modeling submittals to review. If you have spent any time on this application, please send your hourly time summary to Sunday (or me) so it can be added to PTS and included in the invoice.

Thanks,

Chip

EPAOIG Appendix 52

State of Colorado

[redacted]

Fwd: Updated: Sun Valley Steam Plant Permitting Effort Kick off Meeting

1 message

Jung - CDPHE, Doris [redacted] Mon, Jan 7, 2013 at 2:57 PM
To: emmett.malone[redacted] Rosendo Majano - CDPHE [redacted]

public health first - NOT!

---------- Forwarded message ----------
From: **R K Hancock III** [redacted]
Date: Mon, Jan 7, 2013 at 2:50 PM
Subject: Re: Updated: Sun Valley Steam Plant Permitting Effort Kick off Meeting
To: "Jung - CDPHE, Doris" [redacted]
Cc: Chuck Machovec - CDPHE [redacted], Kirsten King - CDPHE [redacted]

Doris,

I hear what you are saying. However, per PS memo 10-02 the Division **does not** require impact modeling to the 1 hour standard for sources of SO2 or NOx with a net change in emissions of less than 40 ton per year. Per the last paragraph (emphasis added): "..., the Division **will apply** EPA's SERs for NOx and SO_2 to the 1-hour NO_2 and 1-hour SO_2 standards **for all** stationary source permitting activities, including determining when ambient air quality impact analyses are necessary for permitting,...".

As for the reasoning, it is explained better in the memo than I can.

Chip

On Mon, Jan 7, 2013 at 2:20 PM, Jung - CDPHE, Doris [redacted] wrote:

> Chip,
>
> It is our understanding that the Sun Valley Steam Center project is a modification at Zuni Station per the testimony before the Colorado PUC on 12/12/12: *"In 2013, the Company plans to undertake much-needed repairs and improvements at Zuni Electric Generating Station ("Zuni Station") to continue steam production operations until it can be replaced late in the third quarter of 2015 by the proposed new Sun Valley Steam Center ("SVSC"). This new steam production facility will consist of two 300 Mlb per hour package boilers and is expected to cost $29 million (excluding allowance for funds used during construction and escalations)."*
>
> Near-field (including flagpole receptors at the stadium) ambient air impacts from this new steam center should be assessed for the following reasons regardless of the outcome of any netting exercise (i.e., even if it is a minor modification):
> - The SO2 impact analysis on file indicates that the existing Zuni facility may be contributing and causing violations of the 1-hr NAAQS and 3-hr CAAQS if the facility is using fuel oil.
> - There is no NO2 cumulative impact analysis completed for Zuni that we are aware of. Based on the impacts estimated for lowering the discharge height of Unit 2 boiler, it is reasonable to believe that the existing Zuni facility could cause or contribute to a violation of the 1-hr NO2 NAAQS.
> - We need to consider that this facility site is situated in an area with high population exposure.

Doris

---------- Forwarded message ----------
From: **R K Hancock III** [redacted]
Date: Thu, Jan 3, 2013 at 4:14 PM
Subject: Re: Updated: Sun Valley Steam Plant Permitting Effort Kick off Meeting
To: "Jung - CDPHE, Doris" [redacted]

OK, thanks.

On Thu, Jan 3, 2013 at 3:00 PM, Jung - CDPHE, Doris [redacted] wrote:

> Chip,
>
> We are unable to attend since we already have a meeting scheduled for Jan 14 at 10 am.
>
> Doris
>
> On Thu, Jan 3, 2013 at 2:46 PM, R K Hancock III [redacted] wrote:
>
> > Chuck, Doris,
> >
> > Chad requested I forward this to you. Do not know if he has discussed with you or not.
> >
> > Chip
> >
> > ---------- Forwarded message ----------
> > From: **Campbell, Chad E** [redacted]
> > Date: Thu, Jan 3, 2013 at 2:38 PM
> > Subject: Updated: Sun Valley Steam Plant Permitting Effort Kick off Meeting
> > To: R K Hancock III [redacted], "Magno, Gary J" [redacted],
> > "Christopher, Jamie" [redacted], "Reed, Jason" [redacted]
> >
> > When: Monday, January 14, 2013 10:00 AM-11:00 AM (GMT-07:00) Mountain Time (US & Canada).
> > Where: CDPHE Offices
> >
> > Note: The GMT offset above does not reflect daylight saving time adjustments.
> >
> > *~*~*~*~*~*~*~*~*~*
> >
> > Chip,
> >
> > This meeting will be to review the Sun Valley Steam Plant and the proposed permitting strategy for the facility.
> >
> > Thanks,
> >
> > Chad

STATE OF COLORADO

[redacted]

CC&V Modeling Analysis

1 message

Rosendo Majano [redacted] Fri, Oct 19, 2018 at 2:59 PM
To: Garry Kaufman [redacted]

Garry,

On 09/27/18 I participated in a meeting with Robyn Wille and Jessica Lowrey, lawyers with the Colorado Attorney General's Office. While the meeting was to discuss the legal challenge to the ColoWyo permit and how the revised modeling analysis for this facility should be conducted, the lawyers made some statements that are applicable to any air permit application and that contradict what you have asked to accept as valid for the CC&V permit application (please see the email below).

