Technical Support Document (TSD)
for the Proposed Supplemental Rule for the Federal Good Neighbor Plan for the
2015 Ozone National Ambient Air Quality Standards

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Ozone Transport Policy Analysis
Proposed Supplemental Rule TSD

U.S. Environmental Protection Agency
Office of Air and Radiation
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The analysis presented in this document supports the EPA's proposed Supplement to the final Federal Good Neighbor Plan (GNP) for the 2015 Ozone National Ambient Air Quality Standards. This document includes: quantification of EGU emissions budgets for the five Supplemental states, reflecting application of the availability timeframes for different mitigation strategies; relevant analyses included in the final GNP; and in limited cases, augmentations to those original analyses. This TSD shows the EPA's assessment of the air quality changes resulting from proposed emissions reductions from the five Supplemental states on downwind nonattainment and/or maintenance locations. In particular, the EPA assesses potential overcontrol by evaluating whether any of the Supplemental States would have all of the Step 1 monitoring locations resolved and or the Step 2 air quality contributions drop below the 1% linkage threshold.

This TSD is organized as follows:

A. Using Engineering Analytics and the Integrated Planning Model (IPM) in the Step 3 Assessment of Significant Contribution to Nonattainment and Interference with Maintenance

In order to establish EGU NO_X emissions control stringencies for each linked upwind state, the EPA is evaluating the same possible uniform levels of NO_X control stringency as identified in the Federal Good Neighbor Plan, which were based on available EGU NO_X control strategies and represented by cost thresholds.[1] The EGU emission reductions pertaining to each level of control stringency are derived using historical data, engineering analyses, and the Integrated Planning Model (IPM) for the power sector as described in section B of this TSD. A similar assessment for one scenario was done for non-EGUs.

It is important to note that for the purposes of estimating air quality impact in Step 3, the EPA calculated emissions for the Supplemental states in the same manner as done for the states included in the Final GNP. Specifically, in Step 3, the EPA evaluated the supplemental states' emissions at each cost threshold as though the NO_X mitigation strategies would be available at the same time as the other states. This approach allows for a reasonable evaluation of air quality impacts and any potential for over-control by assessing all upwind states linked to a given receptor at the same time, thereby avoiding inequitable outcomes of controlling one subset of linked states while failing to control a "second" subset of identically-linked states to a given receptor. EPA recognizes that in practice, sources in the states addressed by this regulatory action being promulgated later than the Federal Good Neighbor Plan will need some additional amount of time to come into compliance. To calculate the states' budgets for purposes of Step 4, the EPA applies the implementation timeline for the different NO_X mitigation strategies based on the expected date this proposed supplemental rule will be finalized, as described in this section and section B of this TSD.[2]

Next, the EPA uses the ozone Air Quality Assessment Tool (AQAT) to estimate the air quality impacts of the upwind state emissions reductions on downwind ozone pollution levels for each of the assessed cost threshold levels in Step 3. Specifically, EPA looks at the air quality improvement at each receptor at each level of control; it also examines whether receptors change status (shifting from either nonattainment to maintenance, or from maintenance to attainment), and looks at the individual contributions of each state to each of its receptors focusing on whether those contributions drop below the Step 2 threshold. See section C in the Ozone Transport Policy Analysis Final Rule TSD for the Federal Good Neighbor for discussion of the development and use of the ozone AQAT and section C of this TSD for estimates for the five Supplemental states.

In this TSD, EPA assesses the EGU NO_X mitigation potential for all states in the contiguous U.S. EPA assessed the air quality impacts from emission reductions for all monitors in the contiguous U.S. for which air quality contribution estimates were available based on

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[1] See the EGU NO_X Mitigation Strategies Final Rule TSD for the Federal Good Neighbor Plan.

[2] This is consistent with how the EPA conducted its analysis in the Federal Good Neighbor Plan where the Step 3 analysis and timing reflected the attainment deadlines and the Step 4 analysisand timing reflected implementation feasibility. Specifically, for the Step 3 analysis, the EPA included emission reductions commensurate with combustion control upgrades for 2023 and emission reductions commensurate with SCR retrofits in 2026; for Step 4, the EPA considered the timing feasibility for mitigation strategies and included emission reductions commensurate with combustion control upgrades starting in the 2024 state budgets and emission reductions commensurate with SCR retrofits were phased in across the 2026 and 2027 state budgets. *See* 88 FR at 36749-50 n.253.

photochemical air quality modeling for the final Federal Good Neighbor Plan or the violating-monitor methodology. The EPA evaluated NO$_X$ reductions and air quality improvements at the receptors determined to have a transport problem (see section III. of the Preamble), and the 5 upwind states that were linked to downwind receptors in step two of the 4-Step Good Neighbor Framework. These states are listed in Table A-1 below.

Table A-1. Upwind States Evaluated in the Multi-factor Test

Arizona
Iowa$^+$
Kansas$^+$
New Mexico$^+$
Tennessee$^+$

+Linkages for Iowa, Kansas, New Mexico, and Tennessee are projected to resolve before 2026. Therefore, those states have a lower level of emission control stringency compared Arizona, which is projected to be linked in 2026.

As in the Final GNP, the EPA relied on adjusted historical data (engineering analytics) as part of the process to identify emissions control stringencies to eliminate significant contribution at step three within the 4-Step Good Neighbor Framework. Historical data were adjusted through the engineering analytics tool to analyze the ozone season NO$_X$ emission reductions available from EGUs at various uniform levels of NO$_X$ control stringency, represented by cost per ton, in each upwind state. Finally, IPM was used to evaluate compliance with the rule and the rule's regulatory control alternatives (i.e., compliance with the emissions budgets). For this analysis for the proposed supplemental rule, the EPA chose to use scenarios that included the Inflation Reduction Act (IRA), matching the additional scenarios that were considered in the Final GNP. EPA also used its engineering analytics tool and IPM projections to perform air quality assessment and sensitivity analysis as part of step 3.

The engineering analysis tool uses 2021 ozone-season data as representative historical emissions and operating data reported under 40 CFR part 75 by covered units. It is a tool that builds estimates of future unit-level and state-level emissions based on exogenous changes to historical heat input and emissions data reflecting fleet changes that will occur subsequent to the last year of available data. See Section B. *Calculating Step 4 EGU Emission Budgets from Historical Data* for a detailed description of the engineering analytics tool.

IPM is a multiregional, dynamic, deterministic linear programming model of the U.S. electric power sector that EPA uses to analyze cost and emissions impacts of environmental [3]￼ All IPM cases for this rule included representation of the Title IV SO$_2$ cap and trade program; the NO$_X$ SIP Call; the CSAPR, CSAPR Update, and Revised CSAPR Update regional cap and trade programs; consent decrees and settlements; and state and federal rules as listed in the IPM

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[3] See "Documentation for EPA's Power Sector Modeling Platform v6 using Updated Summer 2021 Reference Case". Available at https://www. https://www.epa.gov/airmarkets/documentation-epas-power-sector-modeling-platform-v6-summer-2021-reference-case. See also the "Updated Summer 2021 Reference Case Incremental Documentation for the 2015 Ozone NAAQS Actions." https://www.epa.gov/power-sector-modeling/supporting-documentation-2015-ozone-naaqs-actions

documentation referenced above. For details on which measures are endogenously modeled within IPM and which are not, please see Appendix Table C-1.

Table A-2 below summarizes the reduction measures that are broadly available at various cost thresholds for EGUs.

Table A-2. Reduction strategies available to EGUs at each cost threshold.

Cost Threshold ($ per ton Ozone-Season NO_X)	Reduction Options
$1,800	-Retrofitting state-of-the-art combustion controls; -Optimizing idled SCRs; -Optimizing operating SNCRs
$11,000	-All options above and; -Installing SCR and SNCR on coal and oil/gas steam units greater than 100 MW and lacking post combustion controls.

For the Engineering Analytics:

- At $1,800/ton:
    - If 2021 adjusted baseline rate was greater than 0.08 lb/MMBtu for SCR controlled coal units, that rate and corresponding emissions were adjusted down to 0.08 lb/MMBtu starting in 2023 for AQAT analysis and 2025 for calculating budgets;
    - for SCR controlled oil/gas units, if the adjusted historical rate was greater than 0.03 lb/MMBtu then the rate was adjusted downwards to 0.03 lb/MMBtu starting in 2023 for AQAT analysis and 2025 for calculating budgets;
    - for SCR controlled combined cycle units, if the adjusted historical rate was greater than 0.012 lb/MMBtu then the rate was adjusted downwards to 0.012 lb/MMBtu in 2023 for AQAT analysis and 2025 for calculating budgets;
    - for SCR controlled combustion turbine units, if the adjusted historical rate was greater than 0.03 lb/MMBtu then the rate was adjusted downwards to 0.03 lb/MMBtu in 2023 for AQAT analysis and 2025 for calculating budgets; and
    - for units with LNB upgrade potential and an adjusted historical rate greater than 0.199 lb/MMBtu, their rates were adjusted downwards to 0.199 lb/MMBtu starting in 2023 for AQAT analysis and 2025 for calculating budgets.
    - Starting in 2023 for AQAT analysis and 2025 for calculating budgets, units with SNCRs were given their mode 2 NO_X rates[4] if they were not already operating at that level or better in 2019.

- At $11,000/ton:
    - Same as $1,800/ton; additionally:
    - Coal units greater than or equal 100 MW and lacking a SCR were given an emission rate equal to 0.05 lb/MMBtu reflecting SCR installation starting in 2026 for AQAT analysis and 2027 for calculating budgets.

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[4] For a unit with an existing post-combustion control, mode 1 reflects the existing post-combustion control not operating and mode 2 the existing post-combustion control operating. For details, please see Chapter 3.10 of the IPM documentation available at: https://www.epa.gov/airmarkets/documentation-epas-power-sector-modeling-platform-v6-summer-2021-reference-case.

- Oil/gas steam units greater than or equal100 MW and with a three year (2019-2021) average of ozone season emissions of at least 150 tons were given an emission rate of 0.03 lb/MMBtu reflecting SCR installation starting in 2026 for AQAT analysis and 2027 for calculating budgets.

B. Calculating Step 4 EGU Emission Budgets from Historical Data for the Five Supplemental States

The proposed emissions budgets for the five supplemental states were modified to reflect the availability timelines described in the previous section (i.e. all of the mitigation strategies included in the $1,800/ton cost level being available by the start of the 2025 ozone season[5] and those at the $11,000/ton cost level being available by the start of the 2027 ozone season[6]). The state budget calculations described in this section refer only to years 2025 to 2029, as is relevant for the five supplemental states. Uniform cost tresholds and budget information shown for states other than AZ, IA, KS, NM, and TN are copied from the Final Good Neighbor Plan, which the EPA is not reopening, and does not reflect stays of the Plan currently in place on an interim basis done to comply with preliminary judicial stay orders.

1. Calculating 2025-2029 Engineering Baseline Heat Input and Emissions

The underlying data and calculations described below can be found in the workbook titled (Appendix A of the Ozone Transport Policy Analysis Supplemental Proposed Rule TSD). They are *also available in the docket and on the EPA website.*

EPA starts with 2021 reported, seasonal, historical NO_X emissions and heat input data for each unit.[7] This reflects the latest representative owner/operator reported data that was available at the time of EPA analysis for the final Federal Good Neighbor Plan.[8,9] The NO_X emissions data for units that report data to EPA under the Acid Rain Program (ARP), Cross-State Air Pollution Rule (CSAPR), CSAPR Update, and Revised CSAPR Update are aggregated to the summer/ozone season period (May-September). Because the unit-level NO_X emissions for the

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[5] The EPA determined in the Final GNP that combustion control upgrades can be made within 6 months. Since the Final GNP went into effect in the middle of the 2023 ozone season, there was not suffient time for combustion control upgrades to be made until the 2024 ozone season. Consequently, the 2023 budgets for affected states did not include emission reductions commensurate with upgrading combustion controls, but the 2024 budgets did. Since it is expected there will be at least six months between the supplemental rule being finalized and the first ozone season affected states are given budgets (ie 2025), emission reductions commensurate with upgrading combustion controls are included in the first year budgets.

[6] Phased in over 2027 and 2028, similar to the two year phase in the final GNP for reductions commensurate with SCR retrofit

[7] "Seasonal" refers to the ozone-season program months of May through September.

[8] As explained in VI.B.4 of the preamble for the final Federal Good Neighbor Plan, at the end of this procedure EPA is able to evaluate, as part of its quality assurance and quality check, whether the use of recent historical final data (e.g., 2021) is representative of the baseline heat input and emissions for each state and make any adjustments if needed. None of the 5 states covered in this Supplemental Proposal were found to need an adjustment.

[9] As explained in section III.D of the Preamble for this Supplemental Rule, the EPA finds it is appropriate to continue using the same set of data that informed the definition of Good Neighbor obligations for all other states covered by the Federal Good Neighbor Plan.

summer/ozone-season period are relevant to determining ozone-season emissions budgets, those files are shown in the "Unit 2025" through "Unit 2029" sheets in the *Appendix A of the Ozone Transport Policy Analysis Supplemental Proposed Rule TSD* file accompanying this document.[10] In that file, unit-level details such as facility name, unit ID, etc. are shown in columns A through H of the "Unit 2025" through "Unit 2029" worksheets. Reported historical data for these units such as unit type, capacity, fuel, existing post combustion controls, historical emissions, heat input, generation, etc. are shown in columns I through U. The 2021 historical emissions value is in column R. The assumed future year baseline emissions estimate (e.g., 2025-2029) is shown in column AD, and reflects either the same emissions level as that observed in 2021, or a modification of that value based on changes expected to the operational or pollution control status of that unit.[11] These modifications are made due to:

a. *Retirements* - Emissions from units with upcoming confirmed retirement dates are adjusted to zero for ozone seasons subsequent to that retirement date. Retirement dates are identified through a combination of sources including EIA Form 860, utility-announced retirements,[12] and stakeholder feedback provided to EPA, as reflected in the National Electricity Energy Data System (NEEDS) February 2023 file. For the purpose of the engineering analysis, when companies have announced they will either sell a unit or retire it by a certain date, the EPA assumed that the unit would retire unless there is news of a specific potential buyer. Retirement dates are shown in columns J and K and the impact of retirements on emissions is shown in column V. The retiring units are flagged in column W.[13,14]

	2021	**Future Year (e.g., 2025)**
Unit x	10,000 MMBtu x 0.2 lb/MMBtu = 1 ton	*0 MMBtu* x 0.2 lb/MMBtu = *0 ton*

b. *Coal to Gas Conversion* – Emissions from coal units with scheduled conversions to natural gas fuel use are adjusted to reflect reduced emission rates associated with

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[10] The EPA notes that historical unit-level ozone season EGU NO_X emission rates are publicly available and quality assured data. The emissions are monitored using continuous emissions monitors (CEMs) or other monitoring approaches available to qualifying units under 40 CFR part 75 and are reported to the EPA directly by power sector sources.

