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Via <https://www.regulations.gov>

Debra Thomas
Acting Regional Administrator
U.S. Environmental Protection Agency, Region 8
1595 Wynkoop Street
Denver, Colorado 80202

RE: The Board of County Commissioners of Weld County's Comments on the EPA's Decision to Redesignate the Northern Portion of Weld County as Nonattainment, Docket No. EPA-HQ-OAR-2017-0548-0459

Dear Acting Regional Administrator Thomas,

The Board of County Commissioners of Weld County ("Weld County") respectfully submits this comment regarding the U.S. Environmental Protection Agency's ("EPA") "Weld County Remand 120-Day Letter," dated May 25, 2021, in which the EPA notified Colorado of its proposal to designate the entirety of Weld County as nonattainment for the 2015 8-hour ozone National Ambient Air Quality Standard ("NAAQS"). Since the implementation of the Clean Air Act, northern Weld County has been excluded from the nonattainment area, and the most current data confirms that exclusion. For the reasons explained below, the EPA's proposal to now include northern Weld County within the nonattainment boundary for the 2015 ozone NAAQS is inappropriate, arbitrary, and capricious.

Summary

The EPA's proposed redesignation of the nonattainment area boundary to include northern Weld County for the 2015 ozone NAAQS is in response to the D.C. Circuit's remand of the EPA's 2018 designation decision in *Clean Wisconsin v. EPA*, 964 F.3d 1145 (D.C. Cir. 2020). In that case, the court remanded the EPA's designation of the Weld County nonattainment area boundary for further explanation, noting that the remand did not require the boundary to be changed because "there is at least a realistic possibility that EPA will be able to substantiate the relevant designations [with respect to Weld County] on remand." *Id.* at 1177.

The EPA could have responded to the court's remand based on the most current data and modeling results. Rather than seizing that opportunity, the EPA has arbitrarily limited its decision to air

quality, emissions, and weather data in the original record, ignoring the last four years of the best available data. This decision prevents the EPA from fully addressing the court's remand regarding the emissions factor, among other shortcomings. It likewise prevents the EPA from analyzing new quantitative data for northern Weld County emissions, which shows that northern Weld County does not materially contribute to violating monitors on days the 2015 ozone NAAQS is exceeded. As set forth in Section I, the EPA's failure to consider the last four years of best available data is arbitrary and capricious, contrary to past regulatory decisions, and highly prejudicial to Weld County.

In addition, after the EPA promulgates a revised NAAQS, the EPA must evaluate five factors in designating each area as attainment, nonattainment, or unclassifiable for the NAAQS.¹ As set forth in Sections 2 and 3 below, a careful analysis of these five factors reveals that northern Weld County should not be included within the nonattainment area for the 2015 ozone NAAQS. This is true regardless of whether the EPA considers the most current data or limits itself to the original record.

1. Air Quality Factor

Consistent with the Guidance Memo, the EPA analyzed the monitored ozone concentrations for the Denver Metro/North Front Range ("DM/NFR") area to determine if there are any areas that violate the 2015 ozone NAAQS and, if so, which areas contribute to these violations to determine the nonattainment area ("NAA") boundary. An area violates the 2015 ozone NAAQS when the design value exceeds 0.070 ppm. In two technical support documents—the Final EPA Technical Support Document (Colorado) ("Final TSD")² and the 2021 TSD ("2021 TSD")³—the EPA calculated the design value as the 3-year average of the annual fourth highest daily maximum 8-hour average ozone concentrations for the 2014 to 2016 period. The EPA determined that there were five monitors that exceeded the 2015 ozone NAAQS in the DM/NFR area, and none of the monitors in Weld County violated the 2015 ozone NAAQS. Importantly, current data for the 2018–2020 period also show that there are five monitors that continue to exceed the 2015 ozone NAAQS and none of the monitors in Weld County violate the 2015 ozone NAAQS. Moreover, recent analysis show that when monitoring data are adjusted for meteorological effects, the ozone level trends have decreased at monitors throughout the DM/NFR NAA. For counties without violating monitors, the remaining four factors (besides meteorology) are used to assess the spatial extent of the nonattainment area based on the definition of Section 107(d)(1) of the Clean Air Act requiring the NAA include areas that contribute to violating monitors.

¹ See Memorandum from Janet G. McCabe, Acting Assistant Adm'r, to Reg'l Adm'rs, Area Designations for the 2015 Ozone National Ambient Air Quality Standards (Feb. 25, 2016), *available at* <https://www.epa.gov/sites/production/files/2016-02/documents/ozone-designations-guidance-2015.pdf> ("Guidance Memo").

² EPA, *COLORADO: Denver Metro/North Front Range Nonattainment Area Final Area Designations for the 2015 Ozone National Ambient Air Quality Standards Technical Support Document* (2017), *available at* https://www.epa.gov/sites/production/files/2018-05/documents/co_tsd_final_0.pdf.

³ EPA, *COLORADO: Denver Metro/North Front Range Nonattainment Area Intended Area Designations for the 2015 Ozone National Ambient Air Quality Standards Technical Support Document (TSD) for Counties Remanded to EPA*, at 12 (May 25, 2021), *available at* https://www.epa.gov/sites/production/files/2021-05/documents/final_clean_co_tsd_-_weld_county_remand.pdf.

2. Emissions Factor

The EPA has expressly admitted that it does not have a clear understanding of the amount of emissions in the northern portion of Weld County.⁴ Perhaps more importantly, though, this admission demonstrates that the EPA's decision to limit the record has curtailed its ability to satisfactorily address the court's remand. New data is available that isolates northern Weld and Larimer Counties' emissions from other NAA emissions and other attainment area emissions. From this data, it can be estimated that northern Weld County's anthropogenic emissions of ozone precursors comprise no more than 4% of the NAA NOx emission inventory and 2.6% of the NAA VOC emissions inventory. Moreover, even these low percentages of ozone precursor emissions likely overestimate the true level of NOx and VOC emissions in northern Weld County, because a portion of these emissions are emitted in Larimer County. In addition, the EPA does not account for the fact that oil and gas emissions have decreased and will continue to do so given recent state regulations requiring statewide NOx and VOC emissions controls.

3. Meteorology Factor

The EPA cannot justify its decision to remove from the 2021 TSD the composite HYSPLIT plot included in its Final TSD. The composite HYSPLIT plot is critically important to assess the contribution from northern Weld County of ozone at violating monitors on high ozone days. In addition, many other HYSPLIT analyses of the DM/NFR NAA exist. These plots collectively show that results do not materially differ even with analysis of data across different time periods, monitors, and meteorological datasets. In other words, results of the composite HYSPLIT modeling analysis are robust, reproducible, and consistent, and therefore should be considered as part of the record.

First, the composite HYSPLIT plot shows that air parcels most frequently originate or pass through only those areas that are encompassed within the existing NAA boundary on their way to a violating monitor. Areas predicted by HYSPLIT to have a high frequency of back trajectories are referred to as ozone source regions. Air parcels infrequently, if ever, pass through northern Weld County before being transported to a violating monitor. The composite HYSPLIT plot shows that approximately *half of northern Weld County never has an air parcel pass through it* before arriving at a violating monitor. Composite HYSPLIT plots show that air parcels pass through other areas in northern Weld County less than 0.2% of the time on the way to a violating monitor. Therefore, northern Weld County is not an ozone source region for the DM/NFR NAA. In comparison, composite HYSPLIT plots show that air parcels pass through areas completely within the DM/NFR NAA boundary 1–2% of the time (five to ten times more frequently) on the way to violating monitors. The ozone source region depicted by the composite HYSPLIT plots demonstrates the existing NAA boundary—which excludes northern Weld County—fully encompasses the DM/NFR ozone source region. Thus, there is no technical or scientific justification for modifying the boundary.

Second, if the EPA revises the DM/NFR NAA boundary, the EPA should evaluate all attainment areas surrounding a given nonattainment area equally.⁵ In the absence of a “bright line” threshold

⁴ 2021 TSD at 12, *supra* note 3 (stating that it “does not have an accurate understanding of actual emissions from the northern portion of Weld County”).

⁵ Guidance Memo, Attachment 3 at 1, *supra* note 1 (“While technical assessments can help to define the magnitude or relative magnitude of contribution from nearby areas, the EPA is not setting a threshold contribution level or ‘bright line’ test for determining whether a contributing area should be included

contribution level, the relative contribution between areas is the EPA's only metric for providing a justifiable basis for determining which areas meet the definition of "nonattainment" in Section 107(d)(1). However, the EPA has not evaluated all attainment area surrounding the DM/NFR NAA consistently. Instead, the EPA has arbitrarily extended the existing NAA boundary just for Weld County. As shown in the composite HYSPLIT plot, meteorological transport pathways affecting northern Weld County (a proxy for contribution) do not transport air parcels to violating monitors in the DM/NFR NAA any more frequently than any other adjacent attainment area. Therefore, for the EPA to recommend changing the NAA boundary just for Weld County, when other attainment areas have similar or *greater contribution* than northern Weld County, is arbitrary.

Finally, to fully address the EPA's concerns stated in its Federal Register notice, Weld County has conducted revised HYSPLIT modeling. The results are not materially different from the previous HYSPLIT modeling and demonstrate that northern Weld County does not contribute to DM/NFR NAA ozone concentrations any more than any other attainment area bordering the DM/NFR NAA.

4. Geography/Topography Factor

The topographical analysis in the EPA's 2021 TSD is flawed in several important ways: (1) the EPA's revised analysis of the Cheyenne Ridge is arbitrary and is poorly substantiated; (2) the EPA's analysis inaccurately portrays the location of the Cheyenne Ridge; and (3) the EPA's analysis of this topographic feature is incomplete and does not fully consider the relevance of the feature to the DM/NFR NAA boundary.

5. Jurisdictional Factor

The EPA's decision to move the boundary does not fully consider the jurisdictional factors listed in the Guidance Memo. Among other shortcomings, the EPA did not explicitly consider the large size of northern Weld County, its remote and rural character, and the isolation of the northern area from the rest of the county due to the terrain climbing markedly to the north of the existing NAA boundary. Furthermore, the EPA's decision is influenced by: (1) arbitrarily capping the record and therefore it lacked relevant emissions data, and (2) the ample available data that shows a lack of meteorological transport of emissions to violating monitors on high ozone days.

The EPA concluded that "including the entirety of Weld County in the nonattainment area is necessary to effectively encompass the emissions sources contributing to violating monitors."⁶ But this conclusion contradicts its own finding regarding the emissions factor, where EPA stated that it does "not have an accurate understanding of actual emissions from the northern portion of Weld County." Furthermore, the EPA has no quantifiable estimate of the contribution of emissions in Weld County to violating monitors in its arbitrarily capped record of data and modeling to substantiate its jurisdictional conclusion.

within the boundaries of a given nonattainment area. Section 107(d) of the Clean Air Act does not require the EPA to set a threshold contribution.").

⁶ 2021 TSD at 30, *supra* note 3.

6. Weight of Evidence Analysis

Pursuant to the Guidance Memo, once the EPA completes its analysis of the five factors, EPA assesses these factors in combination as part of its “weight of evidence” analysis. The EPA failed to conduct an adequate weight of evidence analysis in its 2021 TSD. Newly available ozone modeling analyses definitively demonstrate that northern Weld County has an insignificant contribution to violating monitors in the DM/NFR NAA. This directly contradicts the EPA’s unsubstantiated position regarding the jurisdictional factor. In its weight of evidence analysis, the EPA did not consider this new data and instead relies predominantly on the topographical factor to support its proposed revision of the DM/NFR NAA boundary. The topography factor analysis prepared by the EPA is inaccurate, unsubstantiated, and incomplete. Therefore, it is insufficient to serve as a basis for the EPA’s proposed revision of the DM/NFR NAA boundary. In addition, the EPA did not carefully consider the jurisdictional boundaries and the administrative challenges to implement and track compliance with requirements for different NAAQS with different NAA boundaries.

In sum, to include northern Weld County in the DM/NFR NAA is contrary to the most current data, previous analyses, and past regulatory decisions. Rather than reversing decades of precedent and relying on an inaccurate and rushed analysis, the EPA should rely on the substantial evidence showing northern Weld County emissions do not contribute to violating monitors on high ozone days. The decision to change the DM/NFR NAA boundary is arbitrary and lacks the support of substantial evidence in the record.

Regulatory and Judicial Review Background

On October 1, 2015, the EPA revised both the primary and secondary ozone NAAQS, triggering the EPA’s responsibility to designate each “area” in the United States as “attainment,” “nonattainment,” or “unclassifiable” for those standards. On April 30, 2018, the EPA finalized its nonattainment area boundaries for the 2015 Ozone NAAQS. In reaching this decision, the EPA conducts a weight of evidence analysis, evaluating the following five factors: (1) air-quality data; (2) emissions and emissions-related data; (3) meteorology; (4) geography/topography; and (5) jurisdictional boundaries.⁷ In that April 30, 2018 decision, the EPA designated the DM/NFR nine-county area as a marginal nonattainment area for the 2015 Ozone NAAQS. The DM/NFR NAA did not and never has included northern Weld County, which has been classified as Attainment/Unclassifiable for ozone since the implementation of the Clean Air Act.

Numerous petitioners filed petitions for review in the D.C. Circuit challenging a subset of the EPA’s attainment designations for over a dozen nonattainment areas across the United States. These separate petitions were consolidated for purposes of judicial review of the EPA’s original designations. *See Clean Wisconsin*, 964 F.3d at 1152. Among other challenges, petitioners contested the DM/NFR NAA boundary, arguing the EPA arbitrarily drew the nonattainment boundary to exclude northern Weld County based on flawed analyses of topographical features and emissions data.

In justifying its original nonattainment boundary designation, the EPA explained that it excluded northern Weld County for two primary reasons: (1) “emissions from the northern portions of Weld County were approximately 25% of NO_x and 18% of VOC total emissions in Weld County” in 2011 (the year for which Colorado provided emissions data),⁸ and (2) the Denver Basin’s “unique meteorological conditions

⁷ Guidance Memo, *supra* note 1.

⁸ Final TSD at 14, *supra* note 2. In its original nonattainment boundary designation, the EPA considered

and topographical features . . . indicate that emissions in Northern Weld . . . are not likely to contribute to violating monitors.”⁹

On July 10, 2020, the D.C. Circuit issued its decision, stating that it was not satisfied with the EPA’s explanation for the Weld County nonattainment boundary based solely on the emissions and topography factors. Regarding the EPA’s first explanation, the court noted that “EPA could not rationally rule out contribution from northern Weld by downplaying the area’s proportionate contribution to the county’s overall, excessive emissions.” 964 F.3d at 1168. As to the EPA’s second explanation, the court highlighted the EPA’s inaccurate characterization of topographical and meteorological data. *Id.* at 1168-69. The EPA claimed a topographical feature called the Cheyenne Ridge “restrict[s] contributions from sources on the upper reaches of and beyond the feature[], including” northern Weld County, from reaching monitors farther south in the Denver Basin. *Id.* Yet in Colorado’s initial submission, the state accurately located the Cheyenne Ridge along Colorado’s border with Wyoming, rather than bisecting Weld County. *Id.* Accordingly, the court concluded that the EPA’s reliance on a mistaken interpretation of the data to justify the Weld County nonattainment boundary was arbitrary and capricious. *Id.*

Importantly, rather than vacating the EPA’s determination of the nonattainment boundary for Weld County, the court remanded the designation to the EPA for further explanation. Indeed, the court suggested the EPA could support its original designation, stating that “there is at least a realistic possibility that the EPA will be able to substantiate the relevant designations on remand.” *Id.* at 1177. Thus, on remand, the EPA did not have to reverse its decision. It could have simply provided an accurate analysis of the emission and topography factor.

The EPA issued its proposed redesignation decision almost a year after the court’s remand. The EPA explained it was limiting its review to the “existing technical record,” and based on its further analysis of the emissions and topography factors, the EPA revised the nonattainment boundary to include northern Weld County.

Argument

I. EPA’s Failure to Consider the Most Current Data Is Arbitrary and Capricious

In its 120-Day Letter, the EPA explained its redesignation decision is based on “only data available at the time of the original designation.” This includes 2014–2016 air quality data and the 2014 National Emissions Inventory. Importantly, it does not include the extensive modeling or monitoring data generated since 2014. Based on its review of this four- to seven-year old data, the EPA stated that it “intends to designate the entirety of Weld County nonattainment as part of the Denver Metro/North Front Range nonattainment area.” In reaching this decision, the EPA ignored the last four to seven years

emissions data from the 2014 National Emissions Inventory. However, when Colorado submitted its TSD, the most recent emissions data available was from 2011. Colorado’s TSD was consistent with the EPA’s Guidance Memo, which states “[t]he EPA believes that it will be appropriate to use 2011 NEI version 2 data because that will be the most recent national emissions inventory information available at the beginning of the designation process.” Guidance Memo at 6, *supra* note 1. As described in Section I, the EPA’s decision to ignore updated data is even more confounding, given that the record includes emissions data that are almost a decade old.

⁹ Final TSD at 34, *supra* note 2.

of best available data. Regardless of what that data shows, failing to even consider it is arbitrary and capricious, and contrary to past regulatory decisions.

The EPA's primary priority should be to ensure its redesignation decision, which would likely have significant and lasting economic consequences for stakeholders, is based on sound and current scientific data and analysis. Indeed, a decision to expand the DM/NFR boundary is going to extend Colorado's extensive non-attainment area regulatory requirements to various facilities and industries that have never been subject to the full complement of NAA standards. This may require expensive facility upgrades and expansion of company compliance programs, not to mention the significant cost to the state and local governments to now enforce upon and monitor compliance with these regulatory standards. Considering the significant consequences of its decision, the EPA's decision to rush this process at the expense of sound scientific analysis is arbitrary and capricious. The EPA claims that its justification for rushing its redesignation decision and limiting it to the 2014–2016 data set is: (1) to remain consistent with the designations across the rest of the country in responding to the court's remand; and (2) to follow the Court's direction to issue revised designations as expeditiously as practicable." Neither justification is tenable or based on sound technical reasoning.

If consistency is truly the EPA's goal, then it should maintain consistency in its designation processes and allow Colorado's citizens the same opportunities afforded to other states to provide additional and more current air quality data to make the most informed and reasoned designation decision. Indeed, as part of past redesignation decisions, the EPA has consistently allowed additional and more current air quality monitoring data. In late 2017, as part of its redesignation process under the 2015 ozone NAAQS, the EPA allowed Georgia to provide more current 2015–2017 air quality data, or any other additional information it would like the EPA to consider. Georgia provided the more current data and revised its initial redesignation recommendation to remove Rockdale County from its recommendation to be designated as nonattainment.¹⁰ The EPA reviewed the most current data and agreed with Georgia's assessment, thereby removing Rockdale County from its nonattainment designation.¹¹ Had Georgia not been allowed to provide the most current air quality data, one county would have been unnecessarily subject to a nonattainment designation and the drastic economic and regulatory consequences that come with such a designation.

Similarly, Michigan provided more current air quality data and analyses, such as updated HYSPLIT and photochemical modeling and ozone gradient studies, to revise its initial nonattainment recommendations for Allegan and Muskegon counties from full-county to partial-county nonattainment areas.¹² Here again, the EPA reviewed the most current data and agreed with the state's revised

¹⁰ Ga. Dep't of Nat. Res., *Letter Re: Georgia's Revised Designation Recommendations for the 2015 Ozone NAAQS*, EPA-HQ-OAR-2017-0548-0289 (Feb. 2, 2018).