There are also two technical arguments used to support the ColoWyo modeling analysis that are being accepted by consensus by everyone involved in this case, and that also contradict what you have asked to accept in the CC&V application. I'm referring to the following topics.

1- The CO AG's Office lawyers indicated in very clear terms that the provisions in Appendix W to 40CFR51 are applicable to minor sources. They explained that while Colorado regulations don't require air quality modeling for minor sources, if modeling is used to demonstrate compliance with the NAAQS, then it should be done according to the procedures established by EPA and they explicitly mentioned that the provisions in Appendix W are applicable and should be followed regardless of the minor source status.

2- The CO AG's Office lawyers also indicated that the Air Division does not have the authority to regulate emissions from mobile sources because those are regulated at the federal level, but that the Division does have the authority to regulate the usage of mobile sources within the facility when issuing a permit for such facility.

3- It was explained during the meeting that the Division is not trying to regulate the emissions from ColoWyo's mobile sources, but that in the context of conducting an air quality modeling analysis to determine compliance with the NAAQS, those emissions need to be included and need to be characterized adequately to represent the worst-case scenario. The CO AG's Office lawyers agreed and indicated that the modeling should be done in a way that withstands future legal challenge.

4- ColoWyo has requested to lower the NO2/NOx in-stack ratio for all Tier 3 and below mobile sources from the previously approved value of 0.4 to a new value of 0.1. In doing this request, ColoWyo has hired two different consulting companies which have presented solid arguments to support that value. Part of those arguments have been the explanation that higher in-stack ratio values are valid only for engines with post-combustion diesel emissions control devices (i.e. Tier 4 diesel engines). While the Division has not reached a final determination on this request, verbally everyone involved is in agreement that these arguments are sound and technically supported, and what is being discussed is not whether those arguments are acceptable or not but rather how many units in the vehicle fleet have those control devices and would therefore have a higher in-stack ratio.

5- ColoWyo has requested to use lower engine loads than the ones in EPA's MOVES for the non-road mobile sources at their site, and for that purpose their consultants have provided actual data from their mining equipment. Some of the issues raised by Division staff, myself included, are: a)That the statistical treatment of the data to calculate the average engine load was not adequate; b)The origin of the data and the procedures for estimating specific segment-specific engine loads used in the calculation of the average, need to be explained in more detail to ensure that the data is representative of actual operations at the mine. Both ColoWyo's and Division's staff were in agreement and ColoWyo has promised to correct the statistical procedures and to provide supporting explanations for the data.

A subsequent meeting took place on 10/11/18 involving not only the CO AG's Office lawyers but also ColoWyo's attorneys, as well as Division's and ColoWyo's technical and management staff. The procedures to conduct the modeling analysis were discussed in detail, including items 3 through 5, and there was consensus that the modeling analysis has to be conducted in a manner that is legally defensible in court. Particular emphasis was made by ColoWyo about the need to represent the worst-case scenario in the model.

In stark contrast to what the Division is agreeing to in the ColoWyo case, for the CC&V air quality modeling analysis, Emmett, Gordon, and you, the three direct supervisors above me in the Division's organizational chart, are asking me to accept as valid the following:

a) That the provisions in Appendix W are not applicable for minor sources and therefore the use of maximum allowable emissions is not pertinent for their mobile sources. Appendix W states that maximum allowable emissions are conducive to the highest impacts on ambient air and consequently those are the emissions that should be used to conduct a modeling analysis. I have already expressed my professional opinion that some of the emissions used by CC&V are not maximum allowable emissions.

b) That the Division does not have the authority to regulate mobile sources and therefore using maximum allowable emissions in the modeling analysis is at the discretion of the Division and not regulatory.

c) That the in-stack ratios of five non-road mining vehicles with Tier 4 diesel engines at CC&V are very low, some as low as 0.01. CC&V has not provided any information to clarify whether those engines have or not post-combustion control devices, yet the emission rates being used very low, corresponding to units with control devices that would raise significantly the in-stack ratio. If the in-stack ratio is low, that means there are not control devices and the total emissions from the engine would be very high, and vice versa, as accepted for the ColoWyo case.

d) That the engine loads for the non-road mining vehicles at CC&V are significantly lower than those in EPA's MOVES, that the statistical treatment of the raw data used by CC&V is correct and that the data provided by CC&V are representative of the actual operations at the mine. This despite the fact that similar to the ColoWyo case, the Division's subject matter experts also have objections to the statistical calculations and representativeness of the data in the CC&V case.

Considering that both ColoWyo and CC&V are both minor sources, and both are mining operations using similar type of non-road vehicles, how do I reconcile the contradictory technical arguments that are being used to support the air quality modeling analysis in each one of those cases?

My main concern is that, in the context of a legal dispute between an external party and the Division, and as one of the Division's subject matter experts, I am providing information and explanations to the CO AG's lawyers for them to use in the legal dispute, and then I would be turning around and contradict myself by approving as valid the exact opposite arguments that I just provided to the CO AG's lawyers.

Wouldn't that place me at risk of perjuring myself?

What would happen if the CC&V permit were to be challenged in court?

Would I personally be in legal risk for knowingly approving technical arguments that I have previously stated to be different when acting as a subject matter expert on the ColoWyo case?