[11] Based on data and changes known at time of analysis.

[12] Starting with the June 2022 version of NEEDS, EPA has begun including announced retirements as that represents the most likely future behavior for the unit, unless compelling information suggests such retirement may not happen or may be delayed. EPA also determined that including announced retirements in the engineering analysis would be helpful in establishing pre-set budgets, particularly beyond 2024, as that would help ensure state emissions budgets are reflective of the best information on the power sector's operating profile in future years. It has been EPA's experience that in recent years, units' announced retirements tend to be moved forward rather than pushed back in time, making the inclusion of announced retirements reasonable. For cases beyond 2024 where unit retirements may be pushed back, the calculation of the dynamic budgets would capture those delayed retirements and would adjust accordingly (i.e., they would continue to reflect the operation of the unit in question). Since states would receive the higher of the pre-set and dynamic budgets from 2026 through 2029, this would prevent states from being under-budgeted because of changes in projected retirements used to establish the preset budgets.

[13] EPA updated its inventory of units flagged as retiring in column N based on stakeholder input, including on previous rulemakings and data from EIA 860 and the PJM retirement tracker.

[14] Units that are to retire by the start of the a year's ozone season are considered retired for that year in the engineering analysis. Units that will operate for at least part of the ozone season of a given year will not be considered retired until the following year for the engineering analysis.

natural gas for years subsequent to that conversion date. To reflect a given unit's conversion to gas, that unit's future emission rates for NO_X are assumed to be half of its 2021 coal-fired emission rates while utilization levels are assumed to remain the same.[15] Therefore, the future year estimated emissions for these converting units are expected to be half of 2021 levels for NO_X. Units expected to convert to gas are flagged using EIA Form 860, utility announcements, and stakeholder feedback, as reflected in NEEDS February 2023. For the purpose of the engineering analysis, when units have a requirement to either convert to gas or retire (i.e., cease burning coal) but there has been no indication which option a unit will take, EPA assumed that the unit would convert to gas. The impact of coal to gas conversion for the future year is shown in column Z, flagged in column AA. The example below pertains to NO_X emission estimates. For any control decisions after the point of conversion, the unit is treated as an O/G Steam unit, shown in column I.

	2021	**Future Year (e.g., 2025)**
Unit x	10,000 MMBtu x 0.2 lb/MMBtu = 1 ton	10,000 MMBtu x *0.1 lb/MMBtu = 0.5 ton*

c. *Retrofits* – Emissions from units with scheduled SCR or SNCR retrofits are adjusted to reflect the emission rates expected with new SCR installation (0.05 lb/MMBtu of NO_X for a coal unit, and 0.03 lb/MMBtu for an oil/gas steam unit) and new SNCR (25% decrease in previously reported emission rate for all boilers except circulating fluidized bed boilers that receive a 50% decrease in previously reported emission rate) and are assumed to operate at the same 2021 utilization levels.[16] These emission rates were multiplied by the affected unit's 2021 heat input to estimate the future year emission level. The impact of post-combustion control retrofits on future year emissions assumptions is shown in column AB, flagged in column AC.

For SNCR:

	2021	**Future Year (e.g., 2025)**
Unit x	10,000 MMBtu x 0.2 lb/MMBtu = 1 ton	10,000 MMBtu x *0.15 lb/MMBtu = 0.75 ton*

For SCR:

	2021	**Future Year (e.g., 2025)**
Unit x	10,000 MMBtu x 0.2 lb/MMBtu = 1 ton	10,000 MMBtu x *0.050 lb/MMBtu = 0.25 ton*

d. *Other* – EPA also made several unit-specific adjustments to 2021 emission levels to reflect forthcoming emission or emission rate requirements specified in consent decrees, BART requirements, state RACT rules, and/or other revised permit limits. The impacts for future year emission assumptions are shown in column AD, flagged in column AE.[17]

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[15] This is consistent with NO_X rate change used in IPM. See "Documentation for EPA's Power Sector Modeling Platform v6 using Summer 2021 Reference Case." table 5-18.

[16] *Ibid.*

[17] EPA checked its inventory of units impacted by consent decrees based on input provided stakeholders and comments on previous rulemakings. No units were determined to be impacted as described in the Allowance Allocation Under the Final Rule TSD and its Addendum.

e. New Units – Emissions for new units are identified in the “New units” worksheet. They reflect under-construction and/or permitted units greater than 25 MW that are expected to be in commercial operation by the designated future year. These assumed emission values for new units are reflected in column F and the online years are in column I. To obtain these emissions, EPA identified all new fossil-fired EGUs coming online after 2021 according to EIA Form 860 and stakeholder comments, as reflected in NEEDS v6 October 2022. EPA then identified the heat rate and capacity values for these units using EIA Form 860, as reflected in NEEDS v6 October 2022, and stakeholder-provided data. Next, EPA identified the 2019 average seasonal capacity factor for similar units that came online between 2015-2019. EPA used these seasonal capacity factors (e.g., 65% for natural gas combined cycle units and 10% for combustion turbines), the unit’s capacity, the unit’s heat rate, and the unit’s estimated NO_X rate to estimate future year emissions (capacity × capacity factor × number of hours in ozone season × heat rate × NO_X emission rate = NO_X emissions).[18] Additionally, for approximately fifteen additional units that are not new units but which have not previously reported data to EPA under 40 CFR part 75 and for purposes of the emissions budgets established under this rule are treated as new units starting in 2024, EIA data sources are used to obtain the necessary data.

	2021	**Future Year (e.g., 2025)**
Unit x	0 MMBtu x0.0 lb/MMBtu = 0 ton	100 MW *0.65 *(153x24) *8000 Btu/KWh *0.01 lb/MMBtu = 9 tons

After completing these steps, EPA has unit-level future year baselines that originate from the most recently reported representative data (2021) and incorporate known EGU fleet changes. The state-level file reflects a summation of the unit-level values..

2. Estimating impacts of combustion and post combustion controls on state-level emission rates

Next, EPA evaluates the impact of the different combustion and post-combustion controls. Similar to the methodology above, EPA continued to adjust the historical data to reflect a future year with specific uniform control assumptions. However, these adjustments were to capture changes incremental to the baseline reflecting different uniform control measures. EPA applied these adjustments for analytical purposes to all states, but only the affected states’ adjustments are relevant for emissions budgets in this rule. Each of these adjustments is shown incrementally for the relevant mitigation technology in the “Unit 2025” through “Unit 2029” worksheets.

a. SCR optimization – Emissions from units with existing SCRs, but that operated at an emission rate greater than a fuel and unit type optimized level (0.08 lb/MMBtu for coal steam, 0.03 for oil/gas steam, 0.03 for combustion turbine, and 0.012 for combined cycle) in 2021, were adjusted downwards to reflect expected emissions when the SCR is

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[18] Emission rate data is informed by historical data, as reflected in NEEDS, for like units coming online in the last five years. See “2019 and 2020 new NGCC Data” worksheet in the “EGU Power Sector 2019 and 2020 data” file in the docket. EPA-HQ-OAR-2021-0668-0142

operated to the applicable optimized emission rate. The applicable optimized emission rate is multiplied by the baseline heat input level to arrive at the future year emissions estimate for a given unit. The impact on future year emission assumptions is shown in column AF and flagged in column AG of the "Unit 2025" through "Unit 2029" worksheets. EPA notes this assumption only applies to ozone-season NO_X as that is the season in which this rule would likely incentivize such operation. In the rule, EPA also incorporated a flag in column AG for units with SCRs and a shared stack. For units with an SCR that share a stack with a unit(s) that does not have SCR, EPA did not assume potential emission reductions attributable to existing SCR optimization as the reported split of emissions between units may not reflect the actual split of emissions. In similar past rulemakings, including the Federal Good Neighbor Plan, some commenters have provided their own emission splits or emission rates for each unit sharing a stack. EPA has continued to use verified reported data that is consistent across all units.

	2021	**Future Year (e.g., 2025)**
Unit x	10,000 MMBtu x 0.2 lb/MMBtu = 1 ton	10,000 MMBtu x *0.08 lb/MMBtu = 0.4 ton*

b. *State-of-the-art combustion controls* – Emissions from units that were operating in 2021 without state-of-the-art combustion controls were adjusted downwards to reflect assumed installation of, or upgrade to, these controls and their expected emission rate impact. EPA assumed a future year emission rate of 0.199 lb/MMBtu for units expected to install/upgrade combustion controls. This emission rate was multiplied by each eligible unit's future year baseline heat input to estimate its future emission level. Details of EPA's assessment of state-of-the-art NO_X combustion controls and corresponding emission rates are provided in the EGU NO_X Mitigation Strategies Final Rule TSD for the Federal Good Neighbor Plan. The impact of state-of-the-art combustion controls on future year emission assumptions is shown in column AH and flagged in column AI of the "Unit 2025" through "Unit 2029" worksheets. EPA also incorporated a flag in column AI, based on stakeholder input, for units with a shared stack. For these units, based on stakeholder provided data, EPA did not assume potential emission reductions attributable to state-of-the-art combustion controls as explained in Section V.B of the Preamble for the Federal Good Neighbor Plan. Note, these assumptions apply emissions adjustments throughout the entire year as the controls operate continuously once installed.

	2021	**Future Year (e.g., 2025)**
Unit x	10,000 MMBtu x 0.4 lb/MMBtu = 2 ton	10,000 MMBtu x *0.199lb/MMBtu = ~1 ton*

c. *SNCR optimization* - Emissions from units with existing SNCRs, but that operated at an emission rate greater than the SNCR optimization rate, were adjusted downwards to reflect expected emissions when the SNCR is optimized. This emission rate was identified specific to each unit based on historical data and is described in the EGU NO_X Mitigation Strategy Final Rule TSD. The optimized emission rate is multiplied by future year baseline heat input levels to arrive at the future year emissions estimate. For the units affected by this adjustment, the impact on future year emission assumptions is shown in column AJ and flagged in column AK of the "Unit 2025" through "Unit 2029" worksheets. Note, this assumption only applies to ozone-season NO_X as that is the season in which this rule’s program would likely incentivize such operation.

	2021	Future Year (e.g., 2025)
Unit x	10,000 MMBtu x 0.2 lb/MMBtu = 1 ton	10,000 MMBtu x *0.15 lb/MMBtu = 0.75 ton*

Post Combustion Control Retrofits (SNCR and SCR): Emissions for eligible coal and oil/gas steam units were adjusted to reflect expected emission reductions from the retrofit of either an SCR or SNCR. Table B-1 shows the eligibility of units assumed to receive each type of retrofit in the engineering analysis. Uncontrolled units at coal facilities that share a stack with an existing SCR but are also eligible to receive a new retrofit SCR are given an emission rate assuming an optimized new SCR in years for which this control measure is available. For more information on the retrofit assumptions, see section V.B of the Preamble for the Federal Good Neighbor Plan and section VI.B of the Preamble for this Supplemental Proposal.

i. SNCR retrofit– Emissions from coal steam units less than 100 MW without post-combustion controls as well as coal-fired circulating fluidized bed (CFB) boilers of any size without post-combustion controls were adjusted downwards to reflect expected emissions if an SNCR were to be retrofitted on the unit. The emission rate was identified as the higher of 75% of the unit’s baseline emission rate level (i.e., reflecting a 25% reduction from the technology) or 0.08 lb/MMBtu (i.e., an emission rate floor for SNCR).[19] For CFB units, the emission rate was identified as the higher of 50% of the unit’s baseline emission rate level or 0.08 lb/MMBtu. The adjusted emission rate is multiplied by future year baseline heat input levels to arrive at the future year emissions estimate for that technology. For the units affected by this adjustment, the impact on future year emission assumptions is shown in column AO and flagged in column AP of the “Unit 2025” through “Unit 2029” worksheets.

	2021	Future Year (e.g., 2025)
Unit x	10,000 MMBtu x 0.2 lb/MMBtu = 1 ton	10,000 MMBtu x 0.*15 lb/MMBtu* = 0.75 *ton*

ii. SCR retrofit- Emissions from 1) coal units greater than 100 MW without SCR controls and 2) oil/gas steam units greater than 100 MW without an SCR and a three year (2019-2021) average of ozone season emissions of at least 150 tons were adjusted downwards to reflect expected emissions if an SCR were to be retrofitted on the unit.[20] The emission rate was identified as the higher of 10% of the unit’s baseline emission rate or 0.05 lb/MMBtu for coal steam units and 0.03 lb/MMBtu for oil/gas steam units (i.e., a 90%

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[19] See https://www.epa.gov/airmarkets/retrofit-cost-analyzer for the “Retrofit Cost Analyzer (Update 1-26-2022)” Excel tool (EPA-HQ-OAR-2021-0668-0118) and for the documentation of the underlying equations in "IPM Model – Updates to Cost and Performance for APC Technologies: SNCR Cost Development Methodology for Coal-fired Boilers" (February 2023).