¹¹ EPA, *Georgia: Atlanta, Georgia Nonattainment Area, Final Area Designations for the 2015 Ozone National Ambient Air Quality Standards Technical Support Document*, https://www.epa.gov/sites/production/files/2018-05/documents/ga_tsd_final.pdf ("After considering the February 2, 2018 updated recommendation, and March 30, 2018 supplemental technical analysis, and based on the EPA's technical analysis as described in this TSD, the EPA is . . . designating the remainder of the Atlanta combined statistical area (CSA) (including Rockdale County) as attainment/unclassifiable.").

¹² Mich. Dep't of Env't Quality, *Letter Re: Area Designations for the 2015 Ozone Standard*, EPA-HQ-OAR-2017-0548-0293 (Feb. 22, 2018).

recommendation.¹³ Indeed, the EPA afforded other states the opportunity to provide more current air quality monitoring data, and multiple states have taken advantage of the EPA's willingness to consider the most current data in making such a consequential designation. Consistency does not mandate that the EPA consider the same years of air quality data for all states in making designations under the 2015 ozone NAAQS, but rather that all states be afforded the same opportunity to provide the most current and accurate air quality data and information in making these consequential, long-lasting designations.

By not considering updated data, the EPA is not adequately responding to the court's remand. The court remanded for the EPA to issue revised redesignations "as expeditiously as *practicable*," which inherently requires the EPA to gain an accurate understanding of all relevant and current air quality data and information. *Clean Wisconsin*, 964 F.3d at 1177. To do that, the EPA should consider the new data. In the 2021 TSD, the EPA recognized deficiencies in the emissions inventory data from the original record, stating "the EPA does not have an accurate understanding of actual emissions from the northern portion of Weld County."¹⁴ But by failing to assess the new data, it did nothing to address these concerns and therefore acted arbitrarily.

Additionally, the court's instruction to issue the revised designation "as expeditiously as practicable" does not mandate that the EPA make haste in its decision. Indeed, that language is the same that the Clean Air Act uses in Section 107(d), which directs the EPA to designate areas under revised NAAQS as "expeditiously as practicable, but in no case later than 2 years from the date of promulgation of the new or revised [NAAQS]." 42 U.S.C.S. § 7407(d)(1)(B)(i). And that 2-year statutory timeframe can even be extended for another year under the Clean Air Act if the EPA does not have sufficient information to make the designation. Thus, the court's directive allows time to make a reasoned judgment based on the most effective tools applied to the most current air quality monitoring data. And if, in fact, the EPA interpreted the court's directive as mandating a speedy redesignation decision, it remains unclear why it took the EPA nearly a year after the Court's decision to propose its redesignation decision, especially if it limited its review to the now five-year-old data set from 2014–2016. Weld County's engineering consultant, Ramboll, reviewed and analyzed the proposed redesignation and most current data in just five weeks for purposes of these comments.

II. The Most Current Data Do Not Support Including Northern Weld County in the NAA

The EPA proposes to move the NAA boundary based on a technical analysis the EPA itself has recognized as insufficient.¹⁵ The EPA's decision to limit the record is not just arbitrary, but it is also unnecessary. The precise data necessary for the analysis are already available. Indeed, since the EPA's original NAA boundary determination,¹⁶ substantial information has been developed that is relevant to the EPA's assessment of the DM/NFR NAA boundary for the 2015 ozone standard. As described below,

¹³ EPA, *Michigan: Detroit, Muskegon County, Allegan County, and Berrien County Nonattainment Areas Final Area Designations for the 2015 Ozone National Ambient Air Quality Standards Technical Support Document*, https://www.epa.gov/sites/production/files/2018-05/documents/mi_tsd_final_0.pdf ("After considering these [revised] recommendations and based on the EPA's technical analysis as described in this TSD, the EPA is not modifying the state's recommendation to designate the areas listed in Table 1 as nonattainment for the 2015 ozone NAAQS.").

¹⁴ 2021 TSD at 12, *supra* note 3.

¹⁵ 2021 TSD at 12, *supra* note 3.

¹⁶ Letter from EPA Regional Administrator Douglas Benevento to Governor Hickenlooper (Dec. 20, 2017), available at <https://www.epa.gov/sites/production/files/2017-12/documents/co-epa-resp-ozone.pdf>.

the most current available data shows that northern Weld County does not contribute to DM/NFR NAA ozone concentrations any more than any other attainment area bordering the DM/NFR NAA.

A partial list of current data related to emissions is listed in Table 1. After a comprehensive review of the best available emissions and topographical data, if the EPA has not determined that northern Weld County does not contribute to violating monitors, then the EPA should review current data relevant for all five factors to assess moving the NAA boundary for Weld County in accord with the Guidance Memo. Table 2 lists publicly available information that is not in the original record and which should be considered by the EPA to fully assess northern Weld County's contribution to violating monitors.

Table 1. Publicly Available Data Relevant to the Full Consideration of Emissions and Topography Factors That Was Not in the 2021 TSD

Applicable Factor	Type of Data	Summary	Citation
Emissions and Emissions-Related Data	Census Data	2019 Census Data - Colorado populations by county and change from 2010	https://www2.census.gov/programs-surveys/popest/tables/2010-2019/counties/totals/co-est2019-cumchg-08.xlsx
Emissions and Emissions-Related Data	2016 and 2020 Emissions Inventories	NOx and VOC emissions summaries by source categories and geographic regions used in the Serious SIP	Regional Air Quality Council (2020). Serious State Implementation Plan for the Denver Metro and North Front Range Ozone Nonattainment Area. December 18, 2020. https://raqc.egnyte.com/dl/g2nFZlaoLc/Ozone_SIP_Element_-_Adopted_121820%2BApdx12-C.pdf
Emissions and Emissions-Related Data	2016 and 2023 Emissions Inventories	NOx and VOC emissions summaries by source categories and geographic regions, including just the northern portions of Weld and Larimer Counties	https://raqc.egnyte.com/dl/jJOtlmqvtw/DIAG_Emiss_Dashboard_03172021.xlsx

Table 2. Publicly Available Data Relevant for the NAA Boundary Determination Not Considered by the EPA in the 2021 TSD

Applicable Factor	Type of Data	Summary	Citation
Air Quality Data	2018–2020 Design Values for DM/NFR NAA	2018–2020 Design Values in Denver Metro/North Front Range, CO	https://epa.maps.arcgis.com/apps/MapSeries/index.html?appid=bc6f3a961ea14013afb2e0d0e450b0d1#
Air Quality Data	Ambient Ozone Concentrations	2011–2014 monitored O3 near the Pawnee Buttes	USDA Forest Service (2014). Pawnee National Grassland Oil and Gas Leasing Analysis Final Environmental Impact Statement. December 2014. Available at: https://www.fs.usda.gov/nfs/11558/www/nepa/95573_FSPLT3_2393686.pdf
Air Quality Data	Weather Corrected Trends in Ambient Ozone Concentrations	Measured trends in DM/NFR NAA ozone concentrations were evaluated by adjusting for the influence of meteorological conditions	Ramboll (2020). Trends in Weather Corrected Ozone and Nitrogen Dioxide Updated Through 2019. Available at: https://raqc.egnyte.com/dl/XBdOYH6zjc/TSD_Weather_Corrected_Trends_Report_v3.pdf CDPHE (2016). Trends in Weather Corrected Ozone and Nitrogen Dioxide. Available at: https://raqc.egnyte.com/dl/H0xiX8ACR4/TSD_TrendsInWeatherCorrectedOzone.pdf
Meteorological Data	2019 HYSPLIT Analysis	HYSPLIT back trajectories using 2019 measurement data	Ramboll (2021). Assessment of the Denver Metro/Norther Front Range Ozone Nonattainment Area Boundary. February 2021. Attached as Exhibit 1.
Meteorological Data	2016–2018 HYSPLIT Analysis	HYSPLIT back and forward trajectories using 2016–2018 measurement data	Ramboll (2020). Conceptual Model of High Ozone in the Denver Metro/North Front Range Nonattainment Area for the 2020 Serious Ozone State Implementation Plan. August 2020. Available at: https://raqc.egnyte.com/dl/FIJGHQj2fi/DM-NFR_2020-O3SIP_Conceptual_Model_Ozone_v6.pdf
Jurisdictional Boundaries	2023 ozone modeling source apportionment results	2023 CAMx results at monitoring sites in the NAA plus ozone source apportionment results	RAQC (2021). 2021 Ozone Modeling Forum. April 20201. Available at: https://raqc.org/inventory/2021-ozone-modeling-forum
Weight of Evidence	2011 and 2017 modeling analyses	2011 and 2017 ozone modeling results for the Moderate SIP	Moderate Area SIP. Available at: https://raqc.egnyte.com/dl/uJfKleU67/FinalModerateOzoneSIP_2016-11-29.pdf Moderate Area SIP Technical Support Documents. Available at:

Applicable Factor	Type of Data	Summary	Citation
			https://raqc.org/sip/technical-support-documents-for-the-moderate-area-2008-8-hour-ozone-standard-state-implementation-plan/ RAQC (2017). 2017 Ozone Modeling Forum. November 2017. Available at: https://raqc.org/inventory/2017-ozone-modeling-forum/
Weight of Evidence	2016 and 2020 modeling analyses	2016 and 2020 ozone modeling results for the Serious Area SIP	Serious Area SIP. Available at: https://raqc.egnyte.com/dl/g2nFZlaoLc/Ozone_SIP_Element_-_Adopted_121820%2BApdx12-C.pdf Serious Area SIP Technical Support Documents. Available at: https://raqc.org/tsd-2008-ozone-standard-serious-sip RAQC (2020). 2020 Ozone Modeling Forum. June 2020. Available at: https://raqc.org/inventory/2020-ozone-modeling-forum

While Weld County has not performed an exhaustive review of this publicly available information, most of the information it has reviewed is directly applicable to the EPA’s review of the DM/NFR NAA boundary. Indeed, key data addresses the data gaps identified by the EPA and directly contradicts the EPA’s proposed revision of the DM/NFR NAA boundary. As set forth below, Weld County first presents a synopsis of data regarding the emissions factor, because that factor is pivotal to fully address the court’s concern on remand. Following the emissions factor, Weld County presents a synopsis of the other four factors in the Guidance Memo and a discussion of the required weight of evidence analysis.

A. Emissions and Emissions-Related Data

1. State Implementation Plan Emissions Inventory Data

The Regional Air Quality Council (RAQC) has finalized two ozone nonattainment State Implementation Plans (SIPs)¹⁷ and submitted the plans to the EPA for review and approval. The “Moderate Area Ozone SIP for the Denver Metro and North Front Range Nonattainment Area”¹⁸ was submitted to the EPA and approved on July 3, 2018 (83 FR 31068). The “Serious State Implementation Plan for the

¹⁷ RAQC, Colorado Serious SIP and Moderate SIP and Technical Support Documents (accessed on July 7, 2021), available at <https://raqc.org/sip/ozone-2008-8-hour-standard/>.

¹⁸ RAQC, Moderate Area Ozone SIP for the Denver Metro and North Front Range Nonattainment Area (accessed on July 7, 2021), available at https://raqc.egnyte.com/dl/uJfKleU67/FinalModerateOzoneSIP_2016-11-29.pdf (“Colorado Moderate SIP”).

Denver Metro and North Front Range Ozone Nonattainment Area”¹⁹ was submitted to the EPA on March 22, 2021, and EPA recently issued a completeness letter.²⁰ The emissions inventories for these SIP submissions were developed by Colorado Department of Public Health and Environment (CDPHE) and account for existing federal and state regulations. Emissions data were collected through academic research and field monitoring, models that combine government data and regulations, Air Pollution Emissions Notice (APEN) reports by businesses, and the National Emissions Inventory. Data from APEN reports are based on permitted calculation methods as approved by the CDPHE. The Moderate SIP analyzed a 2011 base year and a 2017 attainment year. The emissions inventories that were developed for this SIP were developed using EPA-approved emissions models and methodologies (83 FR 14807). The emissions inventory for 2017 was based on anticipated growth, technological advancements, and emissions controls expected to be implemented by 2017. The Serious SIP analyzed a 2016 base year and a 2020 attainment year. The Serious SIP emissions inventories followed a similar methodology as the Moderate SIP, and future year emissions similarly accounted for anticipated growth, technological advancements, and emissions controls expected to be implemented by 2020.

The NAA NO_x emissions inventories for the Moderate SIP and the Serious SIP are shown in Table 3, and the VOC emissions inventories are shown in Table 4. The Moderate SIP projected NAA NO_x emissions decreased by 86 tons per day (tpd) between 2011 and 2017 with on-road emissions sources providing a majority of the projected NO_x emissions decreases. The Serious SIP re-evaluated emissions estimates, and the total estimated NO_x emissions for the Serious SIP 2016 base year are comparable to the Moderate SIP’s 2017 projections. However, the emissions from individual source sectors varied considerably from the Moderate SIP estimates. The Serious SIP projected NAA NO_x emissions decreased by approximately 23 tons per day (tpd) between 2016 and 2020. On-road emissions sources again were estimated to provide a majority of the projected NO_x emissions decreases.

As shown in Table 4, the Moderate SIP projected NAA VOC emissions decreased by approximately 170 tons per day (tpd) between 2011 and 2017, with oil and gas sources providing a majority of the projected VOC emissions decreases. The Serious SIP re-evaluated emissions estimates, and both the total estimated VOC emissions for the Serious SIP 2016 base year and the VOC emissions for the individual source sectors are comparable to what the Moderate SIP projected for 2017. The Serious SIP projected NAA VOC emissions decreased by approximately 60 tons per day (tpd) between 2016 and 2020. Oil and gas sources again were estimated to provide a majority of the projected VOC emissions decreases.

¹⁹ RAQC, Serious State Implementation Plan for the Denver Metro and North Front Range Ozone Nonattainment Area (accessed on July 7, 2021), *available at* https://raqc.egnyte.com/dl/g2nFZlaoLc/Ozone_SIP_Element_-_Adopted_121820%2BApdx12-C.pdf (“Colorado Serious SIP”).

²⁰ Letter from EPA Acting Director Carl Daly to Garry Kaufman (June 2, 2021), *available at* https://raqc.egnyte.com/dl/be0wvpyPrb/Completeness_Determination_CO_Serious_Ozone_SIP_0528_2021.pdf.

Table 3. NO_x Emissions Estimates for DM/NFR NAA

Source Category	Moderate SIP		Serious SIP	
NO _x	Base Year 2011 (tpd)	Future Year 2017 (tpd)	Base Year 2016 (tpd)	Future Year 2020 (tpd)
Totals:	326.1	240.2	238	214.6
Oil and Gas	41.4	65.8	51.0	48.2
Point (EGU & non EGU)	60.7	40.1	25.1	21.7
Area	0	0	0	0
Non-Road Mobile	75.9	54.9	42.6	39.1
On-road Mobile	142.0	73.3	68.4	54.7
Biogenic Sources	6.1	6.1	50.9	50.9

Source: Colorado Moderate SIP (2016)²¹ and Serious SIP (2020)²²

Table 4. VOC Emissions Estimates for DM/NFR NAA

Source Category ¹	Moderate SIP		Serious SIP	
VOC	Base Year 2011 (tpd)	Future Year 2017 (tpd)	Base Year 2016 (tpd)	Future Year 2020 (tpd)
Totals:	689.2	519.7	531.8	471
Oil and Gas	279.7	154.0	163.3	119.0
Point (EGU & non-EGU)	26.5	28.4	22.9	25.0
Area	60.6	67.5	65.3	54.6
Non-Road Mobile	58.2	44.3	44.0	44.3
On-Road Mobile	93.7	55.0	57.6	49.4
Biogenic Sources	170.5	170.5	178.7	178.7

Source: Colorado Moderate SIP (2016)²³ and Serious SIP (2020)²⁴

2. Oil and Gas VOC Emissions Trends Are Substantiated by Measurement Data

The State of Colorado's "Technical Support Document for Point Source and Oil and Gas Emissions Inventory Development" provided an analysis of oil and gas emissions trends and compared the trends to measured VOC concentrations.²⁵ CDPHE concluded that oil and gas VOC emissions inventories are steadily decreasing and have decreased 67% since 2012. Furthermore, these trends are consistent with ambient air quality measurements (shown in Figure 1). Oil and gas emissions inventory trends, and corroboration with measurements, should be central to the EPA's review of the DM/NFR NAA boundary, especially given

²¹ Colorado Moderate SIP, *supra* note 18.

²² Colorado Serious SIP, *supra* note 19.

²³ Colorado Moderate SIP, *supra* note 18.

²⁴ Colorado Serious SIP, *supra* note 19.

²⁵ RAQC, Technical Support Document for Point Source and Oil & Gas Emissions Inventory Development (accessed on July 7, 2021), available at https://raqc.egnyte.com/dl/hi3MOfNkUP/DMNFR_Serious_PointSourceTSD_APCD_Final_12NOV2020.pdf.

the petitioners allegations in *Clean Wisconsin* about oil and gas emissions from northern Weld County (albeit based upon 2011 and 2014 data).²⁶

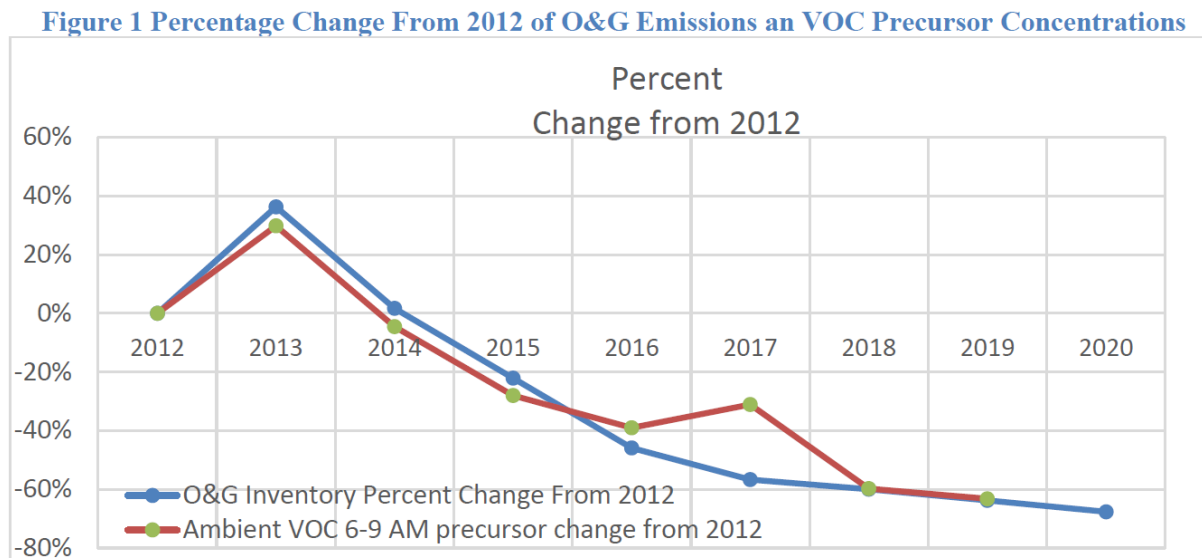


Figure 1. VOC Emissions Inventory Trends Compared to Measured Concentrations

3. Comparison of Northern Weld County Emissions to the Rest of the NAA

New emissions inventory data that estimate NO_x and VOC emissions from different geographic regions in Colorado is critical to the EPA's evaluation of the location of the northern boundary of the DM/NFR NAA. For the first time, emissions from the northern portion of Weld and Larimer Counties outside of the current nonattainment boundary have been estimated separately from the DM/NFR NAA and other regions in Colorado.²⁷ The EPA should consider it, as it is directly relevant to the court's remand. The data would enable the EPA to conduct a more informed evaluation of northern Weld County emissions by comparing the emissions from the northern portion of Weld and Larimer Counties outside of the NAA (referred to as "NLW" source area) to emissions in the DM/NFR NAA.