These are questions that I would like to present to the CO AG's Office before continuing the review of the CC&V case.

The legal concerns are in addition to the possibility of compromising my ethical and professional integrity, and that of the Division, by approving technical arguments that several Division subject matter experts, myself included, agree that are flawed.

In light of all the above I want to request to recuse myself from continuing to review the CC&V modeling analysis. There is a precedent for this back in 2011 when my predecessor Doris Jung, and the previous Modeling Unit manager Chuck Machovec recused themselves from continuing to review a previous CC&V modeling analysis and it ended up being reviewed and approved by a different person (Final Modeling Review report initialed by Gordon Pierce dated 06/20/2011).

There is also the precedent of my supervisor refusing to conduct an additional modeling analysis for the previous ColoWyo application, arguing that he would be enabling actions that would go against EPA guidance (email dated 02/03/2016 from Emmett Malone to Chip Hancock).

Note that in making this request I emphasize that I have already done my job and finalized the review of this application twice (Final Modeling Review Reports dated 09/16/2014 and 06/26/2018), in both cases concluding that compliance with the applicable NAAQS was not demonstrated. My technical analyses and conclusions in those reports have not been challenged and no one has pointed out to any errors or concerns, other than the arguments in your email below that are now being contradicted through what is being approved by the Division in the ColoWyo case.

At this point what I am concluding is that, without anyone pointing out to any errors in my work in the CC&V application, my professional expertise is just not being respected, and consequently I find myself at a dead end with this application, being pressured to accept information that is not technically supported, and according to the aforementioned conversations with the CO AG's Office lawyers, not legally supported. Thus, I am with the CC&V application being placed in an untenable position from an ethical perspective, and possibly also from a legal point of view.

I think that given the circumstances the fresh perspective of a different person reviewing this modeling analysis will be beneficial.

Please let me know if you agree with my request.

Thank you.

Rosendo Majano
[redacted]

---------- Forwarded message ----------
From: **Kaufman - CDPHE, Garrison** [redacted]
Date: Thu, Jul 12, 2018 at 5:32 PM
Subject: Re: CC&V
To: "Pierce - CDPHE, Gordon" [redacted], "Malone - CDPHE, Emmett" [redacted]

Gordon and Emmett,

Thank you for the opportunity to review the draft modeling report and additional communications regarding the potential treatment of non-road engine emissions and other issues with the CC&V modeling. The draft report and subsequent communications raise several issues regarding the latest round of modeling submitted by CC&V. In response to these issues, I wanted to provide some perspective on the issues raised, as well as direction on how to proceed with finalizing this project.

The draft modeling report raises 4 basic concerns with the latest modeling that CC&V has submitted: 1) the NO2/NOx in-stack ratios for non-road and stationary engines at the facility; 2) the engine load values used in calculating emissions from non-road engines; 3) the use of source groups in combination with OLM for NO2 modeling; and 4) the exclusion of certain hiking trails within the facility boundaries from ambient air.

NO2/NOx In-Stack Ratios

The modeling that CC&V submitted utilized a NO2/NOx ratio of 0.05 for blasting and a weighted average ratio of 0.0927 for the non-road engines based on several ratios for different non-road engines at the facility (0.09 for 55 Tier 1-3 non road engines; 0.5 for six Tier 4 non-road engines; 0.2 for four Tier 4 non-road engines; and 0.01 for one Tier 4 non-road engine). The weighted average of 0.0927 was also applied to the stationary engines at the facility, The draft report notes that the permit engineer looked at the ratios and concluded that they were acceptable except the ratios of 0.2, and .01 used for certain of the Tier 4 engines, and application of the weighted average to the stationary engines.

Regarding the five Tier 4 engines, CC&V submitted information from the representative for the engine manufacturer that for four of the engines an in-stack ration of between 0.15 and 0.20 would be reasonable and that an in-stack ratio of less than 0.01 would be reasonable for the fifth engine. CC&V used the high end of these values. I have passed this information on to Roland Hea and Chip Hancock and they concluded that the ratios CC&V used for these five pieces of equipment was acceptable. With respect to the use of the 0.0927 ratio for the stationary engines, CC&V relied on an e-mail from Chuck Pray in 2016 approving a ratio of .09 for both the non-road and stationary engines. Based on this e-mail, Roland Hea concurred that the use of a more conservative ratio of 0.0927 was acceptable.

Given these determinations from permitting I believe that all of the in-stack ratios that CC&V used are acceptable and therefore the potential issues raised in the draft modeling report are resolved.

Non-Road Engine Load

The draft modeling report questions the appropriateness of the engine load factors CC&V used for the various non-road engines at the facility. Engine load is important because it has a large impact on the calculated emissions from the non-road engines. As acknowledged in the draft report and subsequent communications on this issue, determining loads for these types of engines is challenging. Unlike stationary engines that can and do operate close to maximum load, numerous factors preclude non-road engines from operating at or near full load for any extended period of time. In calculating engine loads, CC&V split the various non-road engines into broad categories (e.g. support trucks, shovels, graders, haul trucks) and then calculated average engine loads for these categories utilizing 3 year averages of diesel fuel consumed for each of these categories. As noted in the draft model report and Rebecca Simpson's underlying technical analysis dated May 23, 2018, these practices smooth out both temporal variability and variability between different types and sizes of engines within the broad categories. This, along with the fact that CC&V did not remove outliers, means that CC&V's analysis does not capture peak emissions from a given large category and may in some instances underestimate average load for individual pieces equipment and more narrow categories of equipment of like type and size. Based on all of this, and the assertion that state and federal regulations require that emissions from the permitted facility correspond to potential to emit, the draft modeling report concludes that the load factors CC&V used, and corresponding emissions included in the modeling based on these load factors was improper.