[20] The EPA used a 3-year average of 2019-2021 reported ozone season emissions to derive a tons per ozone season value representative for each covered oil/gas steam unit. This three year period includes a variety of circumstances for the economy and demand for electricity and using the average avoids including or excluding units because of a single anomalous year of generation and emissions.

reduction with an emission rate floor of 0.05 or 0.03 lb/MMBtu). [21] The adjusted emission rate is multiplied by future year baseline heat input levels to arrive at the future year emissions estimate for that technology. For the units affected by this adjustment, the impact on future year emission assumptions is shown in column AO and flagged in column AP of the “Unit 2025” through “Unit 2029” worksheets. Note, this assumption only applies to ozone-season NO_X. To inform quantification of state budgets for the 2027 ozone season control period as explained in preamble section VII.A for the Supplemental Proposal, the EPA also quantifies an intermediate point halfway between the pre- and post-SCR rate is shown as “SCR (Half)” in column AN. For units with an SCR that share a stack with a unit(s) that does not have SCR an intermediate point halfway between pre- and post-SCR optimization is also shown in this column, mirroring the half-way phase in for SCR retrofits.

	2021		**Future Year (e.g., 2027)**
Unit x	10,000 MMBtu x 0.2 lb/MMBtu = 1 ton		10,000 MMBtu x 0.*05 lb/MMBtu* = 0.25 *ton*

Table B-1. Post-Combustion Control Retrofit Assumptions for Coal and Oil/Gas Steam Units in the Engineering Analysis.

Fuel	**Unit Type**	**Capacity (MW)**	**Average of 2019 to 2021 Ozone Season NO_X (tons)**	**Retrofit Type**	**Emission Rate (lb/MMBtu)**
Coal	not CFB	>=100	All	SCR	0.05
Coal	not CFB	<100	All	SNCR	25% reduction
Coal	CFB	All	All	SNCR	50% reduction
Oil/Gas	All	>=100	>=150	SCR	0.03

With all of these unit-level adjustments applied, the resulting unit-level heat input and unit-level emissions are summed up to the state level. New units’ emissions and generation and other state level budget adjustments[22] are added after this step to inform the state-level totals; these state-level emissions are visible in the worksheets titled “State 2025” through “State 2029” in the *Appendix A of the Ozone Transport Policy Analysis Supplemental Proposed Rule TSD for*

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[21] "IPM Model – Updates to Cost and Performance for APC Technologies: SCR Cost Development Methodology for Coal-fired Boilers" (February 2023) ;
"IPM Model – Updates to Cost and Performance for APC Technologies: SCR Cost Development Methodology for Oil/Gas-fired Boilers" (February 2023)

[22] The state level budget adjustment is described in Section VI.B.4.a. of the Preamble for the final Federal Good Neighbor Plan.

the Supplemental Interstate Transport SIP and FIP Actions workbook accompanying this document.[23]

Finally, the EPA identified the column in each "state" tab that corresponds to the control stringency identified for that state and that year as described in Section VI of the preamble. These values constitute the preset state emissions budgets and are shown in column Q. Emission levels at each control stringency are shown in Tables B-2 through B-8 for all states in the contiguous United States, regardless of whether they were covered in the program. Tables for 2023 and 2024 are included because the values are used, as described in section C, to to estimate the air quality contributions and resulting design values for various levels of emissions reductions. The preset state budgets for states covered by this Supplemental Proposal or the Federal Good Neighbor Plan are displayed in Tables B-9 through B-13.

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[23] *Appendix A of the Ozone Transport Policy Analysis Supplemental Proposed Rule* shows the unit-level details and calculations described in sections B.1 and B.2 of this TSD, before aggregating those values to use at the state and regional level. The unit-level values inform the state budgets and are not a prediction of how each unit will operate in the future. Although anchored in historical data, EPA recognizes at the unit-level some units will overperform and some units will underperform the unit-level values.

Table B-2. 2023 Ozone Season NO_X Emissions for States at Different Uniform Control Scenarios

State	2023 Baseline	SCR Optimization	SCR Optimization + SOA CC	SCR Optimization + SOA CC + SNCR Optimization
Alabama	6,412	6,379	6,379	6,379
Arizona	7,723	7,639	7,570	7,439
Arkansas	8,955	8,927	8,927	8,927
California	1,731	1,340	1,340	1,340
Colorado	6,470	6,393	6,393	6,393
Connecticut	381	355	355	355
Delaware	423	388	388	384
Florida	13,541	11,000	11,000	11,000
Georgia	5,191	5,179	5,179	5,172
Idaho	240	240	240	240
Illinois	7,721	7,652	7,652	7,474
Indiana	13,298	12,442	12,442	12,440
Iowa	9,867	9,867	9,813	9,752
Kansas	6,231	5,484	5,484	5,484
Kentucky	13,900	13,601	12,999	12,999
Louisiana	9,974	9,459	9,459	9,363
Maine	108	86	86	86
Maryland	1,214	1,214	1,214	1,206
Massachusetts	297	265	265	265
Michigan	10,746	10,742	10,742	10,727
Minnesota	5,643	5,544	5,544	5,504
Mississippi	6,283	6,210	5,299	5,299
Missouri	20,094	12,755	12,755	12,598
Montana	3,071	3,071	3,071	3,071
Nebraska	8,931	8,894	8,381	8,381
Nevada	2,372	2,368	2,368	2,368
New Hampshire	330	267	267	267
New Jersey	915	773	773	773
New Mexico	2,289	2,259	2,259	2,259
New York	3,977	3,912	3,912	3,912
North Carolina	12,355	9,209	9,209	9,180
North Dakota	12,246	12,246	12,246	11,436
Ohio	10,264	9,110	9,110	9,110
Oklahoma	10,470	10,271	9,580	9,580
Oregon	342	292	292	292
Pennsylvania	8,573	8,238	8,238	8,138

State	2023 Baseline	SCR Optimization	SCR Optimization + SOA CC	SCR Optimization + SOA CC + SNCR Optimization
Rhode Island	279	148	148	148
South Carolina	4,273	3,531	3,531	3,531
South Dakota	521	521	521	521
Tennessee	4,319	4,209	4,209	4,209
Texas	41,276	40,367	40,367	40,134
Utah	15,762	15,755	15,755	15,755
Vermont	54	54	54	54
Virginia	3,329	3,165	3,087	3,065
Washington	1,999	1,729	1,729	1,729
West Virginia	14,686	14,132	13,586	13,306
Wisconsin	6,321	6,315	6,315	6,295
Wyoming	11,643	11,561	10,966	10,953
Total	**337,041**	**315,557**	**311,498**	**309,292**

Note: All states are included solely for illustrative purposes, whether or not they are covered by the program.

Table B-3. 2024 Ozone Season NO_X Emissions for States at Different Uniform Control Scenarios

State	2024 Baseline	SCR Optimization	SCR Optimization + SOA CC	SCR Optimization + SOA CC + SNCR Optimization
Alabama	6,522	6,489	6,489	6,489
Arizona	7,723	7,639	7,570	7,439
Arkansas	8,955	8,927	8,927	8,927
California	1,673	1,283	1,283	1,283
Colorado	6,470	6,393	6,393	6,393
Connecticut	381	355	355	355
Delaware	423	388	388	384
Florida	12,868	10,381	10,381	10,381
Georgia	5,191	5,179	5,179	5,172
Idaho	240	240	240	240
Illinois	7,555	7,486	7,486	7,325
Indiana	12,218	11,415	11,415	11,413
Iowa	9,867	9,867	9,813	9,752
Kansas	5,510	4,763	4,763	4,763
Kentucky	13,900	13,601	12,999	12,999
Louisiana	9,974	9,459	9,459	9,363
Maine	108	86	86	86
Maryland	1,214	1,214	1,214	1,206
Massachusetts	297	265	265	265
Michigan	10,294	10,290	10,290	10,275
Minnesota	4,197	4,099	4,099	4,058
Mississippi	6,042	5,969	5,058	5,058
Missouri	18,612	11,273	11,273	11,116
Montana	3,071	3,071	3,071	3,071
Nebraska	8,931	8,894	8,381	8,381
Nevada	2,592	2,589	2,589	2,589
New Hampshire	330	267	267	267
New Jersey	915	773	773	773
New Mexico	2,289	2,259	2,259	2,259
New York	3,977	3,912	3,912	3,912
North Carolina	12,355	9,209	9,209	9,180
North Dakota	12,246	12,246	12,246	11,436
Ohio	9,083	7,929	7,929	7,929
Oklahoma	10,274	10,075	9,384	9,384
Oregon	342	292	292	292
Pennsylvania	8,573	8,238	8,238	8,138

State	2024 Baseline	SCR Optimization	SCR Optimization + SOA CC	SCR Optimization + SOA CC + SNCR Optimization
Rhode Island	279	148	148	148
South Carolina	4,273	3,531	3,531	3,531
South Dakota	521	521	521	521
Tennessee	4,064	3,983	3,983	3,983
Texas	41,276	40,367	40,367	40,134
Utah	15,924	15,917	15,917	15,917
Vermont	54	54	54	54
Virginia	3,019	2,855	2,778	2,756
Washington	1,999	1,729	1,729	1,729
West Virginia	13,185	12,784	12,239	11,958
Wisconsin	6,321	6,315	6,315	6,295
Wyoming	11,643	11,561	10,966	10,953
Total	**327,773**	**306,578**	**302,519**	**300,330**

Note: All states are included solely for illustrative purposes, whether or not they are covered by the program.

Table B-4. 2025 Ozone Season NO_X Emissions for States at Different Uniform Control Scenarios

State	2025 Baseline	SCR Optimization	SCR Optimization + SOA CC	SCR Optimization + SOA CC + SNCR Optimization
Alabama	6,522	6,489	6,489	6,489
Arizona	8,479	8,395	8,325	8,195
Arkansas	8,955	8,927	8,927	8,927
California	1,672	1,282	1,282	1,282
Colorado	6,470	6,393	6,393	6,393
Connecticut	381	355	355	355
Delaware	423	388	388	384
Florida	12,913	10,426	10,426	10,426
Georgia	5,191	5,179	5,179	5,172
Idaho	240	240	240	240
Illinois	7,555	7,486	7,486	7,325
Indiana	12,218	11,415	11,415	11,413
Iowa	9,867	9,867	9,813	9,752
Kansas	5,510	4,763	4,763	4,763
Kentucky	13,211	12,911	12,472	12,472
Louisiana	9,717	9,203	9,203	9,107
Maine	108	86	86	86
Maryland	1,214	1,214	1,214	1,206
Massachusetts	288	256	256	256
Michigan	10,294	10,290	10,290	10,275
Minnesota	4,197	4,099	4,099	4,058
Mississippi	6,022	5,949	5,037	5,037
Missouri	18,612	11,273	11,273	11,116
Montana	3,071	3,071	3,071	3,071
Nebraska	8,931	8,894	8,381	8,381
Nevada	2,549	2,545	2,545	2,545
New Hampshire	330	267	267	267
New Jersey	915	773	773	773
New Mexico	2,241	2,211	2,211	2,211
New York	3,977	3,912	3,912	3,912
North Carolina	12,270	9,124	9,124	9,114
North Dakota	12,246	12,246	12,246	11,436
Ohio	9,083	7,929	7,929	7,929
Oklahoma	10,266	10,068	9,376	9,376
Oregon	350	300	300	300

State	**2025 Baseline**	**SCR Optimization**	**SCR Optimization + SOA CC**	**SCR Optimization + SOA CC + SNCR Optimization**
Pennsylvania	8,573	8,238	8,238	8,138
Rhode Island	279	148	148	148
South Carolina	4,273	3,531	3,531	3,531
South Dakota	521	521	521	521
Tennessee	4,064	3,983	3,983	3,983
Texas	39,684	38,775	38,775	38,542
Utah	15,924	15,917	15,917	15,917
Vermont	54	54	54	54
Virginia	3,019	2,855	2,778	2,756
Washington	1,999	1,729	1,729	1,729
West Virginia	13,185	12,784	12,239	11,958
Wisconsin	6,014	6,008	6,008	5,988
Wyoming	10,429	10,347	9,752	9,739
Total	**324,308**	**303,114**	**299,217**	**297,048**

Note: All states are included solely for illustrative purposes, whether or not they are covered by the program.