Data presented in Table 5 below show that summertime²⁸ DM/NFR NAA NO_x emissions sources are approximately 13 times higher than NLW NO_x emissions and DM/NFR NAA VOC emissions are

²⁶ The older emissions inventory data relied on in the original record does not account for state and federal oil and gas emissions control requirements. Specifically, state rules were adopted in 2014 and implemented in 2015, while federal rules were adopted in 2016. Both sets of rules are within the scope of the capped record. In addition, the emissions data do not account for the more recent control requirements listed in Table 7.

²⁷ RAQC, Emissions Inventory Data (accessed on July 7, 2021), available at https://raqc.egnyte.com/dl/jOtImqvtw/DIAG_Emiss_Dashboard_03172021.xlsx; RAQC, The Construction of Emissions Inventories: Nitrogen Oxides (NO_x) and Volatile Organic Compounds (VOC) (accessed on July 7, 2021), available at https://raqc.egnyte.com/dl/KvJPMzc1B7/EI_Presentation_May_2021.pdf (describing methods used to estimate the emissions).

²⁸ Emissions inventory data were assessed based on the average tons per day emitted during the months of June, July, and August.

approximately 8 times higher than NLW VOCs emissions. In percentage terms, the total emissions for the northern portion of both Weld and Larimer Counties combined is less than 8% of the DM/NFR NAA NO_x and is approximately 12.5% of the NAA VOC emissions. Importantly, the majority of the NLW and DM/NFR VOC emissions are from natural sources (NAT), which include biogenic VOCs, lightning NO_x emissions, windblown dust, and oceanic components. The majority of NLW NO_x sources are mostly natural, electric generating units (EGU) and oil and gas facilities (OG). The EGU emissions in the NLW source group are emitted only from facilities in Larimer County. Therefore, if natural emissions and the large EGU point sources in Larimer County are excluded from the comparison, the remaining anthropogenic, non-EGU emissions are a more accurate representation of potential northern Weld County emissions.

As shown in Table 6, NLW anthropogenic, non-EGU emissions could be up to 4% of the NAA NO_x emission inventory and 2.6% of the NAA VOC emissions inventory. Furthermore, even these low percentage emissions are likely an overestimate of the true amount of emissions in northern Weld County, because at least a portion of the anthropogenic, non-EGU emissions presented in Table 6 are emitted in Larimer County. The fact that northern Weld County emissions are less than 5% of the NAA emissions for both NO_x and VOC is significant. By not considering this data, the EPA is failing to adequately respond to the court's remand. Moreover, this data soundly refutes the *Clean Wisconsin* court's conclusion regarding Weld County's "excessive emissions," and therefore must be addressed on remand with the best available data.

Table 5. Comparison of DM/NFR NAA and NLW Emissions in tons per day.

Source	NAA (tpd)	NLW (tpd)	NAA (tpd)	NLW (tpd)
	NO _x		VOC	
Total:	170	13	623	78
NAT	12	3	252	68
EGU	12	4	0	0
NEG	20	0	27	0
OG (total)	49	5	192	8
On-road (total)	38	0.52	33	0.78
Other	39	0.48	119	1.22

Source: RAQC (2021)²⁹

Table 6. Comparison of NLW Emissions to NAA Emissions in Percentages.

Source ²	NAA (tpd)	NLW (% of NAA)	NAA (tpd)	NLW (% of NAA)
	NO _x		VOC	
Total	170	7.6%	623	12.5%
NAT	12	25.0%	252	27.0%
EGU	12	33.3%	0	0%
Anthropogenic Emissions Excluding EGU	146	4.1%	371	2.7%

Source: RAQC (2021)³⁰

²⁹ RAQC, Emissions Inventory Data, *supra* note 27.

³⁰ RAQC, Emissions Inventory Data, *supra* note 27.

In addition to the publicly available data discussed above, Colorado Air Quality Control Commission (AQCC) has recently required oil and gas operators report emissions annually to CDPHE (Colorado Regulation 7, Part D Section V.). The first annual emissions inventories were submitted to CDPHE on June 30, 2021 and a summary of these emissions data would also be relevant to the EPA's review of the DM/NFR NAA boundary.

4. Emissions Control Requirements

In addition to the publicly available information about emissions, it is also relevant to consider recently implemented oil and gas emissions control requirements. The Moderate SIP and Serious SIP emissions inventory and corresponding Technical Support Documents were finalized prior to many new state regulations, and therefore the emissions inventory data presented above do not account for new regulatory requirements that will further decrease emissions from sources in northern Weld County. A comprehensive list of newly adopted rules affecting oil and gas sources is presented in Table 7. Most importantly, most of these requirements are applicable state-wide and are not limited to the DM/NFR NAA, meaning that *these controls are effective regardless of the NAA boundary*. Therefore, expanding the NAA boundary to include all of Weld County will not cause such measures to be adopted in northern Weld County, because *they are already in place*. Furthermore, implementation of the Colorado regulations presented in Table 7 is expected to produce additional significant reductions in oil and gas sector emissions beyond the reductions presented in Tables 5 and 6 above.

Table 7. Recent Revisions to Colorado Regulations 3, 7, and 22 adopted since 2019

Regulation Number and Section	Revision Date	State-wide requirements	Non-attainment area requirements
I.DDD. AQCC Regulation 3 Revision	Dec 19 th 2019	<ul style="list-style-type: none"> Established definition for the end of flowback and commencement of operations to prevent use of temporary equipment. Oil and Gas Facilities require pre-construction permit and 90-day deferral was repealed. Routine or predictable venting emissions no longer exempt from APEN. Wastewater impoundments are no longer excluded from APEN reporting. 	<ul style="list-style-type: none"> N/A all changes implemented statewide
S. AQCC Regulation 7 Revision	Dec. 19 th 2019	<ul style="list-style-type: none"> Increase frequency of Leak Detection and Repair (LDAR) requirements Expand condensate tank control requirements to tanks containing hydrocarbon liquids and produced water Prohibit tank venting during loadout. Establish annual emission inventory reporting requirements 	<ul style="list-style-type: none"> Tank Systems in NAA need to install controls on storage tanks with uncontrolled VOC greater or equal to 4 tons per year.
AQCC New Regulation 22	May 22 nd 2020	<ul style="list-style-type: none"> Establish GHG emissions reporting requirements. HFCs not approved by federal requirements need to be replaced by manufacturers. GHG reduction plan requires inventory records to be monitored. 	<ul style="list-style-type: none"> N/A All Changes enforced statewide.
Colorado Oil and Gas Conservation Commission (COGCC) Mission Change	April 16 th 2019	<ul style="list-style-type: none"> Mission of COGCC changed with Senate Bill 19-181 Distance of oil and gas facilities must be 2,000 feet from all other building units. Flaring is regulated to protect and minimize adverse impact to public health. Operators must estimate emissions of specific pollutants that have specific impact on formation of ozone and direct climate change impacts. Cumulative impact analysis collects data and creates database (CIDER) to evaluate cumulative impacts. 	<ul style="list-style-type: none"> N/A All Changes enforced statewide.

Regulation Number and Section	Revision Date	State-wide requirements	Non-attainment area requirements
T. AQCC Revisions to Regulation 7	September 17-18, and 23 rd 2020	<ul style="list-style-type: none"> Reciprocating Internal Combustion Engines (RICE) greater than or equal to 1,000 horsepower must meet emissions standards by May 1, 2026 Owners required to monitor air quality at and/or around pre-production operations and early production operations. New requirements for flowback vessels to control emissions. New definition of Class II Disposal Well facilities. Annual Emission reporting now includes reporting on CO₂ and N₂O with periodic samples of liquid to inform emissions estimates. 	<ul style="list-style-type: none"> Engine brought into 8-hour Ozone Control Area is considered “relocated” and must meet or exceed standards as of operation date. Engines must meet emissions standards by May 1, 2024.
I.EEE AQCC Revisions to Regulation 3	December 16 th 2020	<ul style="list-style-type: none"> Previously approved regional haze requirements in Regulation 3 including emission reduction requirements for sources subject to BART and Reasonable Progress during first planning period registered to Regulation Number 23. Regulation 23 will contain reasonable progress goals for second 10-year planning period. Emissions of NO_x, SO₂ and PM₁₀ are new regulation alongside existing emissions limits. 	<ul style="list-style-type: none"> N/A All Changes enforced statewide.
I.FFF AQCC Revisions to Regulation 3	December 18 th 2020	<ul style="list-style-type: none"> Revised definitions and construction, operating and new source review permitting programs to update definitions and conform to federal regulations. Definition of CO₂e revised to reflect the EPA’s revisions to global warming potentials for fluorinated greenhouse gases. Operating permit program aligns with 50 CFR Part 70 and new sources align with 40 CFR Part 51. Clarification on permits that require hearings. Clarifications of electronic submittal process. Engine exception removal included in Section III.E.3.xxx. 	<ul style="list-style-type: none"> N/A All Changes enforced statewide.

Regulation Number and Section	Revision Date	State-wide requirements	Non-attainment area requirements
U. AQCC Revisions to Regulation 7	December 17 th -18 th 2020	<ul style="list-style-type: none"> • Shorter LDAR repair deadlines for leaks within 1,000 feet of occupied area. 	<ul style="list-style-type: none"> • Reasonably available control requirements implemented. • Requirements for LDAR inspections have been clarified with correct typographical, grammatical, and formatting errors removed. • Boilers greater than or equal to 50 MMBtu/hr must comply with 0.1 lb/MMBtu NOx emission limit. • RICE requirements adjusted and include landfill gas and biogas RICE. • Turbines constructed before February 18th, 2006 must comply with NSPS KKKK. 30-day average of compliance
AQCC February 2021 Revisions to Regulation 7	2021	<ul style="list-style-type: none"> • Pneumatic controllers need to transition to non-emitting pneumatic controllers at oil and gas production plants and natural gas compressor stations. • De minimis emissions no not alter a controller's classification as "intermittent." • Retrofits required for pneumatic controllers at facilities beginning production, recomplected or refractured on May 1, 2021. • Company-wide plans for pneumatic controllers prior to May 1, 2021 to convert to non-emitting controllers. 	<ul style="list-style-type: none"> • N/A All Changes enforced statewide.

Regulation Number and Section	Revision Date	State-wide requirements	Non-attainment area requirements
		<ul style="list-style-type: none"> • Operators must determine total liquid production with non-emission controllers. • Retrofitting will be completed incrementally until May 1, 2022 and May 1, 2023 based on percentages. • Pneumatic controllers necessary for safety or process purpose that cannot be met without emitting natural gas are an exception. • Pneumatic controllers must be tagged for authorized emission of natural gas to atmosphere. • Operators must keep records for five years for retrofit completions, claiming exception demonstrating applicability, copies of compliance plans, records of qualification under section III.C.4.c(iv), tags of pneumatic controllers. 	

Source: AQCC Regulations³¹

³¹ AQCC Regulations (accessed on July 3, 2021), available at <https://cdphe.colorado.gov/aqcc-regulations>.

B. Air Quality Data

In the Final TSD and 2021 TSD, the EPA calculated the design value as the 3-year average of the annual fourth highest daily maximum 8-hour average ozone concentrations for the 2014 to 2016 period. The EPA determined that there were five monitors that exceed the 2015 ozone NAAQS in the DM/NFR area data, and none of the monitors in Weld County violate the 2015 ozone NAAQS. Importantly, current data for the 2018–2020 period also show that there are five monitors that exceed the 2015 ozone NAAQS, and none of the monitors in Weld County violate the 2015 ozone NAAQS.³² Importantly, RAQC has analyzed ozone trends^{33, 34} as part of two ozone nonattainment SIPs which show that when monitored ozone concentrations are adjusted for meteorological effects, ozone trends have decreased at monitors throughout the DM/NFR NAA. Consistent with the Guidance Memo, examining historical ozone data are important to consider as part of the DM/NFR NAA boundary determination.

C. Meteorological Data

EPA Guidance Memo³⁵ recommends meteorological data be analyzed with air parcel back trajectories from the National Oceanic and Atmospheric Administration (NOAA) Hybrid Single-Particle Lagrangian Integrated Trajectory model (HYSPLOT). The HYSPLIT model is described by Rolph et al. (2017)³⁶ and Stein et al. (2015).³⁷ HYSPLIT back trajectories essentially model the path and origin of air parcels prior to arrival at a given location. This information is helpful to understand where the air parcel came from prior to arriving at a monitor. The EPA states that “When HYSPLIT trajectories are produced for specific monitor locations for days with high ozone concentrations...the results illustrate the potential source region for the air parcel that affected the monitor on the day of the high concentration.”³⁸ Furthermore, the EPA states “[w]hile a HYSPLIT trajectory analysis alone cannot yield a conclusion that a particular source region contributes to ozone concentrations, a set of HYSPLIT trajectories that show no wind flow from a particular region on any day with high ozone concentration measurements might provide support for discounting that region as contributing to ozone concentrations.”³⁹

Four independent, publicly-available back-trajectory analyses have been conducted with the NOAA HYSPLIT model for the DM/NFR area. These analyses generally use the same methodology and are

³² EPA Interactive Map, *available at* <https://epa.maps.arcgis.com/apps/MapSeries/index.html?appid=bc6f3a961ea14013afb2e0d0e450b0d1#>.

³³ Ramboll, Trends in Weather Corrected Ozone and Nitrogen Dioxide Updated Through 2019 (July 2020), *available at* https://raqc.egnyte.com/dl/XBdOYH6zjc/TSD_Weather_Corrected_Trends_Report_v3.pdf.

³⁴ CDPHE, Trends in Weather Corrected Ozone and Nitrogen Dioxide (Nov. 17, 2016), *available at* https://raqc.egnyte.com/dl/H0xiX8ACR4/TSD_TrendsInWeatherCorrectedOzone.pdf.

³⁵ Guidance Memo, Attachment 3 at 7–10, *supra* note 1.

³⁶ Glenn Rolph, Ariel Stein, and Barbara Stunder, Real-Time Environmental Applications and Display sYstem: READY, 95 Env't Modelling and Software at 210-228 (Sept. 2017), *available at* <https://doi.org/10.1016/j.envsoft.2017.06.025>.

³⁷ A.F. Stein, R.R. Draxler, G.D. Rolph, B.J.B. Stunder, M.D. Cohen, and F. Ngan, NOAA's HYSPLIT Atmospheric Transport and Dispersion Modeling System, 96 Bulletin Am. Meteorological Soc'y at 2059–2077 (Dec. 1, 2015), *available at* <http://dx.doi.org/10.1175/BAMS-D-14-00110.1>.

³⁸ Guidance Memo, Attachment 3 at 8, *supra* note 1.

³⁹ Guidance Memo, Attachment 3 at 8, *supra* note 1.

consistent with the EPA guidance.⁴⁰ The primary difference between the HYSPLIT analyses presented below is the time period analyzed. The first analysis (Figure 2) is for 2006 to 2008, the second analysis (Figure 3) is for 2013 to 2015, the third analysis (Figure 4) is for 2016 to 2018, and the fourth analysis (Figure 5) is for 2019. Since each analysis was conducted independently, the graphical depiction of results differ, but each analysis is described in detail below to provide additional information about the methods used and results obtained.

HYSPLIT is a particularly useful tool because it can provide a visual depiction of the effect of topographical features on air flow. The EPA implicitly acknowledges this important linkage in the Final TSD in the meteorology factor when discussing the meteorology as a function of terrain on page 26 and then describes these same terrain-induced meteorological patterns in the HYSPLIT runs on page 29. Based on the HYSPLIT analyses in Figures 2 through 5, it is evident that transport flow influenced by the topography, including the Cheyenne Ridge, is generally from within the existing NAA boundary on monitored high ozone days. To evaluate the effect of the lower slopes of the Cheyenne Ridge on pollutant transport patterns, it is useful to consider the effects of other topographical features in the NAA, such as the Continental Divide and the Palmer Divide. In Figure 4, the lower slopes of the Continental Divide and the Palmer Divide appear to have a similar effect on NAA transport patterns as the lower slopes of the Cheyenne Ridge (i.e., the most frequent sources of air parcels on days with monitored high ozone values is typically far removed from the mountain peaks and ridge lines).

Most importantly, the analyses in Figures 2 through 5 all demonstrate that northern Weld County does not contribute to DM/NFR NAA ozone concentrations any more than any other attainment area bordering the DM/NFR NAA area in any of the time periods analyzed, *nor has the contribution of northern Weld County changed between 2006 and the present*. All four, independent analyses demonstrate that the climatological transport patterns associated with high ozone concentrations are one of the primary drivers of the DM/NFR ozone formation processes, and statistically, these climatological transport patterns rarely involve northern Weld County. Regardless of the time period analyzed, this consistency is particularly relevant for the determination of the NAA boundary for the 2015 standard, because it demonstrates that the fundamental physical processes that transport pollutants has not changed since the 2008 ozone standard NAA boundary was established.

The data shown in Figure 2 was generated using HYSPLIT back trajectories for Fort Collins West, Rocky Flats North, and Chatfield.⁴¹ The HYSPLIT model was run for those days in 2006 through 2008 with the four highest daily average 8-hour (MDA8) ozone concentrations monitored at each site and each year. For each day, a 24-hour back trajectory was generated with points for each hour in each 8-hour period contributing to the MDA8. The HYSPLIT model was initiated with 100-meter arrival heights and the EDAS 40 km meteorological fields with vertical motion. The vertical motion feature in the EDAS 40 km data set is particularly informative to establish relationships between surface concentrations and local sources because this tends to result in flows that are nearly terrain-following in most situations. After all the back trajectories were obtained, the number of points in each 0.1-degree latitude by 0.1-degree longitude grid were summed, and these counts were then contoured on a map of the Front Range region. The resulting map shows regions that are most likely to have the greatest influence on peak monitored ozone concentrations (i.e. the “ozone source region”). Figure 2 shows that the ozone source regions during 2006

⁴⁰ Guidance Memo, Attachment 3 at 7, *supra* note 1.

⁴¹ Patrick Reddy and Gabriele Pfister, Meteorological Factors Contributing to the Interannual Variability of Midsummer Surface Ozone in Colorado, Utah, and Other Western U.S. States, JGR Atmospheres at 2434–2456 (Feb. 6, 2016), available at <https://doi.org/10.1002/2015JD023840>.

through 2008 are generally within the DM/NFR NAA, and air parcels arriving at the monitors on the highest ozone days rarely pass through northern Weld County.