I appreciate the concerns raised and commend MMEIU staff on their excellent analysis of this issue. This analysis helps to advance our thinking on how to best model these extremely challenging mining sources. At the same time, rejecting CC&V's modeling based on this analysis is problematic for a number of reasons. As an initial matter, I don't agree with the conclusion that state and federal regulations require the use of PTE in characterizing emissions from the non-road engines for modeling purposes. Because this is a minor source permit the federal regulations set forth in Appendix W do not directly apply. EPA has made this point on several occasions. Nor do our state regulations mandate the use of PTE for the non-road engines at CC&V. Regulation No. 3 does provide that EPA approved modeling protocols (which presumably means Appendix W) be used, but only where modeling is required under Regulation No. 3. Regulation No. 3 only requires modeling of major stationary sources under the PSD program, and does not require modeling of minor sources. The regulation, does, however, give the Division broad discretion in assessing ambient impacts of any permitted source. As part of this broad discretion, the Division has the discretion to determine if and how minor sources should be modeled including determining the emissions that should be used in that modeling.

In addition to the technical complexities associated with determining emissions from non-road engines, the decision on how best to exercise our discretion is complicated by the treatment on non-road engine mobile equipment under our permitting regulations. As currently written, Regulation No. 3 does not give the Division authority to require permits for mobile equipment non-road engine emissions (this restriction is limited to the engine emissions themselves and does not extend to fugitive dust from roadways and other locations). As you know, at least one operator has raised this issue and asserted that based on this we do not have the authority to require modeling of non-road engine emissions at mining sites. While I would not agree with that conclusion, the treatment of these emission sources under our permitting regulations does raise the question of how to properly characterize these emissions. Should they be treated as a part of the modeled source, where we typically have used our discretion to require modeling at or near PTE levels, or should they treated more akin to background or non-source emissions which have typically been modeled at levels closer to actual or average emissions or pollutant concentrations? If the latter approach is taken, the variability of fuel consumption over time, the lack of short term fuel consumption records, the non-uniformity of usage of individual pieces or even categories of equipment from month to month, and the extreme variability of emissions over short time periods due to rapidly changing engine loads resulting from different operating parameters, creates an extremely complex challenge in determining actual emissions. In this case CC&v has used a fairly simplified

approach that could certainly be refined. At the same time, they have consistently been using this approach through multiple iterations of modeling over the past several years, and this approach is based on actual fuel use data. Given this, and the fact that even under the more sophisticated approach taken by MMEIU staff there are still significant uncertainties about the emissions from this equipment on both a temporal and spatial basis, I believe allowing CC&V to use the engine load profiles, and resultant non-road engine emissions reflected in their latest modeling submittal is a reasonable and appropriate exercise of the Division's discretion under the regulation.

Source Grouping and OLM

I am not familiar with this issue and defer to the two of you to determine the best approach for this particular case.

Treatment of Hiking Trails

As I understand it the latest CC&V submittal shows newly identified hiking trails within the ambient air boundary that are not included as ambient air in the modeling for at least certain hours of the day. As indicated in the draft modeling report, and consistent with other areas, I agree that CC&V either needs to include these trails as part of ambient air or they need to demonstrate to the Division's satisfaction how the general public will be excluded from these areas for any periods of time that they are not included as ambient air.

Please let me know if you would like to discuss any of these issues

Garry Kaufman
Division Director
Air Pollution Control Division
Colorado Department of Public Health and Environment
[redacted]

Displaying 2018_HL_Leader.jpg

Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more.

On Mon, Jul 2, 2018 at 11:32 AM, Pierce - CDPHE, Gordon <gordon.pierce@state.co.us> wrote:

---------- Forwarded message ----------
From: **Rosendo Majano** [redacted]
Date: Thu, Jun 28, 2018 at 11:47 AM
Subject: Fwd: CC&V
To: Gordon Pierce [redacted]
Cc: Emmett Malone [redacted]

Gordon - Emmett just asked me to forward this to you.

Rosendo Majano
[redacted]

---------- Forwarded message ----------
From: **Rosendo Majano** [redacted]
Date: Tue, Jun 26, 2018 at 10:54 AM
Subject: CC&V
To: "Brickey, Jonathan" [redacted]
Cc: Emmett Malone [redacted]

Jonathan,

I have finished the review of the CC&V application and I will start preparing the final Modeling Review Report in our regular format. However, that is going to take several days so in the meantime, and as we have done in the past, I'm sending you attached a memo with my findings and conclusions along with two supporting documents from one of the Modeling Unit's mobile sources expert. Hopefully this information will allow you to move forward with your part of the work on this application while I finish my report.