Table B-5. 2026 Ozone Season NO_X Emissions for States at Different Uniform Control Scenarios

State	2026 Baseline	SCR Optimization	SCR Optimization + SOA CC	SCR Optimization + SOA CC + SNCR Optimization	SCR Optimization + SOA CC + SNCR Optimization + SCR (Half)/SNCR Retrofit	SCR Optimization + SOA CC + SNCR Optimization + SCR/SNCR Retrofit
Alabama	6,371	6,339	6,339	6,339	6,053	5,767
Arizona	6,098	6,013	5,944	5,814	4,913	4,012
Arkansas	8,728	8,700	8,700	8,700	6,365	4,031
California	1,672	1,282	1,282	1,282	1,282	1,282
Colorado	4,483	4,405	4,405	4,405	3,731	3,058
Connecticut	381	355	355	355	355	355
Delaware	423	388	388	384	384	384
Florida	11,298	8,811	8,811	8,811	8,111	7,411
Georgia	5,191	5,179	5,179	5,172	5,089	5,007
Idaho	240	240	240	240	240	240
Illinois	6,644	6,575	6,575	6,415	5,889	5,363
Indiana	9,468	8,700	8,700	8,698	8,410	8,135
Iowa	9,773	9,773	9,773	9,713	6,790	4,026
Kansas	5,510	4,763	4,763	4,763	3,938	3,112
Kentucky	13,211	12,911	12,472	12,472	10,190	7,908
Louisiana	9,704	9,189	9,189	9,093	6,370	3,810
Maine	108	86	86	86	86	86
Maryland	901	850	850	842	842	842
Massachusetts	287	256	256	256	256	256
Michigan	7,790	7,786	7,786	7,771	6,743	5,831
Minnesota	4,197	4,099	4,099	4,058	3,321	2,584
Mississippi	6,022	5,949	5,037	5,037	3,484	2,084
Missouri	18,612	11,273	11,273	11,116	9,248	7,381
Montana	3,071	3,071	3,071	3,071	2,124	1,177
Nebraska	8,931	8,894	8,381	8,381	5,672	3,070
Nevada	1,146	1,142	1,142	1,142	1,142	1,142
New Hampshire	330	267	267	267	267	267
New Jersey	915	773	773	773	773	773
New Mexico	2,038	2,008	2,008	2,008	1,843	1,677
New York	3,977	3,912	3,912	3,912	3,650	3,388
North Carolina	11,700	8,847	8,847	8,837	7,490	6,142
North Dakota	12,246	12,246	12,246	11,436	7,181	2,927
Ohio	9,083	7,929	7,929	7,929	7,929	7,929
Oklahoma	10,259	10,061	9,369	9,369	6,631	4,291
Oregon	350	300	300	300	300	300

State	2026 Baseline	SCR Optimization	SCR Optimization + SOA CC	SCR Optimization + SOA CC + SNCR Optimization	SCR Optimization + SOA CC + SNCR Optimization + SCR (Half)/SNCR Retrofit	SCR Optimization + SOA CC + SNCR Optimization + SCR/SNCR Retrofit
Pennsylvania	8,362	8,010	8,010	7,910	7,512	7,158
Rhode Island	279	148	148	148	148	148
South Carolina	4,273	3,531	3,531	3,531	3,531	3,531
South Dakota	509	509	509	509	509	509
Tennessee	4,064	3,983	3,983	3,983	3,983	3,983
Texas	39,684	38,775	38,775	38,542	31,123	23,704
Utah	9,930	9,923	9,923	9,923	6,258	2,593
Vermont	54	54	54	54	54	54
Virginia	3,019	2,855	2,778	2,756	2,565	2,373
Washington	527	257	257	257	257	257
West Virginia	13,185	12,784	12,239	11,958	10,818	9,678
Wisconsin	5,016	5,010	5,010	4,990	4,692	4,394
Wyoming	9,174	9,093	8,499	8,486	6,149	3,811
Total	**299,236**	**278,303**	**274,462**	**272,294**	**224,688**	**178,238**

Note: All states are included solely for illustrative purposes, whether or not they are covered by the program.

Table B-6. 2027 Ozone Season NO_X Emissions for States at Different Uniform Control Scenarios

State	2027 Baseline	SCR Optimization	SCR Optimization + SOA CC	SCR Optimization + SOA CC + SNCR Optimization	SCR Optimization + SOA CC + SNCR Optimization + SCR/SNCR Retrofit
Alabama	6,268	6,236	6,236	6,236	5,741
Arizona	6,098	6,013	5,944	5,814	4,012
Arkansas	8,728	8,700	8,700	8,700	4,031
California	1,672	1,282	1,282	1,282	1,282
Colorado	4,285	4,208	4,208	4,208	2,860
Connecticut	381	355	355	355	355
Delaware	339	312	312	308	308
Florida	11,297	8,810	8,810	8,810	7,410
Georgia	5,191	5,179	5,179	5,172	5,007
Idaho	240	240	240	240	240
Illinois	6,644	6,575	6,575	6,415	5,363
Indiana	9,468	8,700	8,700	8,698	8,135
Iowa	9,773	9,773	9,773	9,713	4,026
Kansas	5,510	4,763	4,763	4,763	3,112
Kentucky	13,211	12,911	12,472	12,472	7,908
Louisiana	9,628	9,113	9,113	9,017	3,792
Maine	108	86	86	86	86
Maryland	901	850	850	842	842
Massachusetts	287	256	256	256	256
Michigan	7,097	7,094	7,094	7,078	5,691
Minnesota	3,044	2,945	2,945	2,905	1,990
Mississippi	6,022	5,949	5,037	5,037	2,084
Missouri	18,559	11,220	11,220	11,063	7,329
Montana	3,071	3,071	3,071	3,071	1,177
Nebraska	8,247	8,210	8,177	8,177	2,974
Nevada	1,115	1,113	1,113	1,113	1,113
New Hampshire	330	267	267	267	267
New Jersey	915	773	773	773	773
New Mexico	2,038	2,008	2,008	2,008	1,677
New York	3,977	3,912	3,912	3,912	3,388
North Carolina	11,700	8,847	8,847	8,837	6,142
North Dakota	12,246	12,246	12,246	11,436	2,927
Ohio	9,083	7,929	7,929	7,929	7,929
Oklahoma	9,317	9,119	8,427	8,427	3,917
Oregon	350	300	300	300	300
Pennsylvania	8,362	8,010	8,010	7,910	7,158

State	**2027 Baseline**	**SCR Optimization**	**SCR Optimization + SOA CC**	**SCR Optimization + SOA CC + SNCR Optimization**	**SCR Optimization + SOA CC + SNCR Optimization + SCR/SNCR Retrofit**
Rhode Island	279	148	148	148	148
South Carolina	4,273	3,531	3,531	3,531	3,531
South Dakota	509	509	509	509	509
Tennessee	2,747	2,666	2,666	2,666	2,666
Texas	37,261	36,352	36,352	36,119	23,009
Utah	9,930	9,923	9,923	9,923	2,593
Vermont	54	54	54	54	54
Virginia	3,019	2,855	2,778	2,756	2,373
Washington	527	257	257	257	257
West Virginia	13,185	12,784	12,239	11,958	9,678
Wisconsin	3,442	3,436	3,436	3,416	3,416
Wyoming	9,174	9,093	8,499	8,486	3,811
Total	289,904	268,981	265,620	263,452	173,643

Note: All states are included solely for illustrative purposes, whether or not they are covered by the program.

Table B-7. 2028 Ozone Season NO_X Emissions for States at Different Uniform Control Scenarios

State	2028 Baseline	SCR Optimization	SCR Optimization + SOA CC	SCR Optimization + SOA CC + SNCR Optimization	SCR Optimization + SOA CC + SNCR Optimization + SCR/SNCR Retrofit
Alabama	6,268	6,236	6,236	6,236	5,741
Arizona	5,873	5,789	5,720	5,590	3,949
Arkansas	8,728	8,700	8,700	8,700	4,031
California	1,672	1,282	1,282	1,282	1,282
Colorado	3,867	3,790	3,790	3,790	2,577
Connecticut	381	355	355	355	355
Delaware	339	312	312	308	308
Florida	10,863	8,489	8,489	8,489	7,089
Georgia	5,191	5,179	5,179	5,172	5,007
Idaho	240	240	240	240	240
Illinois	5,215	5,145	5,145	4,985	4,555
Indiana	8,613	7,845	7,845	7,843	7,280
Iowa	9,773	9,773	9,773	9,713	4,026
Kansas	5,510	4,763	4,763	4,763	3,112
Kentucky	12,839	12,540	12,189	12,189	7,837
Louisiana	9,628	9,113	9,113	9,017	3,792
Maine	108	86	86	86	86
Maryland	901	850	850	842	842
Massachusetts	287	256	256	256	256
Michigan	7,097	7,094	7,094	7,078	5,691
Minnesota	3,044	2,945	2,945	2,905	1,990
Mississippi	4,076	4,003	3,716	3,716	1,752
Missouri	18,559	11,220	11,220	11,063	7,329
Montana	3,071	3,071	3,071	3,071	1,177
Nebraska	8,247	8,210	8,177	8,177	2,974
Nevada	1,115	1,113	1,113	1,113	1,113
New Hampshire	330	267	267	267	267
New Jersey	915	773	773	773	773
New Mexico	2,038	2,008	2,008	2,008	1,677
New York	3,977	3,912	3,912	3,912	3,388
North Carolina	11,700	8,847	8,847	8,837	6,142
North Dakota	12,246	12,246	12,246	11,436	2,927
Ohio	8,047	6,911	6,911	6,911	6,911
Oklahoma	9,317	9,119	8,427	8,427	3,917
Oregon	350	300	300	300	300
Pennsylvania	8,362	8,010	8,010	7,910	7,158

State	**2028 Baseline**	**SCR Optimization**	**SCR Optimization + SOA CC**	**SCR Optimization + SOA CC + SNCR Optimization**	**SCR Optimization + SOA CC + SNCR Optimization + SCR/SNCR Retrofit**
Rhode Island	279	148	148	148	148
South Carolina	4,273	3,531	3,531	3,531	3,531
South Dakota	509	509	509	509	509
Tennessee	2,212	2,130	2,130	2,130	2,130
Texas	33,189	32,280	32,280	32,047	21,623
Utah	9,930	9,923	9,923	9,923	2,593
Vermont	54	54	54	54	54
Virginia	3,019	2,855	2,778	2,756	2,373
Washington	527	257	257	257	257
West Virginia	13,185	12,784	12,239	11,958	9,678
Wisconsin	3,442	3,436	3,436	3,416	3,416
Wyoming	6,722	6,640	6,640	6,627	3,294
Total	276,128	255,337	253,284	251,115	167,453

Note: All states are included solely for illustrative purposes, whether or not they are covered by the program.

Table B-8. 2029 Ozone Season NO_X Emissions for States at Different Uniform Control Scenarios

State	2029 Baseline	SCR Optimization	SCR Optimization + SOA CC	SCR Optimization + SOA CC + SNCR Optimization	SCR Optimization + SOA CC + SNCR Optimization + SCR/SNCR Retrofit
Alabama	5,210	5,105	5,105	5,105	4,610
Arizona	5,873	5,789	5,720	5,590	3,949
Arkansas	7,001	6,974	6,974	6,974	3,582
California	1,672	1,282	1,282	1,282	1,282
Colorado	3,348	3,270	3,270	3,270	2,057
Connecticut	381	355	355	355	355
Delaware	339	312	312	308	308
Florida	10,863	8,489	8,489	8,489	7,089
Georgia	3,849	3,837	3,837	3,830	3,665
Idaho	240	240	240	240	240
Illinois	4,170	4,101	4,101	4,050	4,050
Indiana	7,062	6,374	6,374	6,371	5,808
Iowa	9,138	9,138	9,138	9,077	3,549
Kansas	5,510	4,763	4,763	4,763	3,112
Kentucky	11,520	11,221	10,870	10,870	7,392
Louisiana	8,897	8,383	8,383	8,286	3,639
Maine	108	86	86	86	86
Maryland	901	850	850	842	842
Massachusetts	287	256	256	256	256
Michigan	6,063	6,059	6,059	6,044	4,656
Minnesota	2,654	2,618	2,618	2,578	1,663
Mississippi	4,076	4,003	3,716	3,716	1,752
Missouri	18,559	11,220	11,220	11,063	7,329
Montana	3,071	3,071	3,071	3,071	1,177
Nebraska	8,247	8,210	8,177	8,177	2,974
Nevada	882	880	880	880	880
New Hampshire	330	267	267	267	267
New Jersey	915	773	773	773	773
New Mexico	2,038	2,008	2,008	2,008	1,677
New York	3,977	3,912	3,912	3,912	3,388
North Carolina	9,088	6,588	6,588	6,588	5,139
North Dakota	12,246	12,246	12,246	11,436	2,927
Ohio	7,545	6,409	6,409	6,409	6,409
Oklahoma	9,317	9,119	8,427	8,427	3,917
Oregon	350	300	300	300	300
Pennsylvania	6,032	5,680	5,680	5,580	4,828

State	2029 Baseline	SCR Optimization	SCR Optimization + SOA CC	SCR Optimization + SOA CC + SNCR Optimization	SCR Optimization + SOA CC + SNCR Optimization + SCR/SNCR Retrofit
Rhode Island	279	148	148	148	148
South Carolina	3,031	2,804	2,804	2,804	2,804
South Dakota	509	509	509	509	509
Tennessee	1,198	1,198	1,198	1,198	1,198
Texas	30,134	29,225	29,225	28,992	20,635
Utah	9,930	9,923	9,923	9,923	2,593
Vermont	54	54	54	54	54
Virginia	2,578	2,414	2,337	2,334	1,951
Washington	527	257	257	257	257
West Virginia	13,185	12,784	12,239	11,958	9,678
Wisconsin	3,442	3,436	3,436	3,416	3,416
Wyoming	6,722	6,640	6,640	6,627	3,294
Total	253,349	233,577	231,523	229,494	152,463

Note: All states are included solely for illustrative purposes, whether or not they are covered by the program.