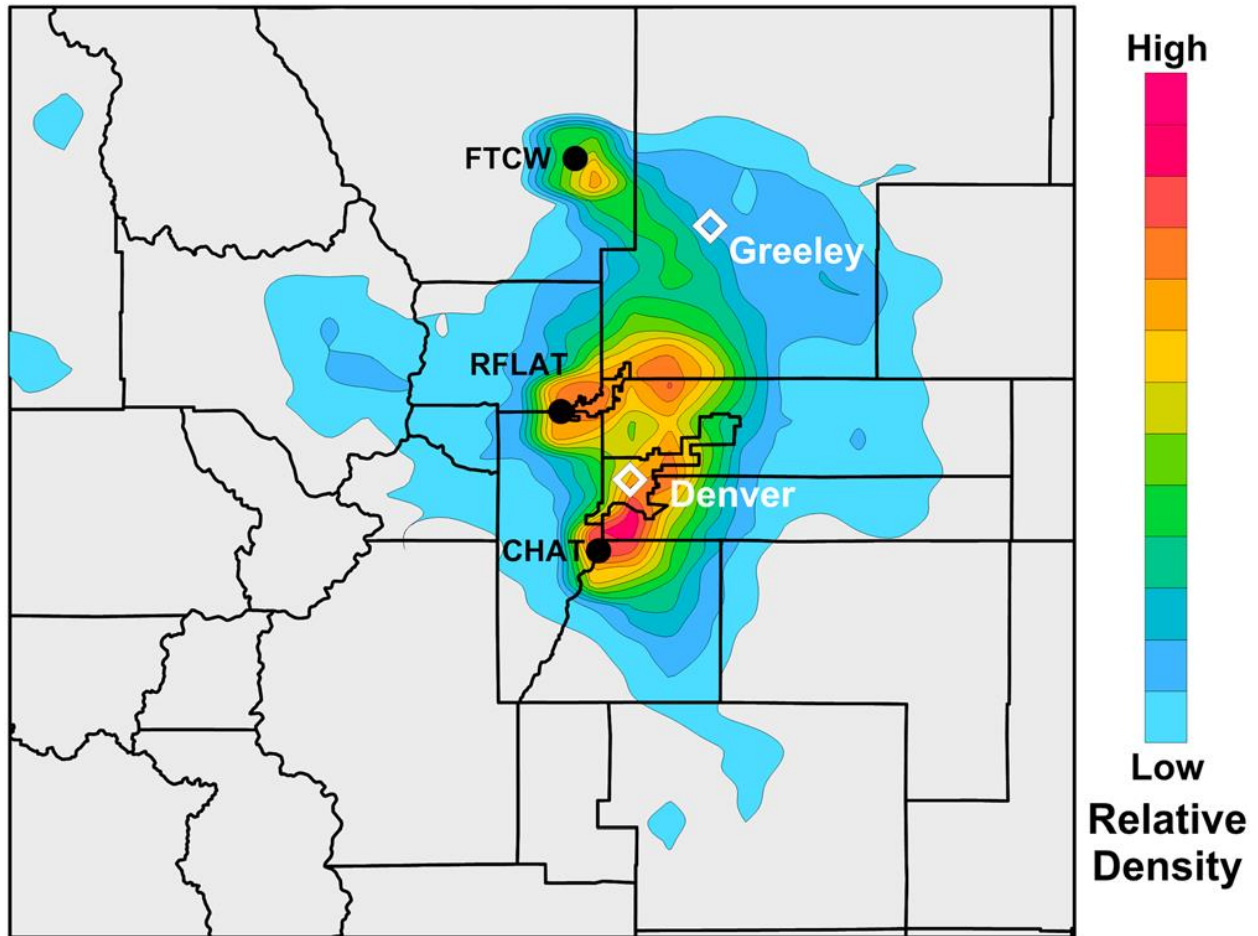
Figure 3 is from the EPA's Final TSD and shows a similar 24-hour HYSPLIT back trajectory analysis for each of the 8 hours contributing to the MDA8 for the four highest days at each site from 2013–2015.⁴² Figure 3 analyzes the same three monitors analyzed in Figure 2 with the addition of the National Renewable Energy Laboratory (NREL) site. Regardless of using more recent data, this analysis shows a similar pattern of ozone source regions as shown in Figure 2. Figure 3 also suggests that the area north of the NAA boundary in Larimer and Weld Counties contributes less to high ozone in the DM/NFR NAA than any other attainment area adjacent to the NAA boundary.

Figure 4 is a back trajectory analysis which was completed for the Serious SIP in 2020.⁴³ Figure 4 shows the ozone source region analyses based on data for years 2016 through 2018. All the other HYSPLIT model settings were identical to the analysis shown in Figure 3, but the arrival height was set at 10 meters, and trajectory points at the monitors were not included. Similar to the results presented in Figures 2 and 3, Figure 4 also shows that northern Weld County does not contribute to high ozone concentrations in the DM/NFR NAA. Importantly, the ozone source region pattern has not changed appreciably since first assessed using information for 2006–2008 (shown in Figure 2).

Figure 5 presents a similar back trajectory analysis using a similar methodology as used in Figure 4 with the main difference being that it is based on more current 2019 data. The HYSPLIT model was initiated with 100-meter arrival heights for 2019 with the North American Mesoscale Forecast System at 12 km resolution (NAM12) sigma-pressure hybrid data.

⁴² Final TSD, *supra* note 2.

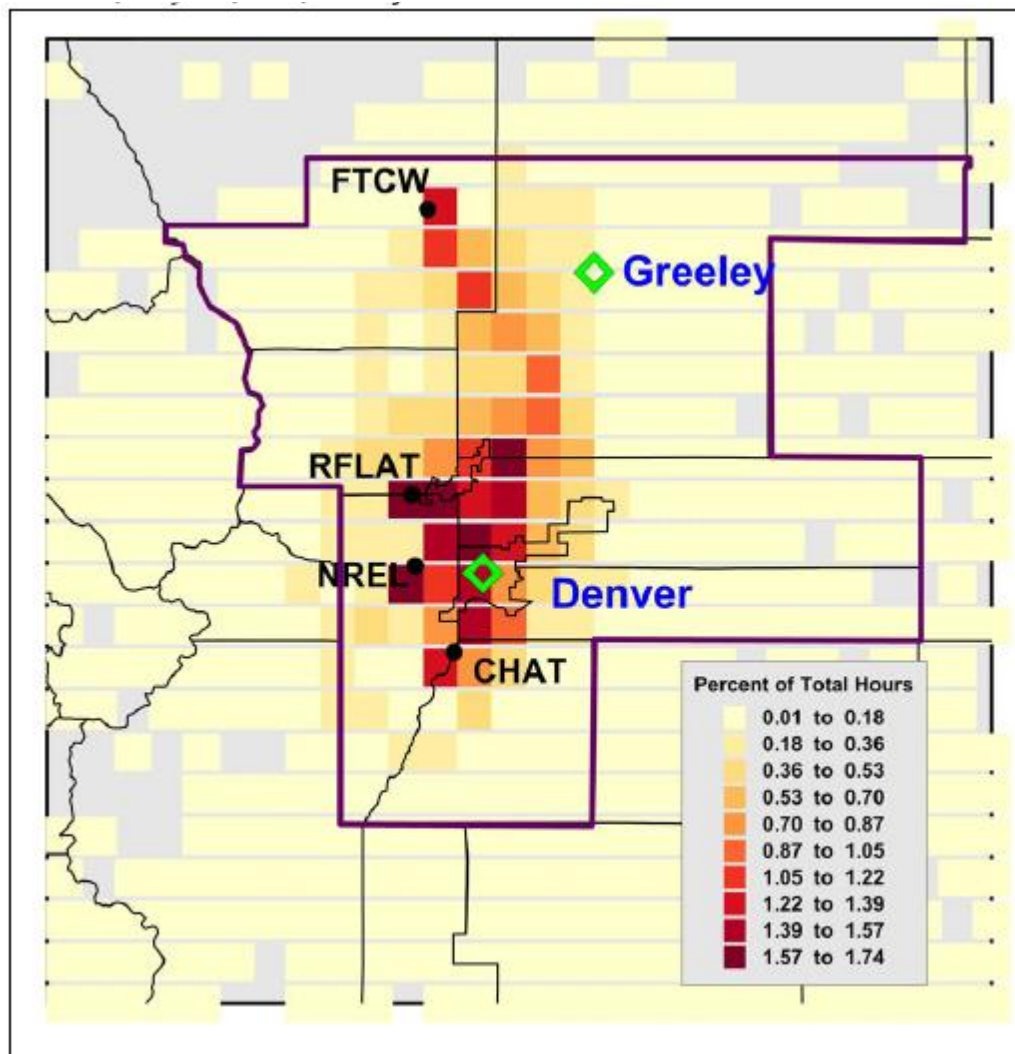
⁴³ Ramboll, Conceptual Model of High Ozone in the Denver Metro/North Front Range Nonattainment Area for the 2020 Serious Ozone State Implementation Plan (Aug. 2020), available at https://raqc.egnyte.com/dl/FIJGHQj2fi/DM-NFR_2020-O3SIP_Conceptual_Model_Ozone_v6.pdf.



Source: Reddy, P.J., and Pfister, G.G.. (2016)⁴⁴

Figure 2. Relative density of NOAA HYSPLIT 24-hour back trajectory points for each hour in each 8-hour period for the four highest daily max 8-hour O₃ concentrations in each year at Fort Collins West, Rocky Flats North, and Chatfield for 2006 through 2008 (lowest densities are not shown).

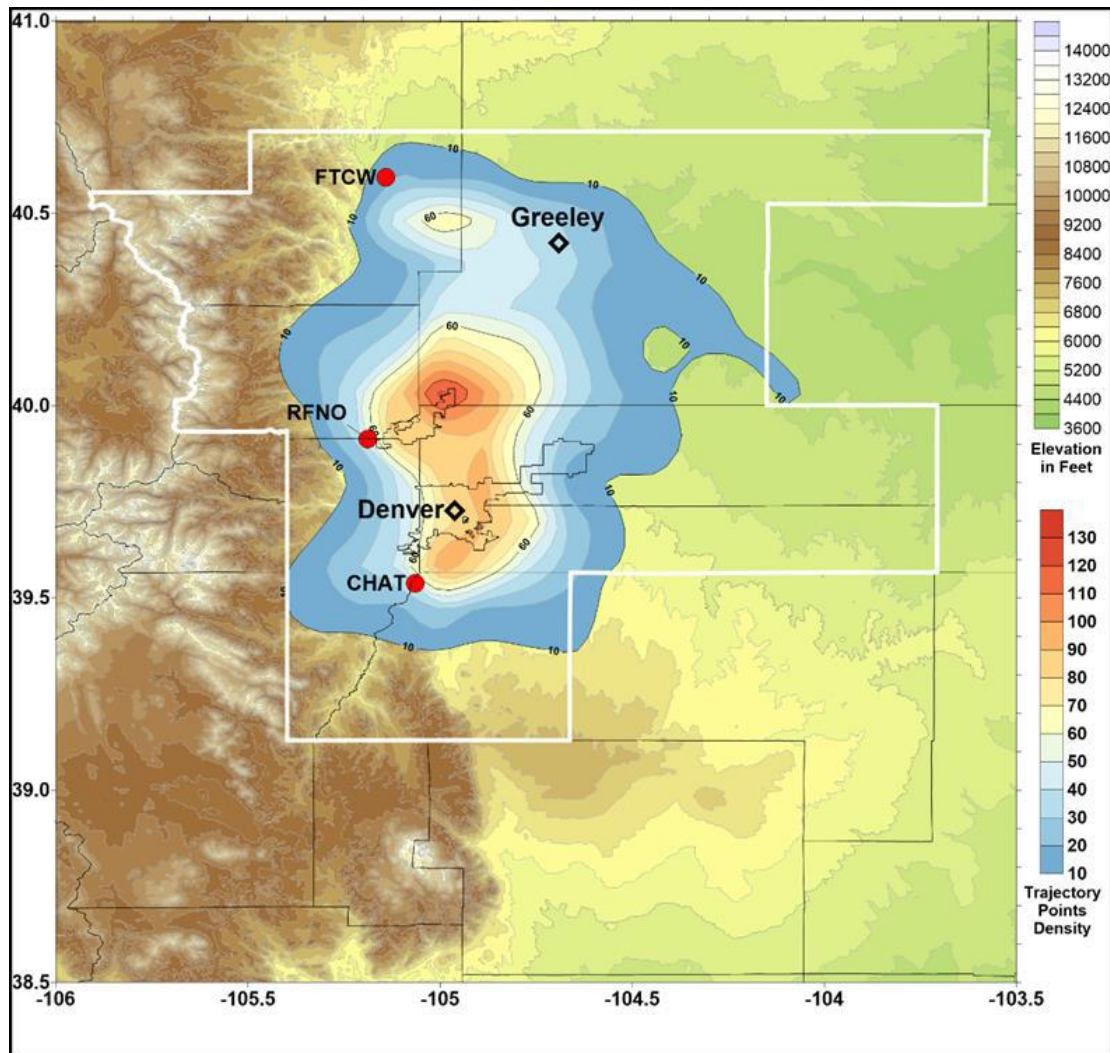
⁴⁴ Reddy and Pfister at 2434–2456, *supra* note 41.



Source: Final TSD⁴⁵

Figure 3. HYSPLIT Back Trajectories for the Four Highest Days in 2013–2015 for Each Violating Monitor; Percent of Total Hours Crossing Each Grid Cell.

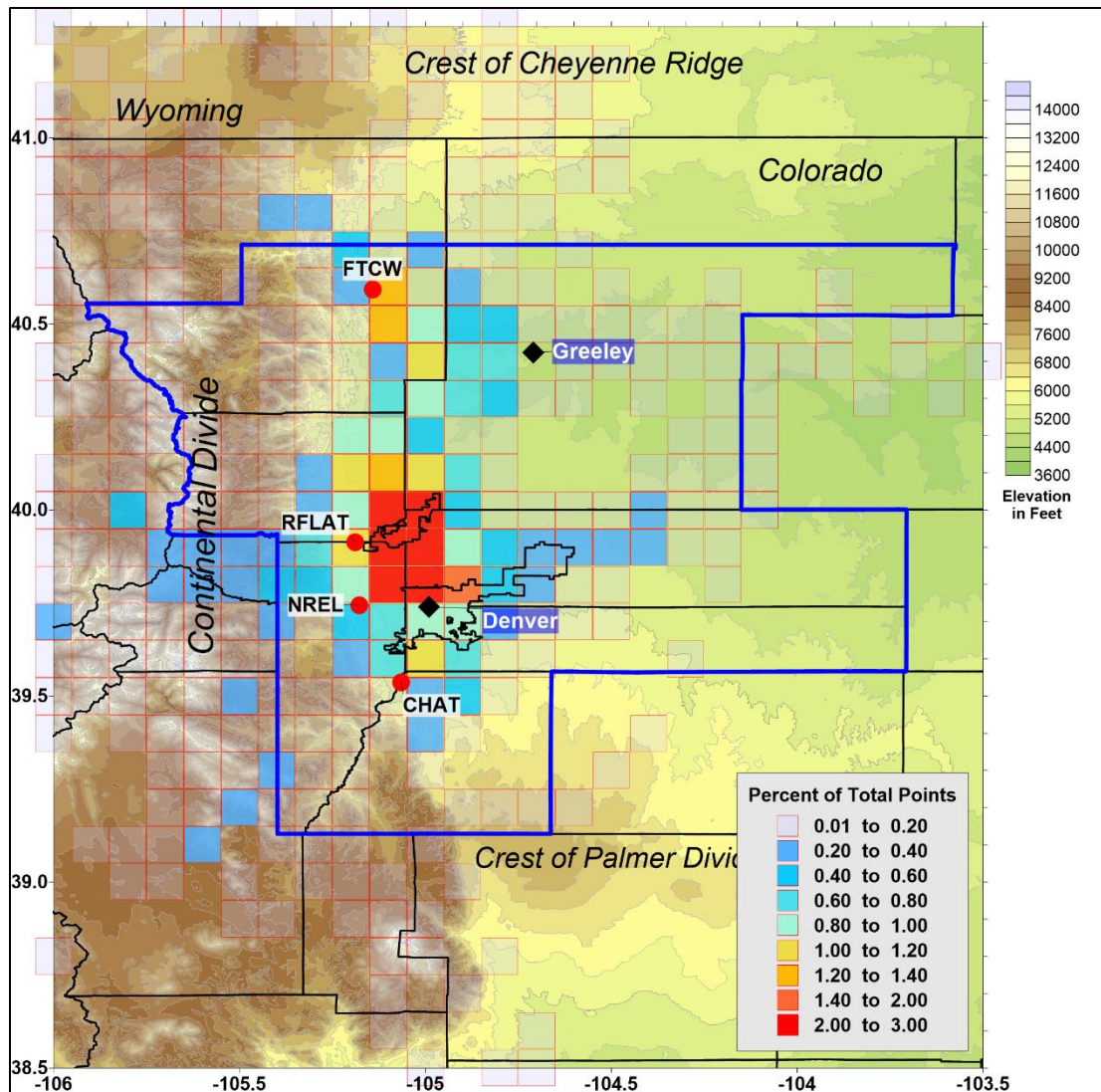
⁴⁵ Final TSD, *supra* note 2.



Source: Reddy, P.J., L.K. Parker, and R. Morris. (2020)⁴⁶

Figure 4. Ozone Source regions for the observed four highest 8-hour concentrations each year at Fort Collins West, Rocky Flats North, and Chatfield for 2016 through 2018 based on the relative densities of 24-hour NOAA HYSPLIT back trajectories for each hour contributing to the maximum 8-hour concentrations.

⁴⁶ Ramboll Conceptual Model of High Ozone in the DM/NFR, *supra* note 43.



Source: Ramboll (2021)⁴⁷

Figure 5. Ozone Source regions for the observed four highest 8-hour concentrations each year at Fort Collins West, Rocky Flats North, NREL, and Chatfield for 2019 based on the relative densities of 24-hour NOAA HYSPLIT back trajectories for each hour contributing to the maximum 8-hour concentrations.

Importantly, the figures are not materially different from each other even with the analysis of different time periods, monitors, and meteorological datasets. It is a combination of the climatological transport patterns, emissions locations, and terrain influenced meteorology, including the Cheyenne Ridge, Continental Divide, Palmer Divide, and the South Platte River Valley that creates the patterns seen in Figures 2 through 5. Taken together, these HYSPLIT data are an independent, yet self-consistent set of data that demonstrate the existing NAA boundary is inclusive of the areas that contribute to elevated concentrations of ozone. All HYSPLIT back trajectory analyses demonstrate that northern Weld County does not contribute to monitored ozone concentrations in the DM/NFR NAA on the four highest ozone days. Specifically, northern Weld County does not contribute to DM/NFR NAA ozone concentrations any

⁴⁷ Ramboll, Assessment of the Denver Metro/North Front Range Ozone Nonattainment Area Boundary (Feb. 2021), attached as Exhibit 1.

more than any other attainment area bordering the DM/NFR NAA. To include northern Weld County in the DM/NFR NAA, as proposed by the EPA, is contrary to all current evidence, previous analyses, and past regulatory decisions.

D. Weight of Evidence Analysis

In the Guidance Memo, the EPA states, “[s]ource apportionment modeling combines into a single analysis several of the factors that the EPA believes are important for determining nonattainment area boundaries: air quality data, emissions, meteorology, and geography/topography. Consequently, this modeling may help identify possible areas for inclusion in the nonattainment area because of their contribution to the violations in nearby areas with violating monitors.” And “[i]n some cases, these supplemental methodologies (e.g., source apportionment modeling) may be used to synthesize the various factors, such as air quality, emissions and meteorological data into quantitative estimates of the contributions from specific areas.”⁴⁸

The RAQC conducted source apportionment modeling of the DM/NFR NAA that provides reliable and quantifiable measures of the contribution of northern Weld County to violating monitors in the NAA.⁴⁹ Model-predicted ozone contributions at violating monitors are available for multiple different regions of the state, including explicit analysis of the DM/NFR NAA and northern Larimer and Weld counties (NLW), and individual days. Table 8 below summarizes the model-predicted ozone contribution by region to the monitoring sites. The ozone concentrations are reported in ppb for the modeled 8-hour average ozone (MDA8) on the 10 days used to calculate the ozone design values. Generally, these are days when the model estimates the highest ozone concentrations for each site. In addition to the data shown in Table 8, this new information is highly relevant and should be considered by the EPA as part of its review of the DM/NFR NAA boundary.

Table 8. Model-predicted ozone contributions by source regions at violating monitors, including Northern Weld and Larimer Counties

Region	Estimated Ozone Contribution at NREL (ppb)	Estimated Ozone Contribution at RFNO (ppb)	Estimated Ozone Contribution at CHAT (ppb)	Estimated Ozone Contribution at FCTW (ppb)
NAA	20.12	20.01	18.98	13.48
NLW	0.08	0.1	0.12	0.31
Rest of CO	2.62	2.69	2.4	2.46
Outside CO	48.58	46.2	48.8	48.55
Total MDA8 Ozone (Average of top 10 days)	71.40	69.00	70.30	64.80

Source: RAQC Source Apportionment Modeling Results (2021)⁵⁰

⁴⁸ Guidance Memo, Attachment 3 at 11, *supra* note 1.