In short, the Cripple Creek & Victor facility will cause modeled violations of the 1-hr NO2 NAAQS. In addition, there are several errors in the modeling analysis that require correction before it can be determined whether the proposed project will or will not cause and/or contribute to modeled violations of the rest of applicable NAAQS.

Let me know if you have any questions.

Rosendo Majano
[redacted]

--

Gordon Pierce
Program Manager
Technical Services Program
COLORADO
Air Pollution Control Division
Department of Public Health & Environment

4300 Cherry Creek Drive South, Denver, CO 80246-1530
[redacted]

APPENDIX C

LETTER FROM JILL HUNSAKER RYAN, MPH, EXECUTIVE DIRECTOR, TO CHANDRA ROSENTHAL, ROCKY MOUNTAIN PEER DIRECTOR, PUBLIC EMPLOYEES FOR ENVIRONMENTAL RESPONSIBILITY (APR. 14, 2021)

COLORADO
Department of Public Health & Environment

April 14, 2021

Chandra Rosenthal
Rocky Mountain PEER Director
Public Employees for Environmental Responsibility
962 Wayne Avenue, Suite 610
Silver Spring, MD 20910
crosenthal@peer.org

RE: March 30, 2021, Letter Regarding Colorado Air Modeling

Dear Ms. Rosenthal:

I write to acknowledge receipt of your letter dated March 30, 2021, in which you describe concerns raised by three employees of the Colorado Department of Public Health and Environment. I take the allegations in your letter very seriously. Since I received your letter, my staff has been working diligently to consider the most responsive and effective approach to address these concerns. We are well on our way to a final plan. You will see a follow-up letter with more detail within the next thirty days.

With regard to CDPHE's modeling guidelines, we removed those guidelines and the memo (PS Memo 10-01) used by the permitting team from CDPHE's website to address outdated and inaccurate information. The PS Memo 10-01 has been retired. This week, CDPHE continues to work toward re-posting the revised modeling guidelines with input from staff and are assessing options for a more complete review with the scientific community. Though still a draft and subject to change with more review, anticipated revisions during this interim period include: 1) removing the reference to the PS Memo 10-01 so all know that the revised modeling guidelines are the single source of information related to modeling, and 2) communicating that APCD will not require modeling of sources that have very low NOx and SO2 emissions, but the modeling unit may consider the low short-term thresholds when evaluating whether modeling is appropriate. This change is necessary to ensure what we communicate to the public is consistent with what we are doing.

You also referred to additional supporting information that you did not include in your letter to me. Specifically, you offered attachments to other letters and the complaint made on behalf of the employees in question. You also offer emails documenting multiple protected

disclosures the employees have made to management. I welcome this information as we prepare to further evaluate the issues.

I completely agree that CDPHE must meet all requirements of the Clean Air act and Colorado Air Pollution Prevention and Control Act. I am confident the Air Pollution Control Division has been implementing Colorado's air pollution permitting program consistently with state and federal law. We welcome the opportunity to respond to the issues and confirm whether the program is on the right course. Governor Polis and CDPHE are deeply committed to reducing air pollution throughout Colorado. Under Governor Polis' leadership, Colorado has witnessed the institution of unprecedented measures designed to reduce a suite of air pollutants affecting Coloradoans every day. CDPHE is committed to administering those measures with the diligence they deserve.

Sincerely,

Jill Hunsaker Ryan, MPH
Executive Director

cc: Deborah Nelson, Acting Environmental Health and Protection Director

APPENDIX D

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, *POLICY NUMBER 13.6, CONFLICTS OF INTEREST* (JUNE 2017)

	Policy:	**Conflicts of Interest**		
	Number (Part):	13.6	Created:	February 2016
	Supersedes:		Revised:	May 2017
	Approved By:	Larry Wolk, M.D., Executive Director and Chief Medical Officer	Approved:	June 2017

Summary

Department employees are required to disclose actual conflicts of interest and perceived or potential conflicts of interest at the time of employment and annually thereafter, in addition to within three business days of becoming aware of any change triggering an actual or perceived or potential conflict of interest. Nonemployees who are affiliated with the department, such as interns or volunteers, are also expected to adhere to the terms of this policy.

Purpose

The purpose of this policy is to establish a framework for the disclosure, assessment, and mitigation or elimination of actual conflicts and perceived or potential conflicts of interest for department staff.

Definitions

Conflict of interest means when financial or other personal or professional considerations compromise an individual's objectivity, professional judgment, professional integrity, and/or ability to perform his or her work.

Conflict of interest panel means a group of employees authorized by the executive director to review and approve or deny management plans created to manage conflicts of interest.

Immediate family member means a person who is related by blood, marriage, civil union, or adoption. Family members include one party with any of the following relationships to another party:

- Spouse, and parents thereof;
- Children, and spouses thereof;
- Parents, and spouses thereof;
- Siblings, and spouses thereof;
- Grandparents and grandchildren, and spouses thereof;
- Domestic partner and parents thereof, including domestic partners of any individual in bullets 2 through 5 of this definition; and
- Any individual related by blood or affinity whose close association with the employee is the equivalent of a family relationship.

Management plan means a plan created by an employee's supervisor to manage all identified actual, potential or perceived conflicts of interest.