As described in Section VI of the Preamble for this Supplemental Proposal, EPA identified $11,000/ton as the level of control stringency for determining significant contribution from EGUs under the Step 3 multifactor test. However, EPA determined that retrofitting post-combustion could not be widely accomplished in Arizona (the only of the the five supplemental states linked to a non-attainment or maintenance receptor in 2026) until the 2027 ozone season. Therefore, Section VII.A of the Preamble explains that EPA applied the reductions available at the $1,800/ton representative cost threshold for years 2025-2026 to arrive at a budget estimate for those years. Then, starting in 2027, EPA applied the reductions available at the $11,000/ton representative cost threshold to arrive at a budget estimate for that year, though for the 2027 budgets only, EPA used the "SCR (half)" rate for applicable units rather than the rate commensurate with SCR retrofits, as discussed in section VII.A. of the Preamble. Those state emissions budgets for the affected states along with the corresponding percent reduction relative to 2021 and the state's baseline emissions for that year are shown below in Tables B-9 through B-13.[24]

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[24] A table providing state emissions budgets for these linked states is provided in Appendix F

Table B-9. OS NO_X: 2025 Emissions Budget and % Reduction

State	2016 OS NO_X (tons)	2021 OS NO_X (tons)	Baseline 2025 OS NO_X (tons)	2025 Budget (tons)	% Reduction from 2021	% Reduction from 2025 Baseline
Arizona	15,941	7,723	8,479	8,195	-6%	3%
Iowa	10,622	9,970	9,867	9,752	2%	1%
Kansas	7,514	6,231	5,510	4,763	24%	14%
New Mexico	16,053	5,066	2,241	2,211	56%	1%
Tennessee	9,759	4,319	4,064	3,983	8%	2%
Total	**59,889**	**33,309**	**30,162**	**28,904**	**13%**	**4%**

Table B-10. OS NOx: Preset 2026 Emissions Budget and % Reduction

State	**2016 OS NOx (tons)**	**2021 OS NOx (tons)**	**Baseline 2026 OS NOx (tons)**	**Preset 2026 Budget (tons)**	**% Reduction from 2021**	**% Reduction from 2026 Baseline**
Arizona	15,941	7,723	6,098	5,814	25%	5%
Iowa	10,622	9,970	9,773	9,713	3%	1%
Kansas	7,514	6,231	5,510	4,763	24%	14%
New Mexico	16,053	5,066	2,038	2,008	60%	1%
Tennessee	9,759	4,319	4,064	3,983	8%	2%
Total	**59,889**	**33,309**	**27,484**	**26,281**	**21%**	**4%**

Table B-11. OS NOx: Preset 2027 Emissions Budget and % Reduction

State	2016 OS NOx (tons)	2021 OS NOx (tons)	Baseline 2027 OS NOx (tons)	Preset 2027 Budget (tons)	% Reduction from 2021	% Reduction from 2027 Baseline
Arizona	15,941	7,723	6,098	4,913	36%	19%
Iowa	10,622	9,970	9,773	9,713	3%	1%
Kansas	7,514	6,231	5,510	4,763	24%	14%
New Mexico	16,053	5,066	2,038	2,008	60%	1%
Tennessee	9,759	4,319	2,747	2,666	38%	3%
Total	**59,889**	**33,309**	**26,166**	**24,063**	**28%**	**8%**

Table B-12. OS NO$_X$: Preset 2028 Emissions Budget and % Reduction

State	**2016 OS NO$_X$ (tons)**	**2021 OS NO$_X$ (tons)**	**Baseline 2028 OS NO$_X$ (tons)**	**Preset 2028 Budget (tons)**	**% Reduction from 2021**	**% Reduction from 2028 Baseline**
Arizona	15,941	7,723	5,873	3,949	49%	33%
Iowa	10,622	9,970	9,773	9,713	3%	1%
Kansas	7,514	6,231	5,510	4,763	24%	14%
New Mexico	16,053	5,066	2,038	2,008	60%	1%
Tennessee	9,759	4,319	2,212	2,130	51%	4%
Total	**59,889**	**33,309**	**25,406**	**22,563**	**32%**	**11%**

Table B-13. OS NO_X: Preset 2029 Emissions Budget and % Reduction

State	**2016 OS NO_X (tons)**	**2021 OS NO_X (tons)**	**Baseline 2029 OS NO_X (tons)**	**Preset 2029 Budget (tons)**	**% Reduction from 2021**	**% Reduction from 2029 Baseline**
Arizona	15,941	7,723	5,873	3,949	49%	33%
Iowa	10,622	9,970	9,138	9,077	9%	1%
Kansas	7,514	6,231	5,510	4,763	24%	14%
New Mexico	16,053	5,066	2,038	2,008	60%	1%
Tennessee	9,759	4,319	1,198	1,198	72%	0%
Total	**59,889**	**33,309**	**23,757**	**20,995**	**37%**	**12%**

3. Variability Limits

Once EPA determined state-emissions budgets representative of the control stringency, EPA calculated the minimum variability limits and assurance levels for each state based on the calculated emissions budgets. Each state's minimum variability limit is calculated as 21% of its budget, and its assurance level is the sum of its budget and variability limit (or 121% of its budget).[25] The minimum variability limits and assurance levels are further described in section VI of the preamble for the Federal Good Neighbor Plan and referenced in section VII.A.2 of the Preamble for this Supplemental Proposal. (In a control period where a state's emissions budget is the dynamic budget rather than the preset budget, the variability limit will be computed as a percentage of the dynamic budget rather than a percentage of the preset budget.)

4. Calculating Dynamic Budgets Starting in 2026

The EPA is using the same dynamic budget methology for each state in the same manner as described section B of the Ozone Transport Policy Analysis Final Rule TSD and section VI of the preamble for the Federal Good Neighbor Plan. The only difference is that for Arizona, the dynamic budget will be calculated assuming emission reductions commensurate with SCR retrofits are phased in over 2027 and 2028, rather than 2026 and 2027. See the dynamic budget worksheets included in *Appendix A of the Ozone Transport Policy Analysis Supplemental Proposed Rule TSD*.

The dynamic budget methodology and templates described in this section have been updated to reflect the addition of the five states included in this supplemental action. The dynamic budgets' emission rates are consistent with this proposal's assumption that SCR retrofits identified for certain EGUs in Arizona would be phased in over 2027 and 2028, as shown in "Dynamic Budget 2027" and a new worksheet being added titled "Dynamic Budget 2028+".

The dynamic budgets methodology for 2026 and subsequent years begins with the data reported to CAMD, similar to the engineering analysis used to determine the preset 2025 through 2029 preset state budgets. Dynamic budgets utilize predetermined emission rates (relying on the same historical data and methodology described for the preset emissions budgets) for each unit. The dynamic budget methodology differs from the methodology used to determine preset emissions budgets in that the dynamic methodology takes that emission rate and multiplies it by heat-input values reported and calculated from the most recent data at the time of calculation (*i.e.,* data not yet available) instead of the most recent data available at time of rule promulgation (*e.g.,* 2021 heat input data) to estimate unit and state emissions (i.e., state emissions budgets). Section VI.B.4.b of the Preamble for the final Federal Good Neighbor Plan describes how EPA uses a rolling, multi-year heat input data set to derive a normalized unit-level heat input value, a process that the EPA will continue to use for the additional states covered by this Supplemental Proposal,

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[25] As described in Section VI of the Preamble for the final Federal Good Neighbor Plan, the EPA finalized a minimum variability limit of 21%. The EPA is continuing to use this minimum variability limit for the five states covered by this Supplemental Proposal, as described in section VII.A.2 of the Preamble. Starting in the 2025 control period, the variability limit would be the higher of 21 percent or the percentage (if any) by which the total reported heat input of the state's affected EGUs in the control period exceeds the total reported heat input of the state's affected EGUs as reflected in the state's emissions budget for the control period. EPA expects that the minimum 21 percent value would apply in almost all instances.

as described in section VII.A.2 of the Preamble for this proposal. This updating heat input value is the dynamic variable which makes the state emissions budgets dynamic. The dynamic heat inputs are multiplied by preset unit-level emission rates prescribed for each year in the dynamic budget templates in *Appendix A of the Ozone Transport Policy Analysis Supplemental Proposed Rule* to get an emissions amount for each unit, and the resulting unit-level emissions amounts for all the units in a state are summed to determine the dynamic state-level budget for the year. That Appendix has worksheets titled "Dynamic Budget 2026 Template", "Dynamic Budget 2027 Template", and "Dynamic Budget 2028+ Template". These worksheets don't show the dynamic budgets for those future years, but they provide the unit-level NO_X rates and the heat input fields to be populated with future data that EPA will use to calculate dynamic budgets for each future year. These worksheets reflect the initial inventory of EGUs used to derive the dynamic ozone season state emissions budget for each control period in 2026 and thereafter.

Inventory of EGUs for determining dynamic budget

- The unit name and corresponding facility detail such as state, ORIS, Boiler, Plant Type are listed in columns A through Q of the "dynamic budget 2026," "dynamic budget 2027," and "dynamic budget 2028+" worksheets.
- The inventory of units in these worksheets reflects EPA's assessment of the future inventory based on current data. It is not an applicability determination, and the eventual inventory of units comprising the dynamic budgets may be slightly expanded (e.g., reflecting new units that come online) or slightly reduced (e.g., reflecting units that have ceased operation) at the time of issuing the dynamic budgets.
- The anticipated inventory of units used to calculate the dynamic budget for each control period is identified as follows:
  - Units that, to the best of EPA's knowledge, are affected under the rule, that reported heat input for the historical control period two years before the year of control period for which the dynamic budget is being calculated (e.g., for calculation of the 2026 budgets, heat input was reported in 2024); and that had a deadline for certification of monitoring systems under § 97.1030(b) by May 1 of that historical control period (e.g., by May 1st of 2024 for the 2026 state budget calculation) will be included in the dynamic budget calculations.[26]
  - New units will be included in the dynamic budget calculations starting with the first control period for which the units have reported a full control period of data following their monitor certification deadlines. For example, a unit with a deadline for certification of monitoring systems under § 97.1030(b) by May 1st of 2024 that reports heat input during the 2024 control period will be included in the 2026 dynamic state budget calculation. EPA will rely on reported CAMD Power Sector Emissions data to identify these units.

Unit-level emission rate, heat input, and emissions data for dynamic budget

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[26] For the 2026 budget calculation, this will generally be the same inventory of units included in the "unit 2026 file" for Group 3 states, except that a unit that actually operates in the 2024 control period will be included in calculating the state's 2026 dynamic budget even if, for purposes of calculating the 2026 preset budgets in this rulemaking, the unit was assumed to be retired in 2026.

- For each of the units identified in the above inventory, EPA populates a pre-determined emission rate. Where available, this rate comes directly from the Engineering Analytic unit-files described above and used in preset budget calculations. EPA applies the emission rate reflecting the selected control stringency. For the "dynamic budget 2026" and "dynamic budget 2027" worksheets, these emission rates come from the "unit 2026" and "unit 2027" worksheets, and are calculated by dividing the unit-level emissions value from column AN into the unit-level heat input value from column X in the "unit 2026" and "unit 2027" worksheets.[27] These unit-level emission rate reflects the control stringency identified in EPA's determination of significant contribution applied to these units in 2026 and 2027. For the "dynamic budget 2028+" worksheet, these emission rates come from column AR in the "unit 2028" worksheet, which are calculated by dividing the unit-level emissions value from column AO into the unit-level heat input value from column X in the "unit 2028" worksheet. The "unit 2026," "unit 2027," and "unit 2028" worksheets reflect lower emission rates for some units where post-combustion control retrofit potential is identified.[28] 2028 reflects full implementation of EPA identified stringency measures for the five states covered in this action,[29] so the rates identified in the "Dynamic Budget 2028+ worksheet will not change to reflect any further stringency level, consequently it will be utilized for each dynamic budget year after 2028 as well.

- There are two types of units (new units, and 2021 non-operating units) for which the above step would not yield an assumed emission rate. Therefore, EPA populates an assumed emission rate based on the following:

    - For new units, EPA applies the following assumed emission rates for well controlled units identified for each generation type as discussed in the EGU NO_X Mitigation Strategies Final Rule TSD[30]:

Applied New Unit Emission Rates for Dynamic Budgets

Unit Type	**Assumed NO_X Emission Rate (lb/MMBtu)**
Coal Steam	0.05
Oil/Gas Steam	0.03

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[27] For units in states not linked to downwind nonattainment or maintenance in 2026, the unit-level emission value comes from column AL in place of column AN.

[28] The emission rate for Iowa, Kansas, New Mexico, and Tennessee (along with Alabama, Minnesota, and Wisconsin as described in the Federal Good Neighbor Plan) continue to be identified by column AQ at this step as those states are not subject to the post-combustion control stringency assumptions. For any expected unit-level coal-to-gas switch identified in the "Unit 2026" worksheet or later years, the emission rates in the dynamic budget worksheet reflects their expected plant type as of 2025.

[29] For states included in the Federal Good Neighbor Plan, 2027 reflects the year of full implementation

[30] Combined cycle and combustion turbines with SCR retrofits can achieve emission rates as low as 0.002 lb/MMBtu (see "Combustion Turbine NO_X Technology Memo" (January 2022) EPA-HQ-OAR-2021-0668-0085), although EPA assumes a floor rate of 0.011 lb/MMBtu for this analysis, marching the assumed floor rate used in IPM.

Combustion Turbine	0.011
Combined Cycle	0.011
All other fossil	0.05

  - For 2021 non-operating units (thus lacking any identified emission rate in the "unit 2024" file), EPA applies an emission rate based on that unit's last year in which it had ozone season operating data prior to 2021. These units are flagged as having "substitute data" in the dynamic budget templates. If that rate exceeds the assumed step 3 technology in effect for that year (e.g., SCR optimization in 2026 for a coal steam unit with an existing SCR), then the emission rate will be adjusted down to that level (e.g., 0.08 lb/MMBtu). If these units have no operating data from a prior ozone season, than they would be assigned rates according to the table above.
- These corresponding emission rates for all units are shown in column R of the "dynamic budget 2026", "dynamic budget 2027,"and "dynamic budget 2028+" worksheet.
- Columns T through X in the "dynamic budget" worksheets will reflect the updated heat input for the units as it becomes available. This is the dynamic variable, and it will be populated through future ministerial actions. For instance, these columns would be populated with heat input values from 2020-2024 for the 2026 dynamic budget calculation. For the 2027 dynamic budget" worksheet, these columns will be populated with heat input values from 2021-2025, and so forth. and so forth.

- Column Y reflects the average heat input from the highest three heat input values from the five year baseline captured in columns T through X (this is the representative unit-level heat input).

- Column Z reflects the representative unit level heat input from column W divided by the state total of representative unit-level heat inputs.
- Column AA-AC reflect the state's heat input over the last three available and column AD reflects the average of these three years (this is the Representative State Level Heat Input value).[31]
- Column AE reflects the unit's normalized unit-level heat input obtained by multiplying the representative unit-level percent of state total (column Z) by the representative state level heat input (column AD).[32]

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[31] For the 2022, 2023, and 2024 state heat input totals, the EPA incorporated heat input adders at this step for Arizona and New Mexico to reflect the total estimated heat input and emissions from 23 units that are likely to be considered existing units for purposes of the dynamic budget calculations starting with the 2027 control period but that do not report data under the Acid Rain Program and consequently did not report data for the 2022 or 2023 control periods and are not expected to report data for the 2024 control period. The units and the amounts of ozone season heat input assumed for each unit are listed in Table VII.A.1-1 in the preamble for this proposed supplemental rule.