⁴⁹ Ramboll, Denver Ozone Modeling Forum: 2023 Local Source APCA Ozone Source Appointment Results (April 14, 2021), available at https://raqc.egnyte.com/dl/IJuxGvGWRQ/CAMx_APCA_Local-Source_Modeling-Forum_2021-04-14v3.pdf.

⁵⁰ RAQC, Source Apportionment Modeling Results (2021), available at [https://raqc.egnyte.com/dl/VHRCCkBur/Dashboard_LocalAPCA_mda8_v2021.03.17_\(1\).xlsx](https://raqc.egnyte.com/dl/VHRCCkBur/Dashboard_LocalAPCA_mda8_v2021.03.17_(1).xlsx).

The source apportionment results clearly show that northern Weld County has an insignificant contribution to violating monitors in the DM/NFR NAA. As presented in Table 8 the largest contribution to ozone comes from outside the State of Colorado. Of those source regions within Colorado, the largest contributor is the DM/NFR NAA. For monitoring sites near Denver (NREL, RFNO, CHAT), the average NLW contribution is approximately 0.1 ppb, depending on the monitor and the day. For comparison, at FTCW the impact from NLW is also insignificant (about 0.3 ppb on average), although it is slightly higher than the rest of the sites. Furthermore, the contributions from the NLW group are inclusive of northern Larimer emissions, and thus the contribution from northern Weld County alone is anticipated to be smaller than what is presented in Table 8. Table 8 provides clear evidence that the northern portion of Weld County does not materially contribute to the violating monitors on days that exceed the NAAQS, and thus there is no reason to include this area in the DM/NFR NAA.

III. Even If the EPA Chooses to Ignore Recent Data, the Original Record Lacks Substantial Evidence to Support Inclusion of Northern Weld County in the Nonattainment Area

A. Technical Assessment of Emissions Factor

The NAA designation process must consider the location and level of emissions for those sources that release ozone-precursor pollutants. The EPA must evaluate the current emissions data from nearby counties to assess areas that could contribute to ozone measured at the violating monitors. The EPA notes this evaluation is performed to differentiate between the impact of emissions from more distant sources and sources in nearby areas that should be included in the nonattainment area, because they can be reduced by adopting control strategies. Combining analyses of the magnitude of emissions and their spatial distribution with meteorological data informs the degree of contributions from nearby areas. Additionally, EPA Guidance Memo suggests that information on the population and degree of urbanization as well as traffic and commuting patterns serve as indicators of emissions-related activities within the area considered for NAA designation.

In attempting to document the evaluations required by the Guidance Memo, EPA's 2021 TSD presents information that is inaccurate and misleading in numerous respects. Figure 4 (page 12) in the EPA's 2021 TSD shows the well counts in both the northern and southern portion of Weld County. The information in this figure is misleading as it appears to include a significant number of wells that are plugged and abandoned. Figure 6 below shows the current number of active oil and gas wells. Figure 6 is based on information from the COGCC database, and the number of active wells are shown by geographic region in Table 9.⁵¹ This is a significant discrepancy that leads to the misleading conclusions in the EPA's TSD that the number of wells in northern Weld County has *the potential* for significant contributions to ozone concentrations at the violating monitors. The EPA uses Figure 4 in the 2021 TSD as the basis for the statement "[given] the presence of numerous wells in the northern portion of the county [it] is reasonable to conclude there is a large amount of NOx and VOC emissions from oil and gas originating in the northern portion of Weld County compared with other counties in the area of analysis." However, there is no quantitative assessment in the TSD to corroborate this statement, and the qualitative nature of this sentence is derived from an inaccurate depiction of the location of active wells in Weld County.

⁵¹ COGCC Interactive Map (accessed on June 15, 2021), *available at* <https://cogcc.state.co.us/maps.html#/gisonline>. Importantly, Weld County attempted to use the original data in the record for this analysis to analyze data for 2016. However, the data were not in the docket EPA-HQ-OAR-2017-0548, despite the EPA's footnote 9 in the 2021 TSD stating that the COGCC oil and gas well shapefiles are in the docket.

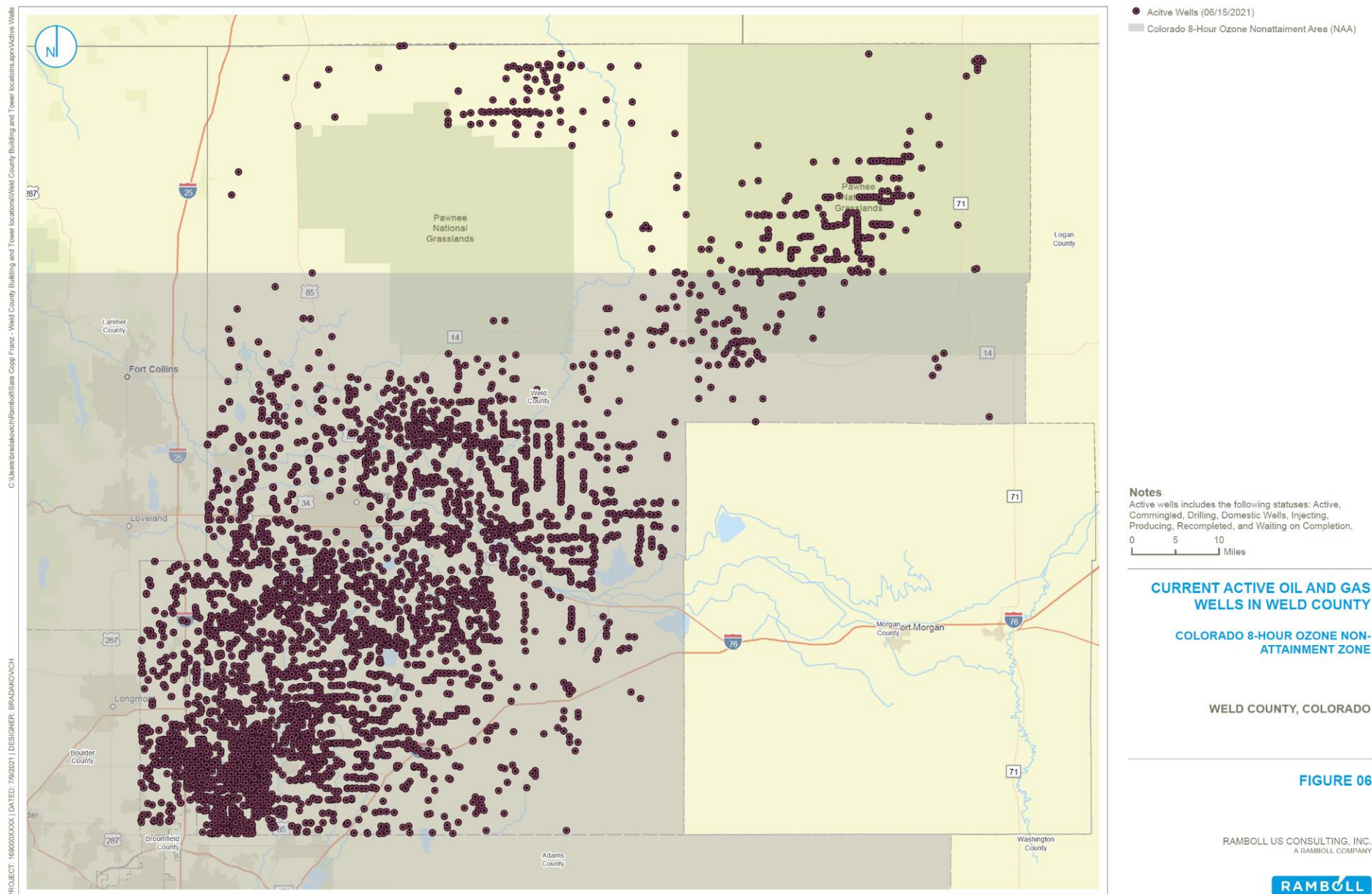


Figure 6. Current Active Oil and Gas Wells

Table 9. Number of Wells in Northern and Southern Weld County by Status Type

Region	Active Wells	P&A Wells	Permitted but not Active Wells	Total Wells
Northern Weld County	877	2,748	845	4,470
Southern Weld County	10,941	26,097	2,395	39,433
Total	11,818	28,845	3,240	43,903

Source: COGCC (2021)⁵²

EPA’s decision to extend the boundary of the NAA is arbitrary because it is based on analysis of the emissions factor that presents the same information as in the original TSD, and yet the EPA reaches the opposite conclusion. The fact that the EPA has conflicting assessments of the same emissions inventory coupled with a lack of specific concerns calls into question the legitimacy of the EPA’s concerns and scientific objectivity.

The EPA concludes the emissions factor analysis by stating that the emissions used in the analysis by the State differs from the 2014 NEI relied upon by the EPA and “[t]herefore the EPA does not have an accurate understanding of actual emissions from the northern portion of Weld County.” This conclusion emphasizes: (1) the EPA does not have a clear understanding of the amount of ozone precursor emissions from the northern portion of Weld County, and (2) as previously discussed, the arbitrary decision to limit the record is also limiting the EPA’s ability to adequately assess the emissions factor and comply with the court’s remand.

B. Technical Assessment of Meteorology Factor

The Guidance Memo requires evaluation of meteorological data “to assess the fate and transport of emissions contributing to ozone concentrations and to identify areas with the potential to contribute to the monitored violations.”⁵³ The EPA suggests modeling of the air parcel trajectories to understand complex transport situations. The guidance indicates that the HYSPLIT modeling system can be useful to illustrate the three-dimensional paths traveled by air parcels arriving at violating monitors. However, the EPA states that “trajectories alone do not conclusively indicate contribution to measured high ozone concentrations” and importantly that “a set of HYSPLIT trajectories that show no wind flow from a particular region on any day with high ozone concentrations might provide support for discounting that region as contributing to ozone concentrations”. It concludes that “trajectories are useful in combination with information on the location and magnitude of ozone precursor emission sources.” The foregoing endorsements of HYSPLIT modelling notwithstanding, the EPA chose to exclude composite HYSPLIT analyses from the 2021 TSD that were included in the Final TSD. The EPA’s exclusion of this highly relevant and probative composite data from the 2021 TSD is highly concerning given the fact that: (1) the meteorological factor was not the basis for the court’s remand to the EPA for the DM/NFR NAA boundary in *Clean Wisconsin*; rather, the court was concerned with the EPA’s location of the Cheyenne Ridge. See *Clean Wisconsin*, 964 F.3d at 1168–69; and (2) consistent with EPA guidance,⁵⁴ the application and use of

⁵² COGCC Interactive Map, *supra* note 52.

⁵³ Guidance Memo at 19, *supra* note 1.

⁵⁴ Guidance Memo at 19, *supra* note 1.

the HYSPLIT model is relevant to understand the transport of ozone precursor emissions to violating monitors on high-ozone days.

Most importantly, the 2017 Final TSD included HYSPLIT plots that demonstrated northern Weld County does not contribute to DM/NFR NAA ozone concentrations any more than any other attainment area bordering the DM/NFR NAA area. Specifically, the Final TSD meteorology factor included Figure 14 that showed “the percentage of total hours aggregated by grid cell and representing 24 hours of back trajectories for each of the eight hours that compose the 4th highest values for each year and for each monitor, in which a back trajectory is crossing a given grid cell. This figure shows a general background level of very low back trajectory presence in grid cells in all directions outside”⁵⁵ of the original area considered for NAA designation. Figure 14 clearly demonstrates that air parcels are unlikely to travel through the emissions area in northern Weld County on violating ozone days and therefore the area is unlikely to contribute significantly to the ozone concentrations at violating monitors. In the 2021 TSD prepared for the EPA’s response to the court’s remand, the EPA completely discarded this information and replaced this highly relevant quantitative data in the existing record with a qualitative opinion on why non-composited HYSPLIT figures prepared by the EPA for specific monitors on specific days were more heavily considered. The EPA justified excluding the Final TSD’s Figure 14 from the 2021 TSD for three reasons:

1. The composite figure did not include back trajectories from the Welch monitor.
2. The composite figure does not include back trajectories from 2016.
3. The composite figure does not include back trajectories from exceedance days that were ranked lower than the 4th maximum for each year.

The technical merits of these expressed concerns are addressed and soundly refuted below. In addition, Weld County commissioned updated HYSPLIT plots that address the three issues identified by the EPA. The results show that the concerns raised by the EPA do not affect the results of the HYSPLIT plots and the revised analysis continues to support the original finding that the northern portion of Weld County does not materially contribute to ozone in the DM/NFR NAA on days of NAAQS violation.

Regarding the exclusion of the Welch monitor, the composite figure consolidates the back trajectories from all other 4 violating sites. Given the location of the Welch monitor, which is in the southwestern portion of the NAA between NREL and Chatfield, it is inconsistent with the conceptual understanding of relevant meteorological patterns to anticipate transport to the southern area would materially affect the results.⁵⁶ Further, Figure 14 presents percentages from multiple data points, and the results are therefore statistically robust and unlikely to significantly change if one additional monitor’s

⁵⁵ Final TSD at 29, *supra* note 2.

⁵⁶ When meteorological conditions are conducive to ozone formation, the dynamic process most likely to affect air transport from the northern Weld County to monitors in the nonattainment area is the Denver Cyclone. However, this process would transport air to areas in the northern portion of the nonattainment area, such as Fort Collins West monitor, if at all, and would not typically transport air parcels to the southern portion of the NAA. Importantly, this process is limited because during the afternoons, when ozone is highest, thermally-driven, upslope flow predominates, which pushes air in northern Weld County further up the slope of the Cheyenne Ridge and into Wyoming. In the evenings and early mornings, down-valley drainage flow from northern Weld County would transport air to the South Platte River Valley, and the down river drainage flow would continue to transport air further down the South Platte River and east, out of the nonattainment area, rather than to the south where the Welch monitor is located.

data are added. The EPA's exclusion of Figure 14 on the basis of the Welch monitor is therefore without technical merit.

Regarding the EPA's concern that the data analyzed is not inclusive of 2016, Figure 14 in the EPA's Final TSD shows the percentages derived from 3 years of measurement data spanning 2013 to 2015. As presented in Section II, multiple HYSPLIT back-trajectory analyses have been performed for different time periods, and it is clear from these analyses that northern Weld County does not contribute to violating monitors in the DM/NFR in any of the time periods analyzed, *nor has the contribution of northern Weld County materially changed between 2006 and the present*. This consistency is particularly relevant for the determination of the NAA boundary for the 2015 standard, because it demonstrates that the fundamental physical processes that transport emissions of ozone precursors from sources in northern Weld County have not changed since the 2008 ozone standard NAA boundary was established. Therefore, the EPA's exclusion of the EPA's Final TSD Figure 14 from the 2021 TSD on the basis of the time period analyzed also is without technical merit.

EPA's final concern related to lower ranked days analyzed is further considered herein. The analysis of all exceedance days rather than just the top four days would perhaps increase confidence in the analysis; however, it is important to note that it is also reasonable to include an analysis with only the 4th maximum ozone value for each year to be consistent with the form of the NAAQS. Therefore, Weld County suggests that only analyzing the top four ozone days at each monitor is not a sufficient justification to completely disregard the highly relevant composite HYSPLIT data in the Final TSD by excluding it from the 2021 TSD.

Instead of excluding the Final TSD's Figure 14 from the 2021 TSD, the EPA could have updated the analysis. The EPA already had all the data necessary to prepare a composite plot and aid its proposed NAA designation decision on remand. To definitively address the EPA's concerns, Weld County commissioned updated HYSPLIT plots that resolve the three issues listed by the EPA. The results of the updated analysis demonstrate that the EPA's concerns were unfounded because the revised analysis is not materially different than the Final TSD's Figure 14.

Specifically, a revised HYSPLIT analysis and plot was developed that includes all dates that have measured ozone concentrations that exceed 70 ppb on an 8-hour average at Fort Collins West, NREL, Rocky Flats North, Chatfield and Welch during the years 2014 to 2016. The number of days for each monitor and year that measured ozone concentrations above 70 ppb are shown in Table 10. The full list of days that were included in the revised HYSPLIT analysis are listed in Exhibit 2.⁵⁷ The resulting composite HYSPLIT plot is presented herein in Figure 7 and is consistent with the composite HYSPLIT plot included by Colorado in its recommendation to the EPA and included by the EPA in the Final TSD. This analysis, which addresses the EPA's concerns, demonstrates that northern Weld County does not contribute to DM/NFR NAA ozone concentrations any more than any other attainment area bordering the DM/NFR NAA.

⁵⁷ The HYSPLIT analysis presented in Figure 7 potentially includes periods with influence from exceptional events, such as wildfires.

Table 10. Number of days with 8-hour average ozone greater than 70 ppb per site and year

Monitor	Number of Days with 8-hour Average Concentrations Values Greater than 70 ppb		
	2014	2015	2016
Ft. Collins-West	12	14	8
Rocky Flats-North	13	13	13
Chatfield	8	11	16
NREL	11	16	18
Welch	0	10	12

Source: EPA (2021)⁵⁸

The method used to generate the data shown in Figure 7 was consistent with EPA guidance. As a first step, the days analyzed were based on the 2014–2016 summer daily maximum 8-hour average ozone concentrations at Fort Collins West, NREL, Rocky Flats North, Chatfield and Welch.⁵⁹ The HYSPLIT model was run for those days presented in Exhibit 2 starting at each monitor location. For each day and monitor identified in Exhibit 2, the 8-hour period used to calculate the MDA8 was determined. For each hour included in the MDA8, a 24-hour back trajectory was generated. The HYSPLIT model was initiated with 10-meter arrival heights and the North American Mesoscale Forecast System at 12 km resolution (NAM12) sigma-pressure hybrid data with vertical motion.

The resulting back trajectories for all monitors and days for years 2014 through 2016 were processed and aggregated. To aid in the comparison with EPA’s Final TSD Figure 14, the results were gridded into a 0.1-degree latitude by 0.1-degree longitude grid and the density of points within each grid was calculated and displayed as shown in Figure 7 below. The resulting figure is directly comparable to the EPA’s Final TSD Figure 14, and a comparison confirms that northern Weld County does not contribute to DM/NFR NAA ozone concentrations any more than any other attainment area bordering the DM/NFR NAA. This comprehensive and quantitative analysis addresses the EPA’s stated concerns and provides a rigorous basis for redesignating the existing NAA boundary bisecting Weld County on remand.

⁵⁸ EPA Air Quality System (accessed on June 11, 2021), *available at* https://aq5.epa.gov/aq5web/airdata/download_files.html#Daily.

⁵⁹ These days may have included exceptional events such as wildfires. A list of all modeled days is presented in Exhibit 2.