Perceived or potential conflict of interest means when an employee or an employee's immediate family member has financial interests, personal relationships, or professional associations with an individual or outside organization such that the employee's work activities could appear to be negatively affected by that interest or relationship in favor of the financial or nonfinancial benefit of the employee or the employee's immediate family member.

	Policy:	Conflicts of Interest		
	Number (Part):	13.6	Created:	February 2016
	Supersedes:		Revised:	May 2017
	Approved By:	Larry Wolk, M.D., Executive Director and Chief Medical Officer	Approved:	June 2017

Substantial financial interest means a financial interest of any kind, which, in view of all circumstances, is substantial enough that it would, or reasonably could, affect an employee's judgment with respect to transactions in which the state is a party and the employee has decision-making capacity or authority.

Policy

Public employees in Colorado are required by Article XXIX of the Colorado Constitution and Sections 24-18-101 *et seq.*, C.R.S., Colorado Code of Ethics to abide by certain ethical principles and rules of conduct in the course and scope of their work.

It is a conflict of interest with department employment for an employee to do any of the following:

- Disclose or use confidential information acquired in the course of the employee's official duties to substantially further the employee's personal financial interest.
- Accept a gift of substantial value or a substantial economic benefit tantamount to a gift of substantial value that meets either of these criteria:
    - Would tend to improperly influence the employee to depart from the faithful and impartial discharge of public duties;
    - Is primarily for the purpose of rewarding the employee for official action taken by the employee.
- Engage in a substantial financial transaction for the employee's private business purposes with a person whom the employee inspects, regulates, or supervises in the course of the employee's official duties.
- Assist any person for a fee or other compensation in obtaining any contract, claim, license, or other economic benefit from the department.
- Assist any person for a contingent fee in obtaining any contract, claim, license, or other economic benefit from any state agency.
- Perform an official act directly and substantially affecting to its economic benefit a business or other undertaking in which the employee either has a substantial financial interest or is engaged as counsel, consultant, representative, or agent.
- Have a personal interest in a department contract made by the employee as an official action.
- Be a member of a department contractor's board or agency, unless such membership is required by law, including statute, rule or executive order.
- Perform an official act directly and substantively affecting a business or other undertaking to its economic detriment when the employee has a substantial financial interest in a competing firm or undertaking.
- Assist or enable a member of the employee's immediate family in obtaining employment, a gift of substantial value, or an economic benefit tantamount to a gift of substantial value from a person whom the employee is in a position to reward with official action or has rewarded with official action in the past.

Employment outside the department in some circumstances may constitute a conflict of interest with department activities. Employees shall report any outside employment in accordance with department policy

10.27, Outside Employment, and such reports will be reviewed for actual conflicts as well as perceived or potential conflicts of interest.

Acceptance of travel expense reimbursement from an entity other than the department may be considered a conflict of interest, and must be reported through the department's travel authorization process to be reviewed for compliance with Article XXIX of the Colorado Constitution, known as Amendment 41.

Any violation of this policy may result in corrective and/or disciplinary action up to and including termination. Nonemployees not complying with this policy shall be dealt with appropriately.

Procedure

1. New department employees shall complete a Conflict of Interest Disclosure Form within 30 days of the start of employment with the department.
2. No later than June 30 of each year, employees shall complete a Conflict of Interest Disclosure Form for the next state fiscal year to report any actual, perceived or potential conflict of interest, and shall file an amendment to their Disclosure Form within three business days of becoming aware of such a conflict of interest.
3. Conflict of Interest Disclosure Forms shall be submitted to the employee's supervisor for review and determination of actual, perceived and potential conflicts of interest, which review shall include a determination of whether any entities disclosed by the employee have a current contract or purchase order with the department. If an actual conflict or perceived or potential conflict of interest exists, the employee's supervisor shall draft a management plan for review and approval by the department's Conflict of Interest Panel.
4. A management plan shall include all of the following:
    a. Identification of the conflict or potential conflict of interest
    b. Any necessary modification to the employee's duties, such as restrictions on work related to the conflict, or termination or reduction in projects related to the conflict
    c. Any necessary modification of the employee's outside interests that create the conflict, such as divesture of financial interests in an outside organization, stepping down from board membership of an outside organization, or formal termination of the conflicting outside interest
    d. Identification of an individual to monitor any ongoing conflicts
    e. At a minimum, annual review of the conflict to determine any impact to the employee's work activities.
5. The department's Conflict of Interest Panel shall review and approve, approve with modifications, or deny all management plans. Decisions made by the Conflict of Interest Panel regarding conflicts of interest are binding, final decisions. Employees found to have a conflict(s) or perceived or potential conflict(s) of interest may be required to divest themselves of the conflicting interest(s) to remedy a conflict situation.
6. Employees also shall report outside employment in accordance with department policy 10.27 and receipt of travel expense reimbursement from a third party through the filing of a travel authorization form for review and approval.