[32] This value is left blank for unit that reports no heat input in the year two years before the year of the control period for which the dynamic trading budget is being calculated.

- Column AF reflects the unit-level assumed emissions for the purposes of state emissions budget quantification. This value will be obtained by multiplying the emission rate (in column R) by the normalized unit-level heat input value (column AE). The product is divided by 2,000 to convert from pounds to short tons.

Summation of the unit-level emission estimates to derive the given year's dynamic budget

After completing the above steps, the unit-level emission values that will be identified in column AF of each "dynamic budget" worksheet are summed to the state level. These states (those 5 states covered for EGU Group 3 under this action and the 22 states included under the Federal Good Neighbor Plan) and state-level values (in tons) are displayed in columns AH and AI of the same "dynamic budget" worksheet. These tonnage values in column AI reflect the state dynamic budgets for the given year (starting in 2026). At this step, a rounding function is applied to express the values to the nearest ton. These state dynamic budgets will be calculated and made public approximately 1 year prior to the beginning of the control period for that vintage year (e.g., 2026 dynamic budgets will be announced in summer of 2025) through the schedule identified in Section VI.A of the preamble for the Federal Good Neighbor Plan.

The procedure for computing a state's dynamic emissions budget for a control period can be expressed in terms of the following formula:

$$DB_P = \sum_{i=1}^{n} \left(\frac{Avg\ HI_i}{\sum_{i=1}^{n} Avg\ HI_i} \times Avg\ HI_S \times ER_i \right)$$

Where:

DB_P = the dynamic emissions budget for a state for control period "p" in pounds;

Avg HI_S = the average of the sum of the total control period heat input values reported under 40 CFR part 75 for all affected units in the state for the control periods in the years two, three, and four years before control period "p" (whether or not the units operated during the control period two years before control period "p") (This is referred to as the "Representative State-Level Heat Input");

Avg HI_i = the average of the three highest of the five total control period heat input values reported under 40 CFR part 75 for unit "i" for the control periods in the years two, three, four, five, and six years before control period "p" (excluding any control period that commenced before the unit's first deadline to begin reporting heat input under 40 CFR part 75 under any regulatory program), or if there are fewer than three non-zero values for the unit from the five control periods, the average of all the non-zero values (This is referred to as the "Representative Unit-Level Heat Input");

ER_I = the NO_X emissions rate shown for unit "i" and control period "p" in the document "Unit-Specific Ozone Season NO_X Emissions Rates for Dynamic Budget Calculations for Five Additional States" posted at www.regulations.gov in docket EPA-HQ-OAR-2023-0402 or, for a unit not listed in that document, the NO_X emissions rate identified according to the type of unit and (where applicable) the type of fuel combusted by the unit during the control period containing the unit's deadline for certification of monitoring systems for the Group 3 trading program under 40 CFR 97.1030(b) as follows:

- 0.011 lb/MMBtu, for a simple cycle combustion turbine or a combined cycle combustion turbine other than an integrated coal gasification combined cycle unit;
- 0.030 lb/MMBtu, for a boiler combusting only fuel oil or gaseous fuel (other than coal-derived fuel) during such control period; or
- 0.050 lb/MMBtu, for a boiler combusting any amount of coal or coal-derived fuel during such control period or any other unit not covered by the two preceding paragraphs;

p = designator for the control period in a given year;

i = designator for an individual affected unit in the state whose first deadline to begin reporting heat input under 40 CFR part 75 under any regulatory program was on or before May 1 of the control period two years before control period "p" and that reported heat input under 40 CFR part 75 during the control period two years before control period "p"; and

n = number of affected units in the state whose first deadline to begin reporting heat input under 40 CFR part 75 under any regulatory program was on or before May 1 of the control period two years before control period "p" and that reported heat input under 40 CFR part 75 for the control period two years before control period "p".

C. Analysis of Air Quality Responses to Emission Changes Using an Ozone Air Quality Assessment Tool (AQAT)

The EPA has defined each Supplemental linked upwind state's significant contribution to nonattainment and interference with maintenance of downwind air quality in the preamble at section VI.A-D. A key quantitative input for the Step 3 multifactor analysis in the Federal Good Neighbor Plan (GNP; 88 FR 36654) was the predicted downwind ambient air quality impacts at various levels of NO_X emission control assessed for upwind EGU and non-EGU sources. For all the Supplemental states, with the exceptions of Kansas and Tennessee, the results of the emissions reductions were included in the final GNP analysis of air quality improvements and effects at Step 3. In this Supplemental proposed rule, we re-report the analysis originally presented in the GNP, including the results for additional monitors (i.e., those that are defined as "violating-monitor maintenance-only receptors" ("violating-monitor receptors") and add a few supplementary analyses (Table C-1). In these supplementary analyses, we account for the emissions reductions resulting from non-EGUs in Arizona, we also examine the effects of simultaneous implementation of the GNP and Supplemental proposed rule across all states in the program. The downwind air quality impacts are also used to inform EPA's assessment of potential overcontrol, as discussed in more detail below.[33]

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[33] The EPA excluded California and Tribal receptors in the ensuing tables (consistent with GNP) as no covered Supplemental states are linked to any receptors within those boundaries.

Table C-1. 2023 Ozone DVs (ppb) for Monitors Assessed Using the Ozone AQAT.

Site	state	county	2021 DV	2022 DV	Engineering Analysis Base (Average DV)	Engineering Analysis Base (Maximum DV)	Violating -Monitor Receptor (1 = Yes)	Modeled Receptor (2 = Yes)	Receptor for Supplemental States (4 = Yes)
40070010	Arizona	Gila	77	76	67.89	69.49	1		
40130019	Arizona	Maricopa	75	77	69.82	70.02	1		
40131003	Arizona	Maricopa	80	80	70.11	70.71	1		
40131004	Arizona	Maricopa	80	81	70.22	70.82	1		
40131010	Arizona	Maricopa	79	80	68.34	69.24	1		
40132001	Arizona	Maricopa	74	78	63.82	64.12	1		
40132005	Arizona	Maricopa	78	79	69.62	70.52	1		
40133002	Arizona	Maricopa	75	75	65.81	65.81	1		
40134004	Arizona	Maricopa	73	73	65.65	66.55	1		
40134005	Arizona	Maricopa	73	75	62.31	62.31	1		
40134008	Arizona	Maricopa	74	74	65.62	66.52	1		
40134010	Arizona	Maricopa	74	76	63.82	66.92	1		
40137020	Arizona	Maricopa	76	77	67.04	67.04	1		
40137021	Arizona	Maricopa	77	77	69.83	70.13	1		
40137022	Arizona	Maricopa	76	78	68.23	69.13	1		
40137024	Arizona	Maricopa	74	76	67.04	67.94	1		
40139702	Arizona	Maricopa	75	77	66.92	68.12	1		
40139704	Arizona	Maricopa	74	77	65.31	66.22	1		
40139997	Arizona	Maricopa	76	79	70.51	70.51	1		
40213001	Arizona	Pinal	74	74	66.92	68.12	1		
40218001	Arizona	Pinal	75	76	67.82	69.02	1		
40278011	Arizona	Yuma	67	68	70.36	72.05		2	
80013001	Colorado	Adams	72	77	62.85	62.85	1		
80050002	Colorado	Arapahoe	80	80	67.84	67.84	1		
80310002	Colorado	Denver	72	74	63.44	64.64	1		
80310026	Colorado	Denver	75	77	64.36	64.66	1		
80350004	Colorado	Douglas	83	83	71.12	71.71		2	
80590006	Colorado	Jefferson	81	83	72.63	73.32		2	
80590011	Colorado	Jefferson	83	84	73.29	73.89		2	
80690011	Colorado	Larimer	77	77	70.79	71.99		2	4
90010017	Connecticut	Fairfield	79	77	71.62	72.22		2	
90013007	Connecticut	Fairfield	81	81	72.99	73.89		2	
90019003	Connecticut	Fairfield	80	80	73.32	73.62		2	
90079007	Connecticut	Middlesex	74	73	68.82	69.12	1		
90099002	Connecticut	New Haven	82	79	70.61	72.71		2	
90110124	Connecticut	New London	73	72	65.58	67.09	1		
1.7E+08	Illinois	Cook	71	72	68.13	71.82		2	4
1.7E+08	Illinois	Cook	75	75	67.18	69.67	1		4
1.7E+08	Illinois	Cook	72	73	63.80	64.50	1		
1.7E+08	Illinois	Cook	74	74	67.92	71.41		2	
1.7E+08	Illinois	Cook	73	74	68.47	71.27		2	
1.81E+08	Indiana	Porter	72	73	63.39	64.59	1		
2.6E+08	Michigan	Allegan	75	75	66.22	67.42	1		4
2.61E+08	Michigan	Muskegon	74	79	67.57	68.47	1		
3.2E+08	Nevada	Clark	73	75	68.19	69.19	1		4
3.5E+08	New Mexico	Bernalillo	72	73	63.84	66.04	1		4
3.5E+08	New Mexico	Dona Ana	72	76	65.62	66.32	1		4
3.5E+08	New Mexico	Dona Ana	80	81	70.83	72.13		2	4
3.5E+08	New Mexico	Dona Ana	75	75	69.73	72.43		2	4
3.5E+08	New Mexico	Eddy	77	77				2	4
3.5E+08	New Mexico	Lea	66	66				2	4
3.61E+08	New York	Suffolk	73	74	66.25	68.05	1		
3.91E+08	Ohio	Lake	72	74	64.33	64.63	1		
4.8E+08	Texas	Bexar	73	75	67.22	67.92	1		
4.8E+08	Texas	Brazoria	75	73	70.59	72.69		2	

4.81E+08	Texas	Collin	75	74	65.53	66.13	1		4
4.81E+08	Texas	Dallas	71	71	65.43	66.64	1		4
4.81E+08	Texas	Denton	74	76	69.93	71.73		2	
4.81E+08	Texas	Denton	76	77	66.04	67.84	1		4
4.81E+08	Texas	El Paso	75		69.82	71.43		2	4
4.82E+08	Texas	Galveston	72	70	71.82	73.13		2	
4.82E+08	Texas	Harris	74	69	75.33	76.93		2	
4.82E+08	Texas	Harris	74	73	65.56	66.56	1		
4.82E+08	Texas	Harris	77	78	71.19	72.20		2	
4.82E+08	Texas	Harris	73	73	69.02	70.63	1		
4.82E+08	Texas	Harris	71	72	70.32	71.52		2	
4.82E+08	Texas	Harris	71	72	68.01	71.52		2	
4.84E+08	Texas	Tarrant	75	76	63.91	64.81	1		4
4.84E+08	Texas	Tarrant	72	77	64.19	65.79	1		
4.84E+08	Texas	Tarrant	72	72	65.31	66.02	1		4
4.84E+08	Texas	Tarrant	74	76	67.62	68.23	1		
4.9E+08	Utah	Davis	78	79	71.88	74.08		2	
4.9E+08	Utah	Salt Lake	76	76	72.48	74.07		2	
4.9E+08	Utah	Salt Lake	76	77	73.21	73.71		2	
4.91E+08	Utah	Weber	71	74	69.20	70.20	1		
5.51E+08	Wisconsin	Kenosha	74	75	70.75	71.65		2	4
5.51E+08	Wisconsin	Kenosha	72	73	67.60	70.70	1		4
5.51E+08	Wisconsin	Ozaukee	71	72	65.21	65.81	1		
5.51E+08	Wisconsin	Racine	73	75	69.59	71.39		2	
5.51E+08	Wisconsin	Sheboygan	72	75	72.64	73.54		2	

Note: The EPA notes that the design values reflected in tables in section C of this TSD Supplement correspond to the engineering analysis EGU emissions inventory that was used in AQAT to determine state-level baseline emissions and reductions at Step 3 in the final Federal Good Neighbor Plan. These tools are discussed in greater detail in the Ozone Transport Policy Analysis Final Rule TSD from the Federal Good Neighbor Plan.

[b] New Mexico Eddy and Lea monitors have no values in the tables in section C of this TSD because calibration factors, which are needed to use AQAT to estimate the impacts of controls on ozone design values, were not available for these two monitors from the modeling analysis performed by EPA to develop calibration factors for the GNP, as described in the Ozone Transport Policy Analysis Final Rule TSD for the Federal Good Neighbor Plan.

As described in the Ozone Transport Policy Analysis Final Rule TSD for the Federal Good Neighbor Plan (OTPA Final Rule TSD), air quality modeling would be the optimal way to estimate the air quality impacts at each cost threshold level from EGU and non-EGU emissions reductions. However, as explained in that rule, due to time and resource limitations EPA was unable to use photochemical air quality modeling for all but a few emissions scenarios. Therefore, the EPA used a simplified air quality assessment tool (AQAT) to interpolate between existing photochemical modeling cases to estimate the air quality contributions and resulting design values for various levels of emissions reductions.[34] The simplified tool allowed the Agency to analyze many more levels of NO_X control stringency than would have otherwise be possible.[35] See the OTPA Final Rule TSD for introduction to the AQAT, details on the construction and evaluation of the tool, and for detailed air quality estimates for a wide range of sensitivities utilized within the multifactor test in Step 3 of the Transport framework for the final GNP.