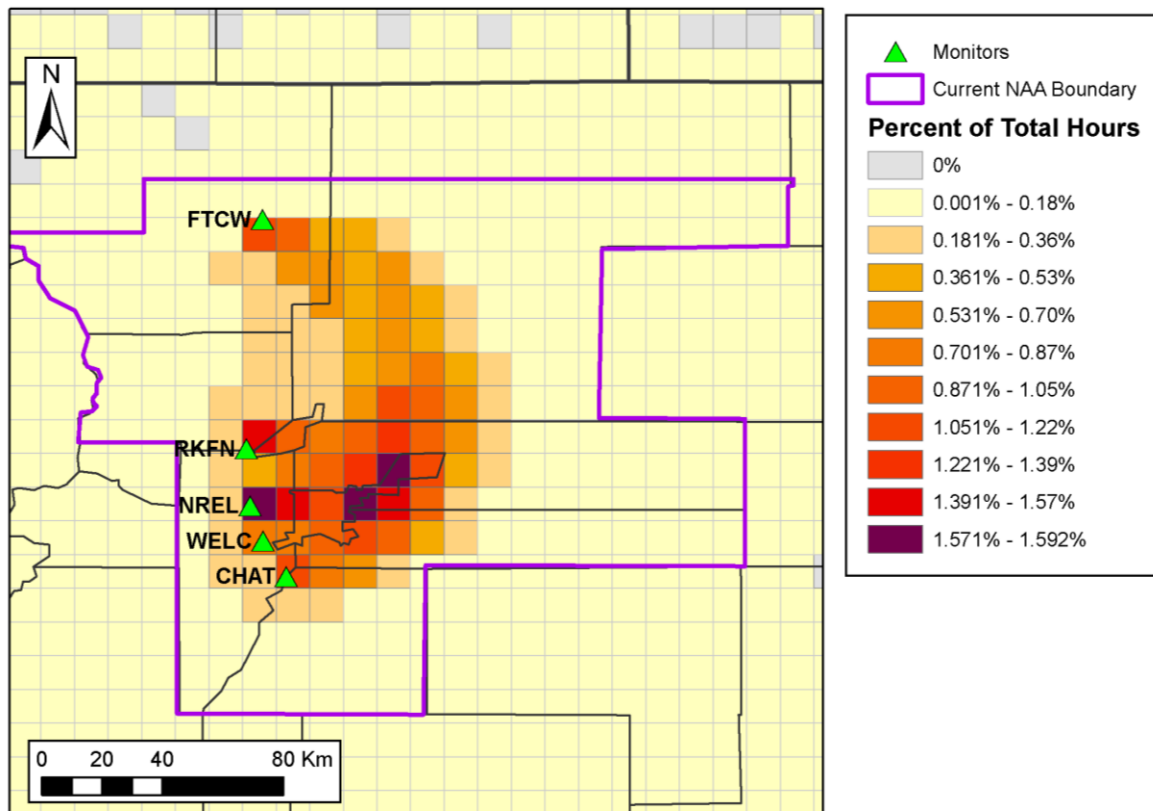


Figure 7. Updated HYSPLIT back trajectory composite plot based on all days with 8-hour average ozone concentrations that exceeded 70 ppb at FTCW, RFNO, NREL, WELC, and CHAT monitors in 2014 to 2016.

In the 2021 TSD, the EPA introduced Figures 8 and 9 as part of its analysis for the meteorology factor. These figures were originally presented in the Colorado 2016 TSD to illustrate in a very simple manner the complex dynamics of the upslope and downslope flows, mountain-plains solenoid circulation and the Denver Cyclone⁶⁰ that are affect the transport of emission precursors in the DM/NFR area during summer. The EPA modified these figures by adding blue arrows with the intention to show the influence of the Cheyenne Ridge in the upslope and downslope flow. The EPA states that the “position and orientation of these blue arrows are the EPA’s interpretation of the data presented in Toth and Johnson (1985)”. However, the EPA does not elaborate or explain in more detail under what circumstances this interpretation is correct or its limitations. These transport dynamics are plausible; however, as this comment letter shows, these qualitative interpretations are not supported, and the EPA does not provide information to assess the importance of this potential transport pathway. It is also plausible that downslope flow from the Cheyenne Ridge is transported to the South Platte River Valley and then east and away from the NAA, in which case northern Weld County would not affect the ozone formation in the NAA.

Rather than the qualitative analysis and simplistic figures presented in the 2021 TSD, the EPA should base their decision on a quantitative analysis. One way to explicitly quantify transport from northern Weld County is by use of the HYSPLIT model in forward trajectory mode which provides a more rigorous and defensible analysis. Weld County commissioned a forward trajectory analysis for purposes

⁶⁰ These terms are defined on page 18 in the 2021 TSD, *supra* note 3.

of these comments and the results are shown herein in Figure 8. These forward trajectories demonstrate that air parcels from northern Weld County are transported to violating monitors less than 0.18% of the time. The HYSPLIT forward trajectories shown in Figure 8 were developed using an approach that is similar to the back trajectories analysis except that HYSPLIT was run in a forward trajectory mode for 39 gridded points in northern Weld County, shown in a red outline on Figure 8. The HYSPLIT model was initiated for days in 2014–2016 when Fort Collins West 8-hour average ozone concentrations exceeded 70 ppb (a full list of days is shown in Table 1 in Exhibit 2). Dates were selected based on monitored concentrations at Fort Collins West because it is the monitor most likely to be influenced by northern Weld County.⁶¹ The forward trajectories were initiated at 7 am the day *prior* to the monitored violation and were run for 36 hours to account for the possibility of recirculation.⁶² The model was run with 10-meter initiation heights, and only trajectory points below 100m above ground level were included in the resulting composite plot in order to assess the influence on monitored surface concentrations.⁶³ The NAM12 meteorological dataset was used with vertical motion. The results from the HYSPLIT forward trajectories demonstrate air from the northern portion of Weld County is transported to the Fort Collins West monitor less than 0.18% of the time on high ozone days.

⁶¹ RAQC Source Apportionment Modeling Results, *supra* note 51.

⁶² Forward trajectories on the day of the monitored violations were also assessed for a HYSPLIT run lasting 14 hours. Results show that the air parcels originating in northern Weld County are not transported to any of the violating monitors, instead the air parcels are transported to the north and east. The air parcels do not travel as far north and east in the 14-hour run as they do when the forward trajectories are run for 36 hours.

⁶³ Assessment of all trajectory points, regardless of height above ground level, showed no material difference on the results presented in Figure 8. The analysis of only points below 100m is more accurate and is also consistent with the EPA's acknowledgment in the 2021 TSD that "[s]urface winds are important for ozone and precursor transport, and may be strongly influenced by local terrain leading to wind directions different from the flow further aloft." 2021 TSD at 21, *supra* note 3.

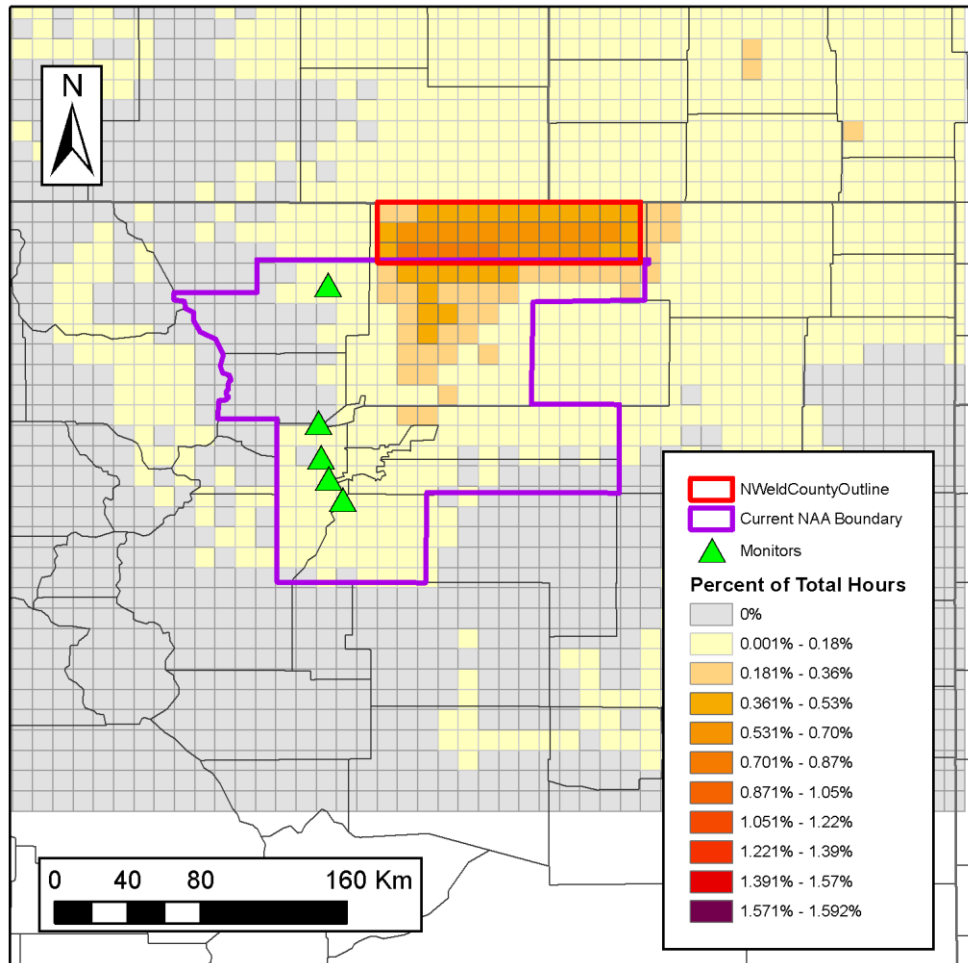


Figure 8. HYSPLIT forward trajectories for northern Weld County on days when the monitored 8-hour average value exceeded 70 ppb at Fort Collins West during 2014–2016.

In addition to demonstrating that the EPA’s concerns about the composite HYSPLIT plot were unjustified and conducting HYSPLIT forward trajectory plots to demonstrate that there is no evidence to support statements about transport from northern Weld County to violating monitors, Weld County disagrees with the EPA’s use and interpretation of HYSPLIT plots. Furthermore, the EPA’s analysis presented in Figures 11 to 15 of the TSD is poorly documented. The EPA does not disclose the settings used for HYSPLIT in their figures nor the days analyzed. It is also unclear if the EPA may have analyzed exceptional events. The EPA also does not explain the basis for selecting the back-trajectory heights that are analyzed. This information is required for transparency and clarity on the conclusions derived from the analysis performed.

The EPA’s HYSPLIT analysis provided in Figures 11 to 15 of the 2021 TSD are identical to those provided in EPA’s Final TSD; however, in the 2021 version, new conclusions are drawn based on the same information with only qualitative analysis to justify the agency’s about-face. The EPA states, “[a]ll of these figures, to a varying degree, show trajectories initiating in or transecting the northern portion of Weld County.” Qualitative review of these figures does not provide any evidence that the northern portion of Weld County is an important source of trajectory initiation or advection (which is substantiated quantitatively herein by Figure 8). Rather, trajectories crossing northern Weld County are similar in frequency to all other attainment areas bordering the existing DM/NFR NAA. Furthermore, the EPA’s

HYSPLIT runs were conducted with back trajectories of 100-m, 500-m and 1,000-m above ground level. These heights are not representative of surface conditions and their use is contradictory to the EPA's statement in the 2021 TSD that "[s]urface winds are important for ozone and precursor transport, and may be strongly influenced by local terrain leading to wind directions different from the flow further aloft."⁶⁴

Instead of relying on visual analysis of back-trajectory plots, the approach provided by Figure 14 of EPA's Final TSD clearly quantifies the frequency with which parcels originate in or cross northern Weld County. Figure 14 is a more defensible basis from which to draw conclusions than individual HYSPLIT runs. Figure 14 of EPA's Final TSD clearly demonstrates that northern Weld County does not contribute to DM/NFR NAA ozone concentrations any more than any other attainment area bordering the DM/NFR NAA. This is further confirmed in the updated analysis, which directly addressed the EPA's concerns, summarized in Figure 7 above. But the EPA excluded Figure 14 from its 2021 Final TSD.

Lastly, the EPA presents as part of its analysis a pollution rose only for the Fort Collins West monitor in Figure 10 of the 2021 TSD. The EPA uses this to illustrate "the influence of local terrain and resulting upslope flow on high ozone." The analysis presented for this figure does not directly support or help to establish any recommendations related to the northern portion of Weld County. A pollution wind rose can only provide information on what is measured at the location of a given monitor and cannot inherently determine the history of the air parcels arriving to this site. This is important because depending on the day, air parcels arriving to this location do not necessarily originate from or are influenced by emissions in northern Weld County. Indeed, reference to the Fort Collins West pollution rose implies that air parcels travel in a straight line to the monitor corresponding to the pollution rose, which is of course not true and belied by the EPA's own back trajectories for the Fort Collins West monitor. The EPA also presents this information in a way that is misleading; ozone formation is driven by photochemistry, so it is expected that high ozone concentrations will tend to occur during the daylight hours, so including all these hours in the upper part of the figure will naturally show higher values than for the periods of time during the night hours (bottom part of figure). For all of these reasons, the Fort Collins West pollution rose included by the EPA in its 2021 TSD does not substantiate in any way that the emission of ozone precursors from sources in the northern part of Weld County are transported to the Fort Collins West monitor.

C. Technical Assessment of Geography and Topography Factors

EPA guidance requires evaluation of the geography and topography factor in which "analyses should examine the physical features of the land that might define the airshed. Mountains or other physical features *may* influence the fate and transport of emissions as well as the formation and distribution of ozone concentrations" (emphasis added).⁶⁵

In the DM/NFR NAA, it is well established that the regional topography affects meteorological conditions. The topography of the Front Range creates local circulations and winds in the summer that tend to keep local emissions of ozone and its precursors within the region. The predominant topographic features affecting wind flows in the region are river drainage basins and mountains/plains. As to river drainage basins, the key topographic feature is the South Platte River Valley which extends from the Denver area northward to Greeley before meandering east and exiting the DM/NFR NAA. As to mountains

⁶⁴ 2021 TSD at 21, *supra* note 3.

⁶⁵ Guidance Memo, Attachment 3 at 10, *supra* note 1.

and plains, the key topographic features include the eastern plains, the Cheyenne Ridge, the Palmer Divide, and the Continental Divide. Previous studies (Reddy and Pfister, 2016; Pfister et al., 2017; Flocke et al., 2020; and CDPHE and RAQC, 2016) have confirmed that during the summer, periods of elevated ozone occur when thermally-driven upslope flows transport ozone and its precursors from the South Platte River Valley into the higher terrain to the north-northwest, west, southwest, and south-southwest. It is also relevant to understand the fact that terrain features, such as the Cheyenne Ridge and the Palmer Divide, do not affect the meteorological conditions at a single location or along an individual line (such as a ridgeline), rather it is the full geographic extent of the terrain (i.e., elevation increases from the base and lower slopes to crest of ridgelines) that affect wind flow and pollutant transport patterns in varying degrees.

Importantly, one of these topographic features, the Cheyenne Ridge was central to the *Clean Wisconsin* court's remand with respect to the topography factor, and the Cheyenne Ridge is relevant to the topographical assessment in all three TSDs developed to assess the DM/NFR NAA Boundary.^{66,67,68} The location of the Cheyenne Ridge as a defining feature of the NAA northern boundary dates back to the original 1997 ozone standard nonattainment area boundary determination in a letter from CDPHE to the EPA from February 5, 2004. In this letter, CDPHE states:

For Weld County, the Division recommends that the northern portion of the county be excluded from the nonattainment area due to the lack of sources that emit ozone precursor emissions and due to the terrain features that logically exclude this area for being considered as part of the airshed. In summary, the northern, rural portion of the county north of Highway 14 (north of 40° 42'47.1" North Latitude) and east to the Logan County line should not be included in the nonattainment boundary. The elevated terrain feature of the Cheyenne Ridge (which runs through the northern portion of the county), coupled with the lack of significant VOC and NOx emissions sources, justify the exclusion of this area from the nonattainment boundary.⁶⁹

Fundamentally, the conclusions reached by CDPHE in 2004 are still accurate today with respect to the topography factor.

Moreover, the EPA does not require confining topography to determine an NAA boundary. For instance, in determining the nonattainment boundary for Sheboygan County, Wisconsin, the EPA split the full-county nonattainment area into two separate areas, reasoning that the area has two different meteorological regimes that affect ozone concentrations (84 FR 4422) and the absence of confining terrain.

⁶⁶ CDPHE, Technical Support Document For Recommended 8-Hour Ozone Designations (Sept. 15, 2016), available at <https://www.epa.gov/sites/production/files/2016-11/documents/co-rec-tds.pdf>. Note that the version posted on the EPA's website is missing Figures 1-20 through 1-27, which were obtained directly from CDPHE.

⁶⁷ Final TSD, *supra* note 2.

⁶⁸ 2021 TSD, *supra* note 3.

⁶⁹ CDPHE Letter to EPA Regional Administrator Roberts Regarding Proposed 8-hour Ozone Standard Nonattainment Boundary (Feb. 5, 2004), attached as Exhibit 3.

In *Clean Wisconsin*, the court noted the “conflicting characterizations of the topographical and meteorological data” as a reason for its remand.⁷⁰ Because the Cheyenne Ridge is central to the relationship between topography, meteorology and the ozone NAA boundary for Weld County, this terrain feature must be evaluated in more detail. For context, different sources of data regarding the Cheyenne Ridge, such as peer-reviewed meteorological journals, media coverage, and conference proceedings for the American Association of Geographers, all depict the location of the Cheyenne Ridge differently. Furthermore, the United States Geological Survey (USGS) does not refer to the topographical feature to the north of the current DM/NFR NAA as the Cheyenne Ridge. Therefore, it is unsurprising that the petitioners and the court found “conflicting characterizations” of this feature given the lack of a unified, consistent definition of the Cheyenne Ridge within the scientific community.

Regardless of this lack of consistency in the geographic literature, an accurate identification and assessment of the Cheyenne Ridge is central to the understanding of the DM/NFR NAA topography and its effects on local meteorological conditions during periods of elevated ozone. Unfortunately, the EPA’s analysis of the topographical factor presented in the 2021 TSD falls short of accurately identifying the Cheyenne Ridge, and therefore the EPA also mischaracterizes its effect on local meteorology.

The topographical analysis in EPA’s 2021 TSD is flawed in several significant respects. First, the EPA’s revised analysis of the Cheyenne Ridge is arbitrary and poorly substantiated. Second, the EPA’s analysis inaccurately portrays the location of the Cheyenne Ridge. Third, the EPA’s analysis of this topographic feature is incomplete because it does not fully consider the relevance of the feature to the DM/NFR NAA boundary. Each of these concerns is detailed below.

1. The EPA’s Analysis of the Cheyenne Ridge Is Arbitrary and Unsubstantiated

It is important to reiterate that the Cheyenne Ridge is a complex topographical feature that is not consistently defined. Unlike the Continental Divide and the Palmer Divide, the EPA cannot rely on the scientific community for a definitive definition of the Cheyenne Ridge. Therefore, it is critically important to evaluate the Cheyenne Ridge with rigor and robust substantiation, which the EPA has failed to do. For example, in the 2021 TSD, the EPA modified the placement of the Cheyenne Ridge label on Figure 16 relative to the same figure in the Final TSD (previously Figure 15). The EPA does not explain this change nor is the change substantiated by a reference in the 2021 TSD. The EPA modified Figure 16 arbitrarily. The agency states in the 2021 TSD, “[a]s illustrated in Figure 17, the Cheyenne Ridge is a wide elevated area that has no clear ridgeline.”⁷¹ But the EPA has located the label for this feature right along the Colorado/Wyoming border without acknowledging the width of the Cheyenne Ridge (which clearly extends quite far to the north of the Colorado/Wyoming border in Figure 17 in EPA’s 2021 TSD), the relevance of the sloping northwest to southeast orientation of the Cheyenne Ridge,⁷² nor the lack of a defined ridgeline. The EPA did not discuss how the width, orientation, or lack of ridgeline for the Cheyenne Ridge was factored into its assessment of the topography and ultimately its proposed change to the northern boundary. The EPA has arbitrarily located the Cheyenne Ridge in its analysis, and as a result, its analysis of the topography factor does not adequately address the Court’s basis for remanding the original designation with respect to this factor.

⁷⁰ *Clean Wisconsin*, 964 F.3d at 1169.