	Policy:	**Conflicts of Interest**		
	Number (Part):	13.6	Created:	February 2016
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Tools/Guidelines/Standards

Conflict of Interest Disclosure Form

Colorado Constitution, Art. XXIX

Sections 24-18-101 *et seq.*, C.R.S., Colorado Code of Ethics

Colorado State Personnel Board Rules and Personnel Director's Administrative Procedures, Board Rule 1-13

Policy 10.27, Outside Employment

APPENDIX E

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, *CONFLICTS OF INTEREST FAQ AND DISCLOSURE FORM INSTRUCTIONS*

Conflicts of Interest

FAQ and Disclosure Form Instructions

A Conflict of Interest is a conflict between an employee's duties and responsibilities with regard to the funding review process, and that employee's private, professional, business or public interests. There may be a real, perceived or potential conflict of interest when the reviewer:

- has a professional or personal relationship with an applicant or the applicant's institution;
- would receive professional or personal benefit resulting from the funding opportunity or application being reviewed;
- has a direct or indirect financial interest in a funding opportunity or application being reviewed; or
- is currently under investigation for an alleged breach of department policies.

A conflict of interest may exist or be perceived as such when reviewers:

- are applicants within the competition and have ability to bias or influence the process to the benefit of their application
- are a relative or close friend, or have a personal relationship with an applicant;
- are in a position to gain or lose financially/materially from the funding of an application;
- have had long-standing scientific or personal differences with an applicant;
- are currently affiliated with an applicant's institution, organization or company - including research hospitals and research institutes;
- are closely professionally affiliated with an applicant, as a result of having in the last six years:
  - frequent and regular interactions with an applicant in the course of their duties at their department, institution, organization or company;
  - been a supervisor or a trainee of an applicant;
  - collaborated, published or shared funding with the applicants, or have plans to do so in the immediate future; or,
  - been employed by the institution, when an institution is the applicant; and/or
- feel unable to provide an impartial review of the application for any reason.

FREQUENTLY ASKED QUESTIONS

Q: Who is required to complete a Conflicts of Interest disclosure form?
A: ALL department employees must complete the form.

Q: How often do I need to complete the Conflicts of Interest disclosure form?
A: At least once a year, and more often if your circumstances change and a new conflict arises or a prior conflict is resolved.

All department employees must disclose conflicts of interest
- upon initial employment,
- annually thereafter, and
- within (30) days of any change which could create a conflict of interest.

Q: What must be disclosed?
A: Generally speaking, an employee must disclose any association outside of the department that has or could be perceived as having the potential to influence how the employee performs his or her official duties. For example, an employee must disclose:

- any interests in an outside organization, including interests as an employee, board member, shareholder, or volunteer,
- interests of immediate family members in outside organizations that has or plans to bid on a contract or grant with, or has or plans to provide a contract or grant to, the department, and
- any intent to run for elected office.

Q: What does not need to be disclosed?
A: An employee does not need to disclose any confidential medical information about themselves or their family. For example, an employee who received medical treatment in a facility in which they have regulatory job responsibilities does not need to disclose such treatment.

Q: Do I have to complete the form if I have no activities to disclose?
A: Yes. There is an option on the form to indicate that you have no conflicts.

Q: What are actual, perceived or potential conflicts of interest?
A: Actual conflicts of interest arise in situations where financial or other personal considerations compromise an individual's objectivity, professional judgment, professional integrity, and/or ability to perform his or her responsibilities to the department.

Perceived or potential conflicts of interest arise in situations where an employee or a member of the employee's immediate family has financial interests, personal relationships, or professional associations with individuals or outside organizations such that the employee's activities within the department could appear to be biased against the department by that interest or relationship. For example, an employee is a member of a board of directors for a nonprofit organization that is intending to bid on a contract for work being issued by a program in the department with which the employee has no involvement.

Q: Who needs to approve my disclosure form?
A: Your supervisor in all circumstances. Your Division's FSM will also provide any relevant contracting information to your supervisor if you identify a potential conflict of interest.

Q: What is a management plan?
A: A management plan is a plan developed by your supervisor that identifies conflicts of interest and describes the requirements for the employee to mitigate or eliminate the conflict.

Q: Who creates the management plan if one is needed – me or my supervisor?
A: Your supervisor.

Q: Who approves the management plan?
A: The management plan is sent to the Conflict of Interest Panel for their review and approval. The Panel may approve the management plan, approve it with modifications, reject it for the supervisor to modify it, or deny it if the disclosure is incomplete.
- Only in the case of a denial will you need to start over with a new disclosure form.
- In all other instances, if additional work is needed, the individual with more work to do will receive an email with instructions for what is needed to complete their task in the existing disclosure form or management plan.

Q: What if I don't agree with the management plan requirements? Can I appeal the decision of the Panel concerning my management plan?
A: Management Plans approved by the Panel are final decisions, and you must abide by that decision. The decision may not be appealed.

Q: Do I use this Conflicts of Interest disclosure form to disclose employment with an entity other than the department?
A: While outside employment should be included on this form, department Policy 10.27, Outside Employee, provides specific instructions and a reporting form for outside employment.

Q: What can the department require that I do to mitigate or eliminate a conflict of interest?

A: There are a lot of ways in which conflicts of interest may be mitigated or eliminated, depending upon the circumstances surrounding each particular conflict. For example, the department may require elimination of a conflict of interest by instructing you to terminate your activities or interest in an outside organization. To mitigate against a conflict of interest, the department may set limits on activities that you may be involved in either within the department, or for an outside organization, or both.