In this Supplemental rulemaking, the EPA utilized the AQAT constructed during the final GNP. In fact, most of the AQAT estimates utilized in this Supplemental rule are simply extracted from AQAT worksheets generated during the final GNP. However, in a few instances, new worksheets were generated to better represent some alternative emissions scenarios. The AQAT and its inputs and outputs of the tool can be found in the "Ozone_AQAT_proposal_supplemental.xlsx" excel workbook, the Ozone_AQAT_proposal_results_supplemental, and the AQAT and results file from the final GNP ("Ozone_AQAT_Final.xlsx" and "Ozone_AQAT_final_results.xlsx", docket ID# EPA-HQ-OAR-2021-0668-1116).[36]

Throughout this document, including this section and Appendix D, we present the results of our AQAT analysis for receptors deemed "violating-monitor maintenance-only" receptors ("violating-monitor receptors"). Because these receptors had modeled projected concentrations that did not meet criteria to be identified either as nonattainment or maintenance-only receptors under EPA's traditional Step 1 methodology using photochemical grid modeling, the engineering base case and control case values for these receptors will appear to be below the 71 ppb level for identifying nonattainment and maintenance receptors. Nonetheless, as can be seen in Table C-1 above, these monitoring sites' 2021 and 2022 monitoring data and DVs indicate the basis why the EPA has determined that these sites are receptors for the 2023 analytic year. The presentation of these values in the AQAT excel tool and results workbooks is an artifact of the modeling data and not a reflection of the EPA's technical judgment of the effect on ozone concentrations at these sites of the control-stringency levels evaluated. As presented in this document, in order to conduct a Step 3 air quality and overcontrol analysis for violating-monitor receptors, we have

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[34] In the final GNP, the EPA used CAMx to model several base cases (i.e., one of 2016, one of 2023, and one of 2026). The EPA calculated air quality contributions for each state for both the 2023 and 2026 cases. In addition, EPA modeled with source apportionment the 2026 final policy control case. At proposal, EPA also modeled the 2026 base case and a 2026 case with air quality contributions where EGU and non-EGU emissions were uniformly reduced by 30%.

[35] As an example, each AQAT estimate under the Step 3 methodology focuses on the specific air quality linkages for an individual receptor and the air quality effects of emission reductions from those specific states. Consequently, for ~700 receptors, each with a specific pattern of states contributing greater than or equal to the 1% threshold, and 6 levels of stringency, this would entail 4,200 individual photochemical air quality modeling simulations to replicate.

[36] The final GNP AQAT estimates in the GNP workbook are based on EGU emission estimates completed on Jan 20, 2023 and may not represent the final emission estimates used in the final GNP rule.

developed a modified methodology to project the effect of the analyzed control stringencies at these receptors using the recent monitoring data.[37]

The remainder of section of this document will report the results of the NO_X emissions cost threshold analyses: (1) previously conducted for the final GNP (with the inclusion of all modeled and violating-monitor receptors) for 2023 and (2) previously conducted for the final GNP for 2026 (for just the receptors modeled to be in nonattainment and/or maintenance for 2026, with the inclusion of non-EGU emission reductions for Arizona,[38] and (3) for both 2023 and 2026, a suite of updated analyses where all states finalized in the GNP along with the Supplemental states simultaneously make emissions reductions. The analysis demonstrates there are no instances of "overcontrol" for the five Supplemental states; specifically, where all of their air quality contributions to remaining air quality problems are expected to resolve at a lower stringency level than the one selected in this proposal for these states.

In the final GNP, the EPA conducted a variety of AQAT scenarios[39] summarized in Table C-2 that informed its primary Step 3 evaluation in that rule. The results discussed in the remainder of the document pertain to the scenarios described in Table C-2, which reflect alternative views of future emissions. Each of these scenarios was examined for 2023 and 2026, where appropriate, using two configurations of AQAT where the patterns of reductions were adjusted between a single-receptor oriented "Step 3" configuration (the approach used in Step 3 in the final GNP) and a full geography control configuration (where the overall effects of this Supplemental rule inclusive of the final GNP are applied to all receptors). The "Full Geography" configuration results are shown in Appendix D.

Table C-2 – Summary of Scenarios Evaluated with AQAT

Scenario	Summary
$0	Baseline
$1,600	Baseline + SCR optimize
$1,600	Baseline +SCR optimize + SOA CC
$1,800	Baseline +SCR/SNCR optimize
$1,800	Baseline +SCR/SNCR optimize + SOA CC
$11,000 (i.e., "Full Step 3, EGU only")	Baseline +SCR/SNCR optimize + SOA CC + SCR Retrofit
$11,000 +_ non-EGUs (i.e., "Full Step 3")	Baseline +SCR/SNCR optimize + SOA CC + SCR Retrofit + non-EGUs
$1,800 +_ non-EGUs	Baseline +SCR/SNCR optimize + SOA CC + non-EGUs

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[37] The results of that analyses are included in this section in Table C-5.

[38] The AQAT analysis that informed the final GNP already included the data on 2023 and 2026 EGU control stringencies as illustrative for all states including these five Supplemental states. The analysis did not include illustrative non-EGU reductions from non-covered states. Thus, for the one Supplemental state linked through 2026, Arizona, the existing AQAT information included EGU control stringencies for both 2023 and 2026, but additional analysis is included here to also reflect the proposed non-EGU strategy for Arizona beginning in 2026.

[39] The EPA uses the word scenario and case interchangeably, referring to a cost threshold level of OS NO_X emissions reductions from EGUs and non-EGUs.

\$0 w/IRA	Baseline + delta in emissions between IPM base and IPM base w/IRA
\$11,000 w/IRA	Baseline +SCR/SNCR optimize + SOA CC + SCR Retrofit + delta in emissions between IPM final policy and IPM final policy w/IRA
\$11,000 +_ non-EGUs w/IRA	Baseline +SCR/SNCR optimize + SOA CC + SCR Retrofit + non-EGUs + delta in emissions between IPM final policy and IPM final policy w/IRA

*All "baseline" references entail Baseline Engineering Analysis 202x OS NO_X + engineering non-CEMs.
All non-EGU scenarios were only evaluated in 2026. The \$11,000 EGU option involving post-combustion retrofit was also only considered for 2026.
"Non-EGUs" in the context of this TSD refer to the suite of emissions controls and emissions reductions identified at Step 3 for all of the non-EGU industries.

For each scenario above, the EPA utilized its "Primary" calibration approach. In the final GNP, the EPA performed a range of additional sensitivities using an "Alternative" AQAT calibration approach (see the OTPA Final Rule TSD for details). As described in the final GNP, for the *Primary Calibration*,– state- and monitor-specific calibrations were created using the relationships between NO_X emissions reductions and air quality improvements derived using the 2026 base case and 2026 reduction case (where EGUs and non-EGUs for each and every state had their emissions reduced by 30%). Both of these model runs were done at proposal in the GNP.

As mentioned above, in the final GNP, the EPA also performed sensitivities for each of the rows in Table C-2 reflecting two different approaches to assessing the effects of the rule, which we will refer to as "configurations." These approaches are summarized here and further discussed in section C.2.(c).2 of the OTPA Final Rule TSD. The confiurations are described in detail, below.

> *Step 3 Configuration* - For the "Step 3" configurations, all states that contributed at or above 1% of the NAAQS to a *particular* monitor in the air quality modeling base case for the year being analyzed (either 2023 or 2026), as well as the state containing the monitor were simultaneously adjusted to the emission levels for each of the scenarios in Table C-2. At that particular monitor all other states were adjusted to the engineering base case level. This approach forms our primary overcontrol analysis, the results of which are discussed in the preamble of the final rule.
>
> *Full Geography Configuration* - For the "Full Geography" configuration, all states that were linked to any receptor in the 2023 or 2026 base cases (i.e., only states included in the final GNP rule and in this Supplemental rule), but no other states[40], were simultaneously adjusted to the emission levels for each of the scenarios in Table C-2. This approach presents an alternative way of thinking about the effect of the rule, in a more holistic way, but this approach introduces a "who goes first" problem and the potential for capturing incidental overcontrol resulting from emissions reductions in states not linked to a particular receptor above 1% of the NAAQS. The results of the "full geography" configuration are shown in Appendix D.

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[40] For the purposes of the AQAT "Full Geography" estimates, we included California as being included in the rule and making any available reductions. See the final GNP preamble section I for how this state is treated in that rule. In this rule, we continue the treatment utilized in the final GNP.

As described above, two AQAT estimates were created for each of the scenarios based on the "Step 3" configuration and the "Full Geography" configuration. These apply different patterns of emission reductions to the states at various monitors. For each scenario analyzed using the Step 3 configuration, on a receptor-by-receptor basis, the emissions change for each upwind state is associated with one of two emission levels (either the engineering base case emission level for that year or the particular cost threshold level) depending on whether the upwind state is contributing at or above 1% of the NAAQS in the air quality modeling base case to that receptor or if the receptor is located within the state.[41] In these scenario assessments using the Step 3 configuration, each monitor is treated completely independently, and the modifications are applied to each linked state and the home state regardless of whether the state is included in the particular rule and regardless of whether the monitor is considered a receptor for the particular rule. In other words, states that are contributing above the air quality threshold (i.e., greater than or equal to 1 percent of the NAAQS) to that specific monitor, as well as the state containing the monitor (regardless of whether that state is included in the rule or not (e.g., for Colorado and Connecticut in the final GNP), make NO_X emission reductions that are available at the particular cost threshold level for that year. The emissions for all other states are adjusted to the engineering base case level for that year regardless of whether they are linked to another receptor. Consequently, for the Step 3 configuration for a single scenario (where there are 730 monitors), there are potentially 730 individual patterns of linked and unlinked states, and, thus, 730 potential AQAT simulations. In this Supplemental rule, for 2023, we assessed the maximum air quality contributions to all identified receptors, i.e., to those receptors identified using the photochemical air quality modeling in the base case as well as for violating-monitor receptors (see preamble section III.D.2 for details). For 2026, because we do not identify receptors using the violating-monitor methodology, we limited the analysis to those receptors identified using the modeling-based methodology in the base case for the final GNP.

For the scenarios assessed using the "Full Geography" configuration, all states included in the final GNP or this Supplemental rule that were linked to any receptor in the 2023 or 2026 base cases (i.e., only states included in the rule) were simultaneously adjusted to one of the cost threshold levels shown in Table C-2, regardless of whether (or not) the state was "contributing at or above the 1% of the NAAQS in the base case air quality modeling to a particular receptor. In other words, all states that were included in the rule were adjusted for each receptor, while all other states were adjusted to the base case. In these scenarios using the "full geography" configuration, the emissions of the state containing the monitor were adjusted only if it was linked to a monitor in another state. So, for example, Colorado was adjusted to engineering analysis base case levels since the state is not "linked" to a receptor in another state and is not

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[41] For purposes of AQAT analysis, tribal EGU emissions are adjusted based on linkages using either the tribal contribution or the contribution from Utah . In this way, for the Colorado receptors to which Utah is linked, we make sure we account for emission reductions from tribal EGUs located within the borders of Utah . For sources in New Mexico and Arizona located on Tribal lands, the emissions were only adjusted within the AQAT tool if the tribal contribution to a monitor was greater than or equal to 0.70 ppb. If adjustment of the tribal contributions had been done in concert with adjustments of Arizona or New Mexico (for those states'linkages), we anticipate that some additional air quality improvement would have accrued to the downwind monitors. Since the Step 2 overcontrol assessment excludes the contributions from tribal sources, coordination of the tribal contribution with Arizona or New Mexico would have no impact on whether those states are potentially overcontrolled . As shown in Tables C-9 and C-10, these states are not overcontrolled. It is very unlikely that the reductions anticipated from the existing tribal sources in New Mexico and Arizona in this Supplemental rule would resolve receptors at Step 1, were they able to be included.

included in the final rule. The scenarios assessed using the "full geography" configuration examine the air quality results when emission reductions have been applied to the final rule geography. EPA views this analysis as not appropriate for Step 3 because it introduces the problem of allowing linked states to potentially free ride on reductions from non-linked states (i.e., EPA views this situation as having the potential to display potential overcontrol that is only incidental). It therefore introduces an issue where the order of individual states making emissions reductions could affect the results (i.e., a "who goes first" problem). Nonetheless, this analysis can be used to show that—even if this approach were acceptable or for some reason legally required—emission reductions made for states that are not specifically linked at or above 1% of the NAAQS to a monitor are not anticipated to affect the air quality at that monitor to a degree that would change any results in the Step 3 analysis.

As described in the OTPA Final Rule TSD, for each monitor, the predicted change in contribution of ozone from each state is calculated by multiplying the state-specific 2026 base case ozone contributions from the air quality modeling by the state- and receptor-specific calibration factor as well as by the ratio of the change in emissions (OTPA Final Rule TSD Tables C-5 or C-6) for either the emissions cost threshold level or the engineering base case emission level depending on whether the state is linked in 2023 or 2026).[42, 43] The state- and receptor-specific calibrated change in ozone is then added to the ozone contribution from either the 2023 or 2026 base case air quality modeling, depending on whether the scenario is for 2023 or 2026. The result is the state- and receptor- specific "calibrated" total ozone contribution taking into account the emissions remaining at a particular emission reduction cost threshold level.

As described in the OTPA Final Rule TSD, for each monitor, these state-level "calibrated" contributions are then summed to estimate total ozone contribution from all states to a particular receptor. "Other" ozone contributions are added to the state contributions to account for other sources of ozone affecting the monitor. The change in concentration from the "other" nonanthropogenic ozone categories are found by multiplying the change in the total anthropogenic concentration, between the scenario and the base case, by the "nonState" calibration factors (calculated as the ratio of the change from these "all other" contributions divided by the change in the total anthropogenic contribution from the 2026 base case to the 2023 case).[44] This change in the "other" contribution is then added to the base case value to get the total "other" contribution for the scenario. The total ozone from all the states and "other" contributions equals the average design values estimated in the assessment tool. The maximum design values were estimated by multiplying the estimated average design values by the ratio of the modeled 2026 base case maximum and average design values.

Generally, as shown in the OTPA Final Rule TSD, as the emissions cost threshold stringency increased, the estimated average and maximum design values at each receptor decreased. In the assessment tool, the estimated average design value was used to further estimate whether the location will be out of attainment. Meanwhile, the estimated maximum

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[42] For the case of Arizona in 2026, when accounting for the 329 tons of potential emissions reductions from non-EGUs in the non-EGU scenarios, the percent changes are modestly different, and these changes carry through to the air quality contributions (see Ozone_AQAT_proposal_supplemental.xlsx, sheet 2026_OS NOx, row 3, for the updated values).

[43] The change in concentration can be positive or negative, depending on whether the state's total anthropogenic ozone season NO_X emissions for the scenario are larger or smaller than the air quality modeling base case emission level for that year.