⁷¹ 2021 TSD at 30, *supra* note 3.

⁷² In the 2021 TSD, the EPA describes the topography of the Cheyenne Ridge as “west-northwest to east-southeast ridgeline around the boarder of Colorado and Wyoming.” 2021 TSD at 30, *supra* note 3.

2. The EPA's Depiction of the Cheyenne Ridge Is Inaccurate

Since topography and elevation are static information and have not changed since passage of the federal Clean Air Act, the topographical data are in the record. Therefore, even limiting themselves to the data in the “capped” record, the EPA should have used available tools to better educate itself about elevation, geographic extent and general boundaries of the Cheyenne Ridge to fully address the court’s basis for remand rather than rely exclusively on a self-modified map (Figure 16 in the 2021 TSD) and a single figure from a 1990 paper (Figure 17 in the 2021 TSD) that is difficult to interpret.⁷³ To more fully assess the location and geographic extent of the topographic features influencing the DM/NFR NAA, Figure 9 provides an elevation map of Colorado and southern Wyoming.⁷⁴ The data in Figure 9 is consistent with the data presented by the EPA in Figure 17 in the 2021 TSD, with the advantage of Figure 9 being that it is easier to see the full extent of the Cheyenne Ridge. The blue ellipse in Figure 9 approximately encompasses the extent of the topographic feature referred to as the “Cheyenne Ridge” which is bounded to the south by the South Platte River and to the north by the North Platte River, to the west by the Continental Divide and to the east by the confluence of the North and South Platte Rivers.

⁷³ This is analogous to the EPA’s use of information about the Denver Cyclone in its assessment of the meteorology factor in the 2021 TSD, which was not in the original record. 2021 TSD at 18 n.16, *supra* note 3.

⁷⁴ All the figures related to the topography factor were obtained using the USGS data viewer, which is publicly available at <https://apps.nationalmap.gov/viewer/>.

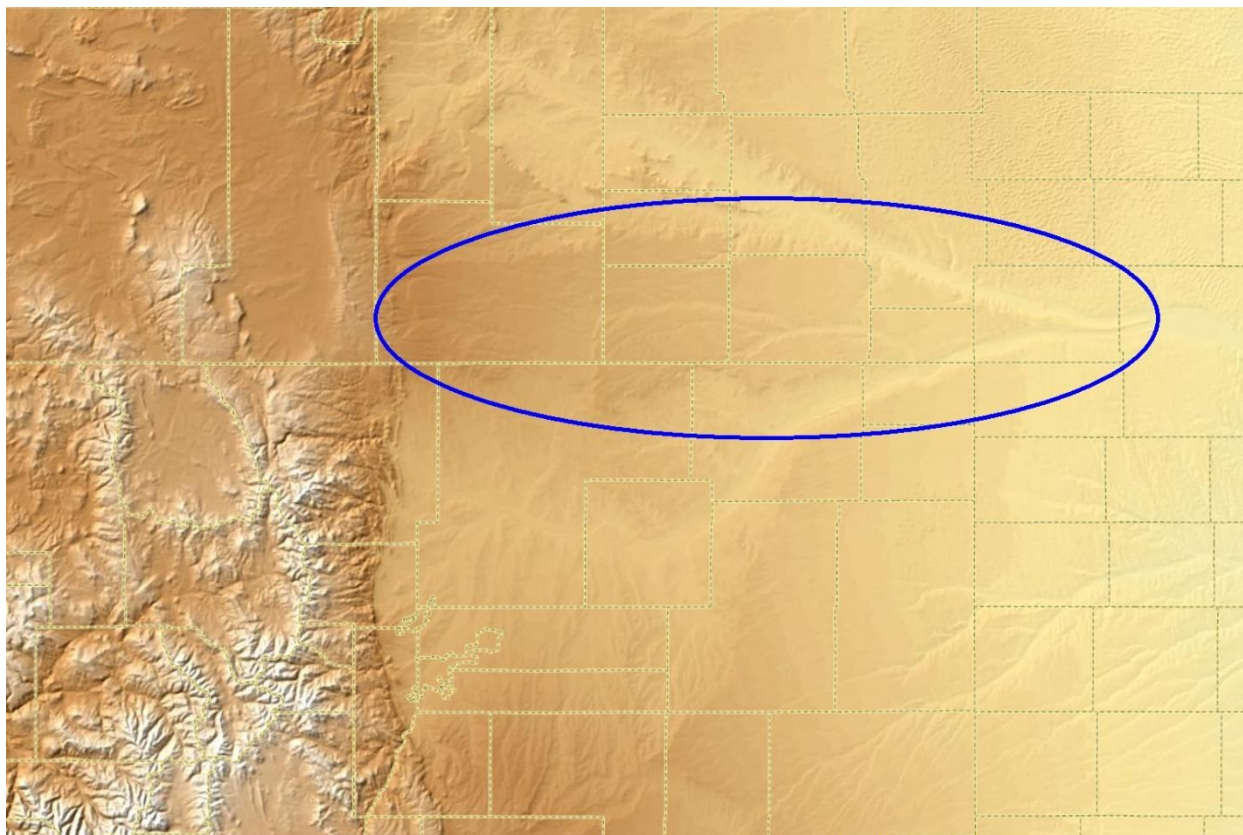


Figure 9. Elevation Map of Northern Colorado and Southern Wyoming. The Cheyenne Ridge is generally encompassed by the blue ellipse.

It is informative to examine the watershed boundary, shown in Figure 10, in order to better understand the geographic extent of the Cheyenne Ridge. The watershed boundary demarcates the farthest extent of an area “that drains all the streams and rainfall to a common outlet.”⁷⁵ A watershed boundary is defined, in part, based on topography due to the influence of topography on water drainage and is therefore relevant to the topography factor and its associated influence on the airshed. Commonly, a watershed boundary is an area of high elevation relative to its surrounding environment and, therefore, the northern watershed boundary of HUC 6-101900 shown in Figure 10 serves as one method to analyze the elevation, geographic extent and general boundaries of the Cheyenne Ridge. It is striking that the northern boundary of the watershed extends far north beyond the Colorado/Wyoming state line and is well north of the label of the Cheyenne Ridge arbitrarily placed on Figure 16 of the 2021 TSD.

⁷⁵ USGS, Watersheds and Drainage Basins, available at https://www.usgs.gov/special-topic/water-science-school/science/watersheds-and-drainage-basins?qt-science_center_objects=0#qt-science_center_objects.

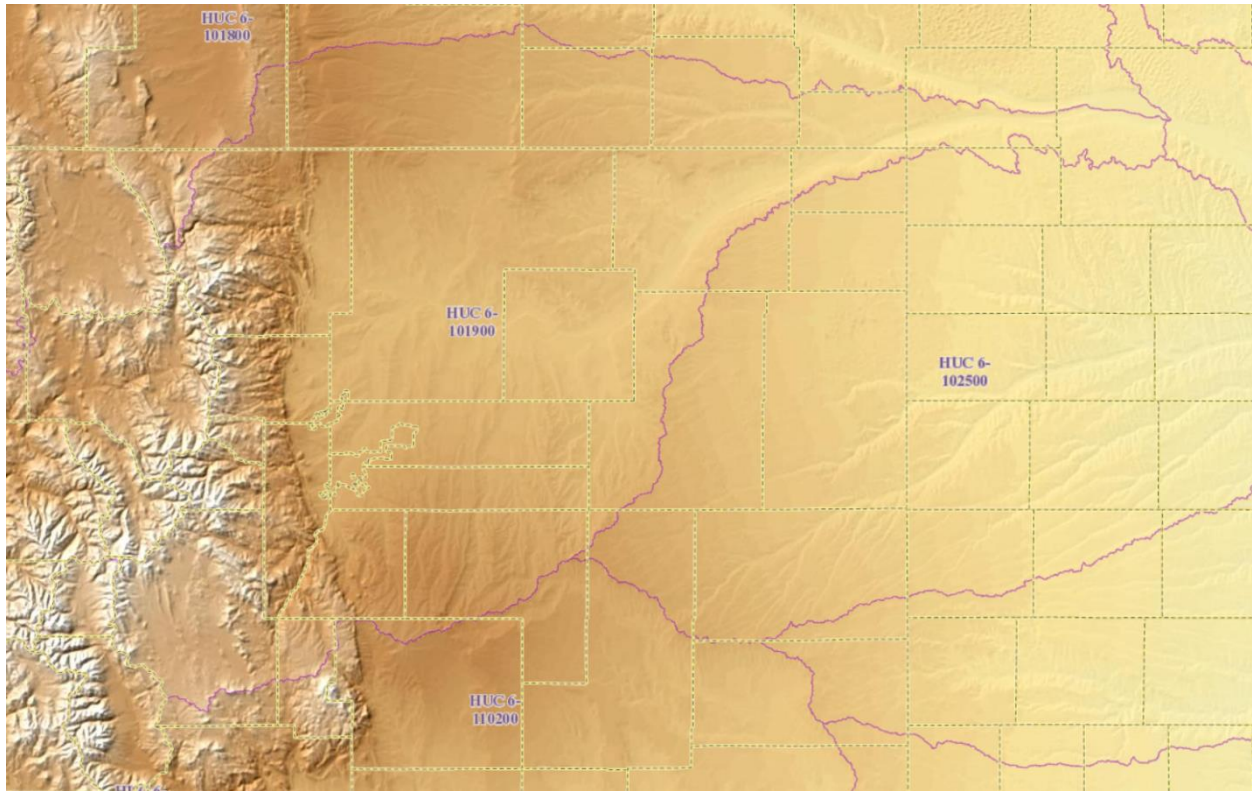


Figure 10. Watershed Boundaries in the DM/NFR Region.

Figure 11 shows the elevation profile for a north-south transect starting at the Palmer Divide and extending to the northern edge of the Cheyenne Ridge. This transect was selected to approximately correspond to the watershed boundaries in Figure 10 and enable a comparison to Figure 17 of EPA's 2021 TSD. When compared with Figure 17 of EPA's TSD, Figure 11 is consistent and provides additional granularity, which is necessary to understand the complex topography of the region. Consistent with Figure 17 in the 2021 TSD, the elevation profile in Figure 11 shows how the Palmer Divide is a natural topographic boundary to the southern extent of the DM/NFR NAA, while the Cheyenne Ridge as a natural topographic boundary to the north DM/NFR NAA. The elevation of the Palmer Divide is generally higher than that of the Cheyenne Ridge. In the transect presented in Figure 11, the Palmer Divide is approximately 200 meters higher than the Cheyenne Ridge. The red "x" on the transect in Figure 11 indicates the location of the city of Denver and the elevation profile shows in more detail how Denver is roughly 150 km from the southern peak of the Cheyenne Ridge. Importantly, Denver is 140 km from the Colorado/Wyoming border, meaning that the southern peak of the Cheyenne Ridge is at least 10 km north of the Colorado/Wyoming boarder, which is far to the north of where the EPA has located the Cheyenne Ridge in its analysis.

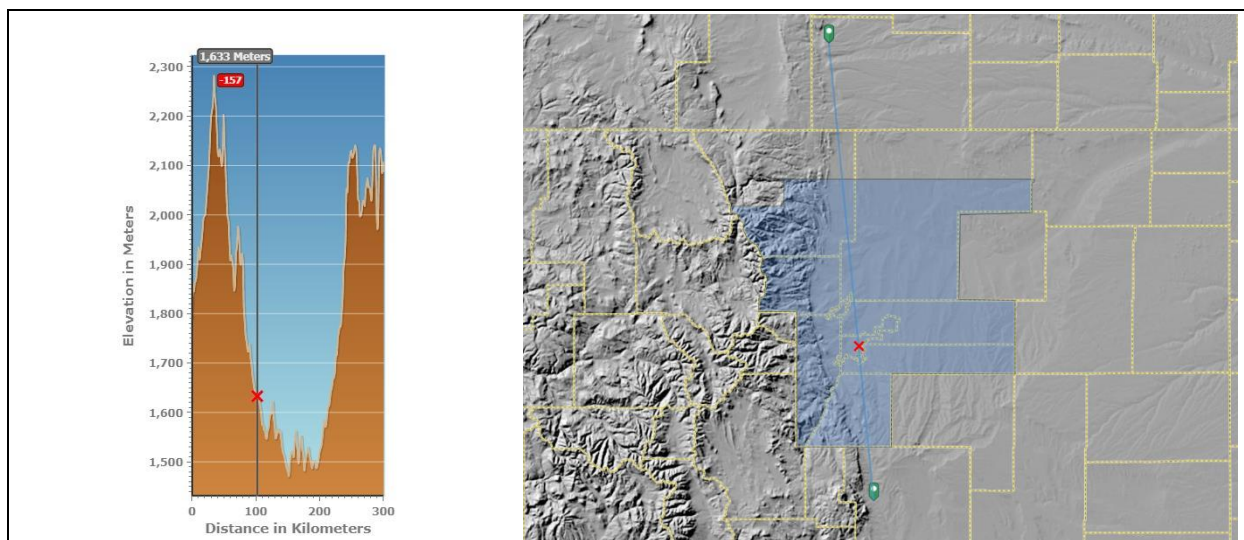


Figure 11. Elevation profile (left) along the southeast to northwest cross section indicated in the map(right). Red “x” is placed approximately at Denver. Current DM/NFR NAA boundary is shaded in blue.

3. The EPA’s Analysis of the Cheyenne Ridge Is Incomplete

Furthermore, the EPA noted two important features of the Cheyenne Ridge in its textual description: (1) “the Cheyenne Ridge is a wide elevated area that has no clear ridgeline,”⁷⁶ and (2) the Cheyenne Ridge orientation is “west-northwest to east-southeast.”⁷⁷ The importance of these features is not further addressed by the EPA but both features are important to understand the topography features. As detailed in this section, the lack of a clear ridgeline means that the peak elevation of the Cheyenne Ridge is not a clear, distinct line feature as portrayed by the EPA in Figure 16 of the 2017 TSD. The peak elevation of the Cheyenne Ridge meanders north and south of the state line, in places the peak elevation is as much as 50km away from the state line. To analyze this more fully, we have extracted south-north elevation transects from USGS to show elevation profiles south to north along three separate transects crossing the western, central and eastern parts of Weld County. A red “x” marks the approximate location of the Cheyenne Ridge peak elevation. The southern terminus of all transects was selected to correspond with the South Platte River which is the lowest point along the transect, and the northern terminus of all the transects was selected to be on the northern side of the Cheyenne Ridge to enable the viewer to see the maximum elevation of the ridge. All three transects are shown as panels in Figure 12.

As shown in Figure 12 panels (a) and (b), the Cheyenne Ridge peak elevation located north of the state line for the western and central Weld County transects, while Figure 12 panel (c) shows the Cheyenne Ridge peak elevation is approximately 10-15 km south of the state line in eastern Weld County. Importantly, Figure 12 also is consistent with the EPA’s statement that the Cheyenne Ridge orientation is “west-northwest to east-southeast”⁷⁸ with the peak elevation on the western side being further to the north than the peak elevation on the eastern side.

⁷⁶ 2021 TSD at 30, *supra* note 3.

⁷⁷ 2021 TSD at 30, *supra* note 3.

⁷⁸ 2021 TSD at 30, *supra* note 3.

The implications of a meandering, non-distinct ridgeline and west-northwest to east-southeast orientation means that the Cheyenne Ridge is not adequately considered in the EPA's simplified topographical assessment. Furthermore, the EPA's focus on the ridgeline of the Cheyenne Ridge misses the importance of the full geographic extent of the terrain (i.e., elevation increases from the base and lower slopes), which also affects wind flow and pollutant transport patterns. As supported by the HYSPLIT analyses presented in the meteorological factor in this letter above, these lower elevation terrain features have significant influence on the wind patterns and pollutant transport on high ozone days. The area to the north of the current DM/NFR NAA boundary is relatively isolated from the lower elevation areas.

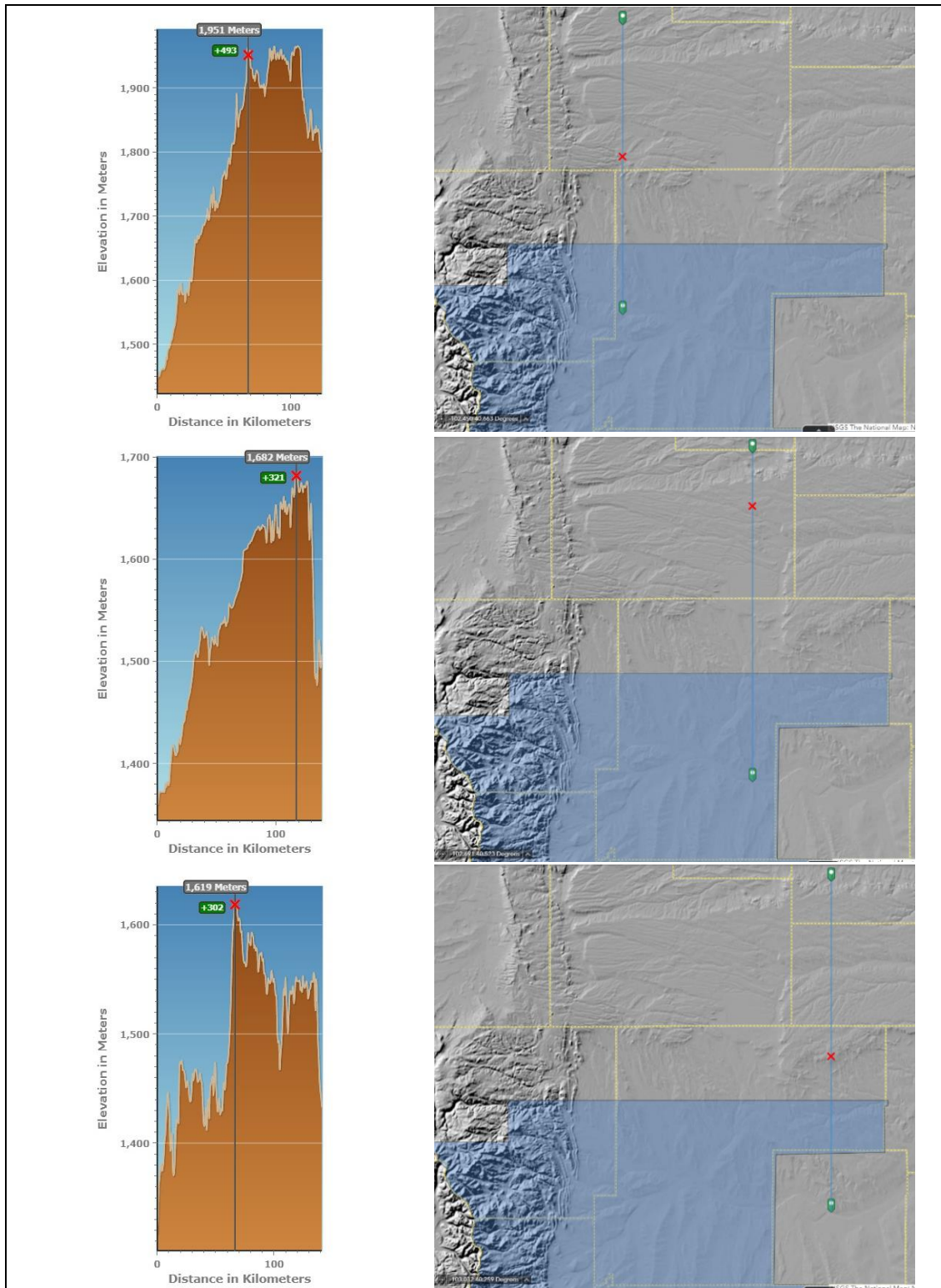


Figure 12. South to North elevation profiles (left) along the lines indicated in corresponding map (right). Red “x” indicates approximate location at the southern edge of the Cheyenne Ridge. Top: Western Weld County transect placed at 104.908° W. Middle: Central Weld County transect placed at 104.265° W. Bottom: Eastern Weld County transect placed at 103.851° W.