Q: Will my disclosures for the Conflict of Interest policy be treated confidentially?
A: The department will only share your disclosures with those tasked with reviewing the disclosures to determine if conflicts exist and how to mitigate or eliminate those conflicts; however, the department is subject to the requirements of the Colorado Open Records Act and may be required to release this information.

Q: What sanctions may be imposed against me if I fail to complete and submit the disclosure form as required by the policy?
A: Employees are subject to progressive discipline for violations of department policy, which includes corrective action and/or disciplinary action up to and including termination. Non-employees not complying with this policy shall be dealt with appropriately.

Q: If I am aware of others in the department who I believe may have an actual, potential or perceived conflict of interest, is it my responsibility to report that conflict?
A: The policy and associated forms pertain to the self-reporting of conflicts of interest. If you believe another employee may have an actual, potential or perceived conflict of interest, it is appropriate to raise that issue with the employee and/or his or her immediate supervisor. Employees may also report concerns through the Ethics Line at https://cdphe.ethicaladvocate.com/

Q: Who can I contact for questions regarding this policy?
A: Ann Hause, Director of the Office of Legal and Regulatory Compliance
Ann.hause@state.co.us - 303-692-3472

DISCLOSURE FORM INSTRUCTIONS

Important - Read First

- Access Conflicts of Interest forms on the department's Office of Legal and Regulatory Compliance (OLRC) intranet page.
- Always make sure to click "submit" or "approve" after each step, otherwise the form will not move forward to the next step. A missing "Submit" or "Approve" button means the form is incomplete.
- Textboxes do not 'wrap' in Google Chrome and may appear to be cut off even though the text is there.

Employee Instructions:

Conflicts of interest may be difficult to identify. Here's a few items to consider when filling out your form:

- Consider any prior employment you have had in the last two years and how it relates to your current position or the work of the department.
- Consider employment of your immediate family members for the last two years and how it relates to your current position or the work of the department (e.g. your spouse works for a company that the department regulates).

- Consider any volunteer, or outside employment you have and how it relates to your position or the work of the department (i.e. you volunteer at an agency that the department regulates).

Keep in mind that conflicts of interest are NOT limited to work of the division you work in, but rather the entire department.

1. You cannot start a form and exit midway through. You must complete it or you will have to start over.
2. Use the address book icon  on the form to "find" your name.
    - Type and select your name in the search results and click "OK".
3. Enter your job title, division name, and very brief job description in the appropriate fields.
4. Select the appropriate filing type.
    - Annual – This is for the required annual filing, which for new employees must be completed within 30 days of hire.
    - Amendment – This is for updating information regarding a previously filed form for change that occurs before the annual filing date, or within 30 days of a change in personal circumstance that creates a new potential conflict.
5. Choose the appropriate conflict of interest choice. If you choose "Potential Conflict of Interest", additional information is required.
    - Complete the additional questions that appear.
    - Click on "I have additional conflict to disclose" if you have more than one potential conflict.
6. Use the address book icon to "find" and select your Fiscal Service Manager's name.
7. Use the address book icon to "find" and select your Supervisor's name.
8. Sign and submit. *A missing "Submit" button means the form is incomplete.*
9. Once the disclosure has gone through the process you will be notified via email. If more information is needed, your form may be rejected and returned to you to complete. You will receive an email notification if this occurs.

FSM Instructions:

1. You will receive an automated email with a link.
2. Use CORE to verify whether there are contracts between the department and entity in review. This information will help the Panel determine whether there is a conflict or not.
    a) Access the PROC-38 Report. For routing number, use the CT number in CORE.
    b) Find the Division and the purpose of the contract in CORE by searching under CT or PO.
    c) Enter the contract number to find the contract document.
    d) View the header, Default Shipping tab for the division. The Default Shipping tab can also tell you the program (i.e. Chronic Disease) in most cases.
    e) You may have to look at the extended description tab or the fund accounting tab (under "accounting") for more information.
3. Add the information regarding the contract to the form then approve and submit.
4. Make sure to "submit" or "approve" after each step, otherwise the form will not move forward to the next step. *A missing "Submit" or "Approve" button means the form is incomplete.*

✓ Remember to complete a form for yourself as an employee.

Supervisor Instructions:

1. You will receive an automated email with a link at various steps in the process.
2. Click on the link and follow the instructions on the page for approval or completion of a management plan, when applicable. When corrections are needed, you must list the corrections needed in the comments box then "reject".
3. Make sure to "submit" or "approve" after each step, otherwise the form will not move forward to the next step. *A missing "Submit" or "Approve" button means the form is incomplete.*

   ✓ Remember to complete a form for yourself as an employee.

Checking Form Status:

Pending or completed forms can be accessed at any time by visiting the following pages:

Employee's page - "My COI Requests"
Supervisor's Page – "COI Supervisors Page"
FSM's Page – "COI FSM Page"

Status Definitions:

Supervisor Confirmation Supe Approval Yes Conflict Supe Approval No Conflict Panel Reject to Supe	Awaiting supervisor action
FSM Approval	Awaiting FSM action
Panel Approval	Awaiting Panel review and action
Employee Confirmation	Awaiting employee's final signature confirming understanding of the Panel's final decision