The method to analyze the Cheyenne Ridge peak elevation described above for Figure 12 was repeated using the same north-south transects at three locations in Weld County; however, for these transects a red “x” marks the approximate location of the current NAA borderline (shown in Figure 13), and the Colorado/Wyoming border (shown in Figure 14). The southern and northern terminus of all transects are identical to Figure 12.

Figure 13 shows that the existing border for the current DM/NFR NAA is generally located above the South Platte River Valley floor and also below an area of rapid elevation gain to the top of the Cheyenne Ridge. The rapid elevation gain north of the current DM/NFR NAA boundary geographically isolates northern Weld from the rest of the county. Figure 14 shows the EPA’s proposed NAA boundary along the Colorado and Wyoming border is in an isolated region, and in some locations (shown in Figure 14 panel c), it is on the other side of a geographic barrier.

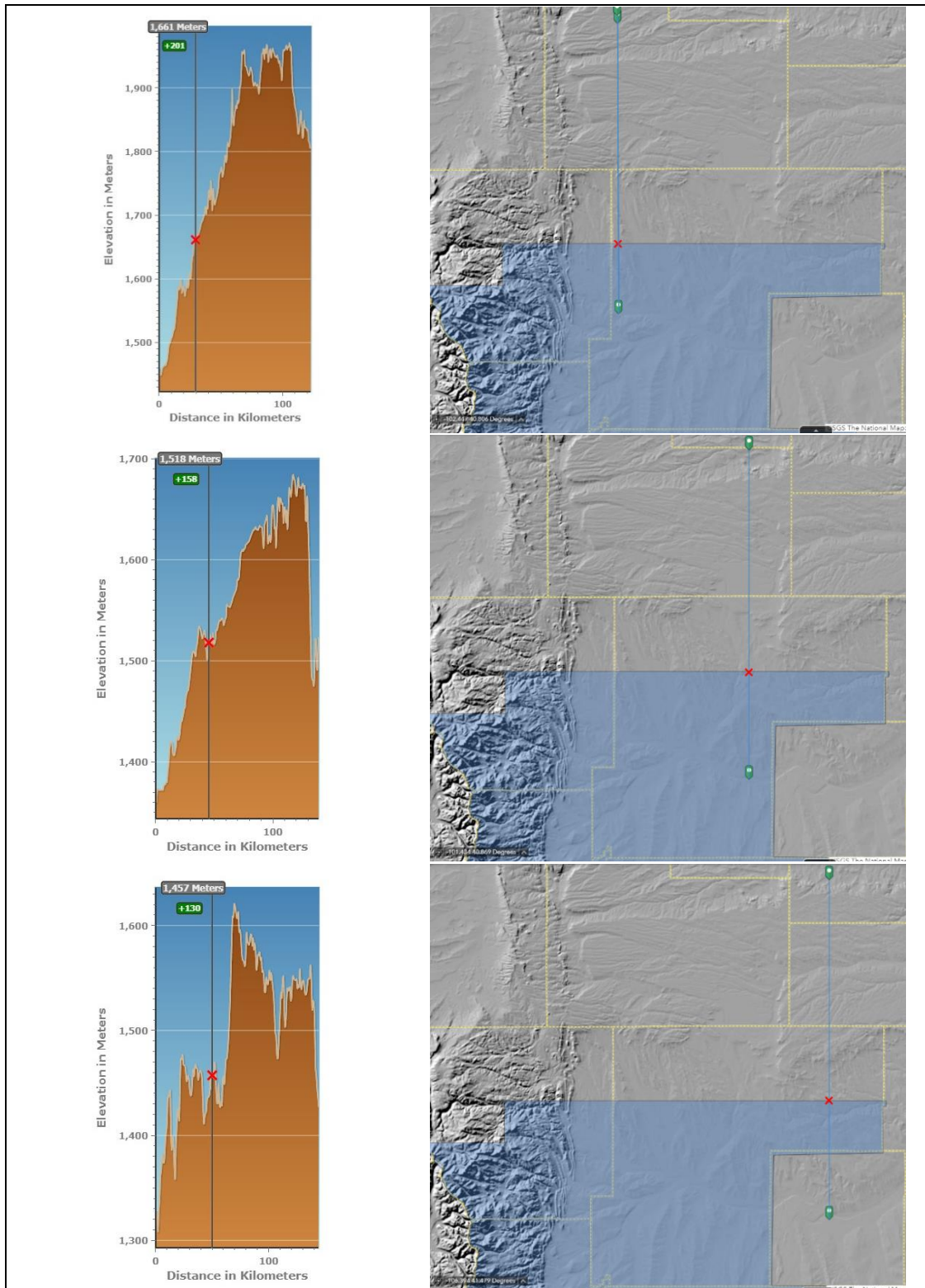


Figure 13. South to North elevation profiles (left) along the lines indicated in corresponding map (right). Red "x" indicates approximate location of current NAA borderline. Top: Western Weld County transect placed at 104.908° W. Middle: Central Weld County transect placed at 104.265° W. Bottom: Eastern Weld County transect placed at 103.851° W.

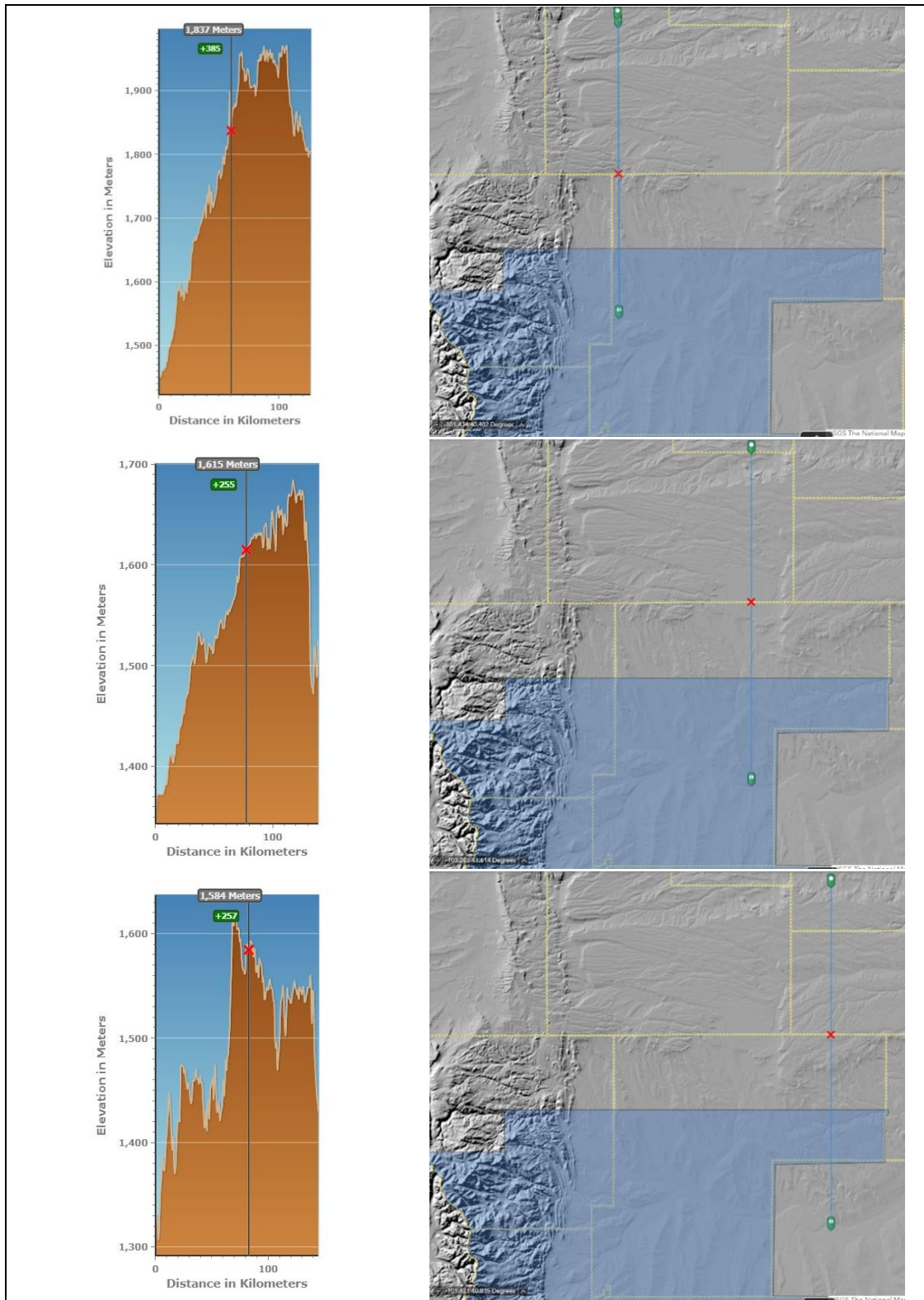


Figure 14. South to North elevation profiles (left) along the lines indicated in corresponding map (right). Red “x” indicates approximate location of CO/WY border. Top: Western Weld County transect placed at 104.908° W. Middle: Central Weld County transect placed at 104.265° W. Bottom: Eastern Weld County transect placed at 103.851° W.

D. Technical Assessment of Jurisdiction Factor

In the EPA's Guidance Memo, the EPA stated:

While the EPA generally believes it is appropriate to include the entire violating or contributing county in an ozone nonattainment area, we recognize that, in some cases, an assessment of relevant information may support inclusion of only part of a county. For example, as has been the case in past designations, there may be low elevation areas (e.g., valleys) with poor air quality in violation of the NAAQS due to restricted atmospheric dispersion where higher elevations (e.g., mountainous) areas in the same county can be shown not to have sources of emissions that contribute to the violation. Alternatively, partial county boundaries may be appropriate in situations where the sources located in a contributing county are located only in a portion of a large county that is otherwise not contributing to the nearby violations. Particularly in the western United States where counties are large, including only partial counties in a designated nonattainment area may be appropriate. For defining partial county boundaries, the EPA recommends the use of well-defined legal jurisdictional boundaries such as townships, census block, immovable landmarks (e.g. major roadways), or other permanent and readily identifiable boundaries.⁷⁹

The EPA further noted:

For those portions of the area where an evaluation of the available information clearly establishes that emissions sources do not contribute to exceedance at the violating monitor(s), the EPA believes it would be appropriate to exclude that portion of the area from the nonattainment area. This weight-of-evidence approach to determining area boundaries could result in nonattainment areas consisting of an entire metropolitan area, single counties, or, in cases, supported by relevant analysis, partial counties, including partial counties within larger urban areas or in a relatively isolated locations.⁸⁰

The agency also stated that "[e]xamples of jurisdictional boundaries include . . . existing nonattainment areas."⁸¹

Based on review of the current record, Weld County believes that northern Weld County meets all the criteria the EPA specified in its guidance to justify the existing NAA boundary including Weld County as a partial county within the DM/NFR NAA boundary. Specifically, the northern portion of Weld County:

1. Is an area of higher elevation than the rest of the county;
2. Is shown not to have sources of emissions that contribute to the violation (see Emissions Factor, Meteorology Factor, and source apportionment modeling in Weight-of-Evidence sections above);
3. Is part of a very large county in the Western US. Weld County is approximately 4,000 square miles, which is roughly the size of the States of Delaware and Rhode Island combined;

⁷⁹ Guidance Memo at 7, *supra* note 1.

⁸⁰ Guidance Memo, Attachment 3 at 1, *supra* note 1.

⁸¹ Guidance Memo, Attachment 3 at 10, *supra* note 1.

4. Emissions sources are less than 5% of the total DM/NFR NAA emissions, while the remainder of Weld County emissions sources (in the NAA) are located in areas identified as ozone source regions (see Emissions Factor, Meteorology Factor above);
5. Is a relatively isolated location that is difficult to access due to the remote location, climbing elevation to the north and the lack of roads; and
6. Has a relevant jurisdictional boundary, that being the existing NAA northern boundary.

In the 2021 TSD, the EPA did not comprehensively evaluate the jurisdictional factors listed in its own guidance. Specifically, the EPA did not explicitly consider the large size of Weld County, the remote rural location of northern Weld County, its isolation from the rest of the county due to climbing elevation and remote location, and the ample available data regarding the lack of meteorological transport of emissions. Instead, the EPA concluded that “including the entirety of Weld County in the nonattainment area is necessary to effectively encompass the emissions sources contributing to violating monitors.”⁸² This conclusion is unsupported and is particularly confounding due to: (1) the EPA’s conclusion in the Emission Factor analysis that the EPA “does not have an accurate understanding of actual emissions from the northern portion of Weld County,” and (2) the EPA has no quantifiable estimate of the contribution of emissions in Weld County to violating monitors to substantiate this statement. Therefore, the EPA’s decision to move the boundary clearly did not adequately consider jurisdictional factors.

E. Weight of Evidence Analysis

According to EPA guidance, in making NAA designation recommendations, there should be consideration of the five factors together and use a weight of evidence approach to the analysis. “The contribution evaluation should generally consider the location and magnitude of the emissions, and the potential for these emissions to contribute to the ambient conditions at the violating monitors as informed by the meteorological and geographical/topographical analysis factors.”⁸³ The EPA has failed to do an adequate weight of evidence analysis in the 2021 TSD.

In the 2021 TSD, the EPA fundamentally presents the same information as in Final TSD and yet it reaches a different conclusion that it is not supported by the data therein. The location and magnitude of VOC and NOx emissions in both TSDs are unchanged, yet the EPA reaches a different conclusion, regardless of the uncertainty expressed in the 2021 TSD about the emission factor. In its 2016 TSD supporting a recommendation consistent with the EPA’s original designation, the State of Colorado provided an analysis that explained its rationale for recommending the northern portion of Weld County be excluded from the NAA as related to the estimated amount of emissions and insignificant contribution to ozone. The EPA disregards this data in favor of an ozone formation conceptual model that contradicts the State of Colorado without supporting evidence and attempts to use the topography of the Cheyenne Ridge to justify its decision. The EPA’s conceptual model in the 2021 TSD lacks sufficient analysis to provide confidence that the EPA clearly understands not only the location of the Cheyenne Ridge but also its influence on wind flow patterns and emissions transport. The State’s HYSPLIT analysis from its 2016 recommendation, which was arbitrarily discarded by the EPA, demonstrates the EPA’s conceptual model of transport from northern Weld County in the DM/NFR NAA is inaccurate. The EPA’s analysis should have considered this important data, particularly because this information is consistent with a wealth of independent data supporting CDPHE’s conceptual model.

⁸² 2021 TSD at 30, *supra* note 3.

⁸³ Guidance Memo, Attachment 3 at 11, *supra* note 1.

In its weight of evidence analysis, the EPA predominantly relies on the topographical factor in its proposed revision of the DM/NFR NAA boundary. The reliance on topography is misplaced because: (1) the topography factor and its effects are highly complex and not comprehensively analyzed by the EPA, and (2) the EPA has inaccurately characterized the location of the Cheyenne Ridge. Weld County's analysis of the topography factor is more comprehensive and accurate than the analysis in EPA's 2021 TSD. The EPA has attempted to redefine the northern boundary based on a perceived location of the crest of the Cheyenne Ridge, even though the EPA acknowledges the Cheyenne Ridge does not have a clear ridgeline. Furthermore, the Colorado/Wyoming state line is not a representative boundary because the peak elevation of Cheyenne Ridge meanders from north to south—at some locations the peak elevation is well north of the border (approximately 50 km) and at other locations is well within Weld County. The topography factor analysis prepared by the EPA is inaccurate, unsubstantiated, and incomplete. Therefore, it should not serve as a basis for the EPA's proposed revision of the DM/NFR NAA boundary.

Finally, the EPA did not carefully consider the jurisdictional boundaries. According to its guidance, the EPA "believes that [it] is appropriate to use already established air planning boundaries where possible, to assure continued effective planning and implementation." In this case, changing the NAA will create administrative challenges for the State to implement and track compliance with different requirements associated with different NAAQS for different NAA boundaries.

IV. If the EPA Finalizes Its Redesignation Decision, It Is a Local Action That Is Not of Nationwide Scope or Effect

The EPA claims that "[i]f finalized, the action designating [Weld County, Colorado and El Paso County, Texas] for the 2015 ozone NAAQS would be 'nationally applicable' within the meaning of CAA section 307(b)(1)." See 86 Fed. Reg. at 31463. Alternatively, the EPA stated that it intends to exercise its complete discretion to publish a finding that the final action is based on a determination of "nationwide scope of effect" under Section 307(b)(1). Yet in Weld County's review, this decision involves a locally or regionally applicable action, and it is not of nationwide scope or effect.

Here, the EPA's proposed redesignation of the northern portion of Weld County is a purely local action. In determining whether the EPA's action is regional or national, the relevant inquiry is "the location of the persons or enterprises that the action regulates rather than on where the effects of the action are felt." *New York v. EPA*, 133 F.3d 987, 990 (7th Cir. 1998). As the EPA explains, it is "proposing to expand the boundary of the Denver Metro/North Front Range, Colorado nonattainment area to include the entirety of Weld County, rather than excluding the northern portion of the county." The proposed redesignation of northern Weld County does not cross state lines or involve any other county besides Weld County. Indeed, no person outside of Weld County can claim that the EPA's redesignation decision has any regulatory application in their jurisdiction. Because the redesignation only affects individuals and entities in Weld County, the redesignation is a purely local action. See *Texas v. EPA*, 706 Fed. Appx. 164 (5th Cir.) ("We are not aware of any case holding that a rule that on its face regulates entities and conduct in a single state is nationally applicable"). By definition, this redesignation of the nonattainment boundary to include Weld County is limited to a single jurisdiction in Colorado.

Moreover, nothing in the EPA's proposed redesignation contemplates nationwide scope or effect. Simply because the EPA made a similar finding in its Federal Register notice about another county in Texas does not transform the decision into a "national" action or make the decision one of "nationwide scope or effect." The two decisions were made separately based on completely different data sets unique to each region. Indeed, the 120-day letter sent to Colorado's governor does not even mention the EPA's

proposed redesignation of El Paso County, Texas, which would be expected if this decision was truly one of “nationwide scope or effect.” Moreover, the burden of each redesignation decision will be borne solely by the people who live within the nonattainment boundary. Rather, EPA’s decision constitutes a mere amalgamation of two local actions in a single Federal Register notice.

In light of the foregoing, Weld County urges the EPA to not finalized its proposed redesignation, and if it chooses to do so despite the overwhelming data and analyses to the contrary, Weld County further urges the EPA to not publish a finding the final action is based on a determination of “nationwide scope of effect” under Section 307(b)(1).

Conclusion

The EPA has failed to adequately respond to the D.C. Circuit’s remand in *Clean Wisconsin*. The court directed the EPA to explain its designation of northern Weld County as attainment, recognizing the possibility that the EPA “will be able to substantiate” this designation on remand. 964 F.3d at 1177. Instead, the EPA chose to ignore at least the last four years of current data by limiting its review to the original record. This decision is arbitrary and capricious and contrary to its previous regulatory decisions. The most current data do not support including northern Weld County in the nonattainment boundary. But even if this data are not considered, a thorough analysis of the original record likewise shows that northern Weld County should not be included within the nonattainment boundary.

Accordingly, the EPA should reaffirm its original NAA boundary designation for the 2015 ozone NAAQS with respect to northern Weld County based on additional analyses consistent with those summarized herein. The Board of County Commissioners of Weld County appreciates the opportunity to submit these comments on the EPA’s proposed ozone NAA boundary redesignation.

/s/ Bruce T. Barker
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