[44] See column BV in "2023_Scenario_primary" or "2026_Scenario_primary" in the Excel file Ozone AQAT Final in the docket for the Federal Good Neighbor Plan (EPA-HQ-OAR-2021-0668-1116)

design value was used to further estimate whether the location will have problems maintaining compliance with the NAAQS. An area was noted as having a nonattainment or maintenance issue if either estimated air quality level was greater than or equal to 71 ppb. For the 2023 analysis in this Supplemental rule, for the violating-monitor receptors, since the average and maximum design values were already below 71 ppb in the 2016v3 modeling, an additional assessment was conducted to assess air quality effects and overcontrol at these receptors. As described in the following section, the EPA uses the certified 2022 design values as a proxy for a base case 2023 design value for violating-monitor receptors (which are considered a type of maintenance receptor). That value is then adjusted in a relative way using the change in air quality from the engineering base case relative to the engineering base case from AQAT. In other words, using AQAT, the air quality change from the engineering analysis base to one of the other scenarios is divided by the engineering analysis base resulting in a fractional change. This fractional change is multiplied by the 2022 design value (serving as proxy) to get a change in air quality that is subtracted from the respective 2022 design value (serving as proxy). These values represent estimates of 2023 air quality change under the scenarios analyzed. The EPA repeated this analysis using the 2021 certified design values as a sensitivity, and these results are included in the accompanying spreadsheets in the docket (see Ozone_AQAT_proposal_results_supplemental.xlsx for details). (Those results would not produce any alternative regulatory conclusions concerning air quality effects or overcontrol under the scenarios analyzed.) Only the results based on the 2022 design values serving as proxy for 2023 design values are shown in this TSD (see in Table C-5).

1. Description of the analytic results using the primary approach for the Step 3 AQAT configuration.

For each year, 2023 and 2026, the EPA assessed the ozone AQAT output estimates from the final GNP or alternatively used that tool to reestimate improvements in downwind air quality at base case levels and at each of the cost threshold scenarios. For each scenario, the EPA examined the average and maximum design values for each of the receptors and evaluated whether they dropped below 71 ppb (at which point their nonattainment and maintenance issues, respectively, would be considered resolved). In each scenario, the EPA also examined each state's air quality contributions, assessing whether a state maintained at least one linkage (i.e., greater than or equal to 1% (0.70 ppb) to a receptor located in a downwind state) that was estimated to remain in nonattainment and/or maintenance. The EPA examined incrementally the engineering base case, and all of the mitigation steps listed in Table C-2 of this Supplemental document but focused on the stringency level identified in the final GNP for the 2023 and 2026 time-periods. EPA also assessed changes in air quality for the non-EGU mitigation potential for 2026. As described above, to create an additional set of 2023 estimates for the violating-monitor receptors, EPA performed an additional analysis for each scenario, where the air quality improvement was applied in a relative way (i.e., as a percent change) to the 2021 and 2022 measured design values. These calculations using 2022 design values serve as a proxy for 2023 design values (consistent with the treatment of violating-monitor receptors as a type of "maintenance" receptor), and these are presented in this TSD, while 2021 design values serve as a sensitivity (and are not presented in this TSD, but are available in the docket). In this way, we were able to assess the effects of particular levels of stringency on violating-monitor receptors.

The key findings of these analyses are 1) there are air quality improvements at the identified receptors at the Step 3 selected level of control stringency for the Supplemental states; 2) no Supplemental states have their contribution to a receptor identified in either the 2023 or 2026 base cases drop below 1% at any mitigation level assessed for as long as that receptor remained in nonattainment or maintenance, and 3) all Supplemental states remain linked to a downwind problematic receptor up through the penultimate mitigation step. All of these analyses include simultaneous emissions reductions from the states included in the final GNP. These findings verify that the proposed stringency level does not constitute overcontrol for the five Supplemental states (and confirms the absence of overcontrol for the other 23 states covered in the GNP, even with these states included). These findings held through EPA's alternative assessments as well (i.e., using the Full Geography Configuration).

There are 80 receptors outside California in 2023. These include 30 using the "traditional" air quality modeling-plus-monitoring methodology and an additional 50 that are violating-monitor receptors. There are 17 receptors outside California in 2026 that are projected using the traditional air quality modeling-plus-monitoring methodology. Generally in this TSD, the receptors identified using the traditional Step 1 approach are referred to as "modeled receptors" as distinct from violating-monitor receptors. See the Air Quality Modeling Final Rule TSD for the Federal Good Neighbor Plan for details on receptor identification and contribution calculations at Steps 1 and 2.

For each year, using the Step 3 configuration of AQAT with the primary calibration, the average and maximum design values (in ppb) were estimated. Air quality values for each identified receptor and cost threshold level can be found in Tables C-7 through C-10 of the

OTPA Final Rule TSD for the Good Neighbor Plan (with the exception of Arizona when non-EGUs are included).

In 2023, we observe that all monitors that were projected using the air quality modeling to have nonattainment and/or maintenance issues consistently have their average and/or maximum design values at or above 71 ppb for all scenarios prior to installation of new post-combustion controls (Tables C-3 and C-4). We observe that there is air quality improvement at increasing cost threshold levels. As was the case for the final GNP, in 2023 (but also for 2026) we observe that receptors 350151005 and 350250008 in Eddy County and Lea County New Mexico, respectively, do not have calibration factors based on the "primary" approach.[45]

For the purpose of Step 3 for violating-monitor receptors, EPA used 2022 certified design values since these data are the most recent available information to indicate potential ozone levels at these same locations in 2023. The 2022 design values are therefore used as a proxy to represent 2023 base case ozone levels in the analysis in this TSD to inform EPA's Step 3 evaluation.[46] (violating-monitor receptors are another type of "maintenance" receptor. *See* 88 FR 36704. See section III.C.2 in the preamble for this action for further discussion.) To project the effect on design values for the violating-monitor receptors of the scenarios analyzed, the AQAT-calculated changes in air quality were used in a relative way, calculated as a change from the 2022 measured DVs that serve as a proxy to represent 2023 base case DVs), we observe that there is air quality improvement at increasing cost threshold levels (Table C-5). We also observe that only values that had base case design values exactly equal to 71 ppb had their concentrations drop below the 71 ppb level. Only a single receptor (monitor ID#: 481130075) in Dallas Texas, which had a design value equal to 71 in 2022 (as well as 2021) had its estimated design value drop below 71 ppb). Neither Kansas or Tennessee were uniquely linked to this particular violating-monitor receptors. Both maintained linkages to other violating-monitor receptors that persisted through the selected control stringency level.

In 2026, of the 17 receptors, we observe similar behavior seen in the final GNP (see the OTPA Final Rule TSD for details). For 2026, the AQAT average and maximum design values for the receptors can be found in Tables C-6 and C-7. For scenarios that assess non-EGU emissions reductions, the reductions from Arizona have air quality effects. For the remaining scenarios (where there were no non-EGU emissions reductions), the air quality estimates for 2026 were taken directly from the final GNP.

In regards to upwind contributions, we continue to use the calibrated AQAT to estimate the change in the air quality contributions of each upwind state to each receptor (see the description of the state and receptor-specific contributions in section C.2.c.(2) of the OTPA Final Rule TSD) in order to determine whether any state's contribution is below the 1 percent threshold used in step 2 of the 4-Step Good Neighbor Framework to identify "linked" upwind states. For this assessment, we compared each of the Supplemental states' adjusted ozone concentration against the 1% air quality threshold at each of the cost threshold levels at each

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[45] In the air quality modeling for the GNP proposal, we did not have air quality contributions for these monitors for either (or both) the 2026 base case and the 2026 case where EGU and non-EGU emissions had been reduced by 30%. Consequently, using the "primary" calibration approach in AQAT, we continue to not have design value or contribution calculations for these receptors.

[46] We also note that 2023 monitoring data is not yet certified, and further, because the Federal Good Neighbor Plan was in effect in several states during the 2023 ozone season (and sources may have otherwise voluntarily taken emissions-reduction measures consistent with the Plan either earlier than the effective date or in states where the Plan was stayed), the 2023 monitoring data is less reliable for use in establishing an air quality baseline, i.e., one in the absence of the Federal Good Neighbor Plan.

remaining receptor, using the Step 3 configuration of AQAT using the primary calibration factor, focusing on the stringency levels proposed for these states. For 2023, for the subset of monitors that are violating-monitor receptors, and the subset of modeled monitors that are projected to have average or maximum design values greater than, or equal to 71 ppb, the maximum remaining air quality contribution results are shown in Tables C-8 and C-9, respectively. For 2026, the results are shown in Table C-10.

To see static air quality contributions and design value estimates for the receptors of interest for each year and cost level scenario, see the individual worksheets within the "Ozone_AQAT_proposal_results_supplemental.xlsx" workbook (the individual worksheets in this file are labeled in Appendix B of this document). For interactive worksheets within AQAT, refer to the "202X_scenario_primary" worksheets after setting the desired scenario in the "summary_DVs_202X" worksheet within the "Ozone_AQAT_proposal_supplemental.xlsx" workbook. Within AQAT, in the summary_DVs worksheet, adjust cells I1 and I2 to match the desired scenario of interest. The numbering for the various scenarios is shown in Table C-11. For a cost threshold scenario estimate, cell I1 would be a value of 0 through 8 (note that 6, and 7 are invalid), while cell I2 should be fixed with a value of 0.

Generally, for all Supplemental states, in all years to which they are linked in the base case, across all cost level scenarios, we did not see instances where all of the state's contributions dropped below 1% of the NAAQS assessed across all its linkages to remaining downwind receptors. That is, for a single receptor, if a state was linked to that receptor in the base case for that year the state almost always remained linked with a contribution greater than or equal to 1% of the NAAQS in all scenarios. This is not a surprising result because, for a linkage to be resolved by emission reductions of just a few percent, the original base contribution would need to be within a few percent of the threshold.

As explained earlier, using the Step 3 configuration of AQAT using the primary calibration factor, EPA performed the overcontrol test at Step 3 using an identical methodology to that used in the final GNP as well as prior CSAPR Rules (in this case supplemented with the additional analysis for the violating-monitor receptors focusing on evaluating the changes in air quality relative to 2022 measured design values, serving as a proxy for representative 2023 design values (see above)). Collectively, these analyses indicate that there is no overcontrol at full implementation of the mitigation strategies in either 2023 or 2026 identified in this action when combined with the implementation from the GNP. Focusing on 2026, even with full implementation of EGU and non-EGU reductions, nonattainment/maintenance receptors and corresponding air quality contributions greater than or equal to 1% of the NAAQS persisted for Arizona indicating the absence of "overcontrol" for that state.

Table C-3. 2023 Average Ozone DVs (ppb) for NO$_X$ Emissions Cost Threshold Levels ($/ton) Assessed Using the Ozone AQAT for Modeled Receptors.

Site	state	county	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize
40278011	Arizona	Yuma	70.36	70.35	70.34	70.34	70.34
80350004	Colorado	Douglas	71.12	71.10	71.10	71.10	71.10
80590006	Colorado	Jefferson	72.63	72.61	72.61	72.61	72.61
80590011	Colorado	Jefferson	73.29	73.27	73.27	73.27	73.27
80690011	Colorado	Larimer	70.79	70.78	70.78	70.78	70.78
90010017	Connecticut	Fairfield	71.62	71.58	71.57	71.57	71.56
90013007	Connecticut	Fairfield	72.99	72.93	72.91	72.91	72.90
90019003	Connecticut	Fairfield	73.32	73.28	73.26	73.27	73.25
90099002	Connecticut	New Haven	70.61	70.54	70.52	70.53	70.51
170310001	Illinois	Cook	68.13	68.11	68.11	68.11	68.11
170314201	Illinois	Cook	67.92	67.88	67.88	67.88	67.88
170317002	Illinois	Cook	68.47	68.38	68.38	68.37	68.37
350130021	New Mexico	Dona Ana	70.83	70.82	70.82	70.82	70.82
350130022	New Mexico	Dona Ana	69.73	69.72	69.72	69.72	69.72
350151005	New Mexico	Eddy					
350250008	New Mexico	Lea					
480391004	Texas	Brazoria	70.59	70.53	70.53	70.52	70.52
481210034	Texas	Denton	69.93	69.90	69.88	69.89	69.88
481410037	Texas	El Paso	69.82	69.82	69.81	69.81	69.81
481671034	Texas	Galveston	71.82	71.75	71.72	71.73	71.70
482010024	Texas	Harris	75.33	75.27	75.27	75.25	75.25
482010055	Texas	Harris	71.19	71.13	71.11	71.12	71.10
482011034	Texas	Harris	70.32	70.26	70.26	70.25	70.25
482011035	Texas	Harris	68.01	67.95	67.95	67.94	67.94
490110004	Utah	Davis	71.88	71.87	71.87	71.87	71.87
490353006	Utah	Salt Lake	72.48	72.47	72.47	72.47	72.47
490353013	Utah	Salt Lake	73.21	73.20	73.20	73.20	73.20
550590019	Wisconsin	Kenosha	70.75	70.65	70.65	70.65	70.65
551010020	Wisconsin	Racine	69.59	69.46	69.46	69.46	69.46
551170006	Wisconsin	Sheboygan	72.64	72.46	72.46	72.46	72.46

Table C-4. 2023 Maximum Ozone DVs (ppb) for NO_X Emissions Cost Threshold Levels ($/ton) Assessed Using the Ozone AQAT for Modeled Receptors.

Site	state	county	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize
40278011	Arizona	Yuma	72.05	72.04	72.04	72.04	72.04
80350004	Colorado	Douglas	71.71	71.70	71.70	71.70	71.70
80590006	Colorado	Jefferson	73.32	73.31	73.31	73.31	73.31
80590011	Colorado	Jefferson	73.89	73.87	73.87	73.87	73.87
80690011	Colorado	Larimer	71.99	71.98	71.98	71.98	71.98
90010017	Connecticut	Fairfield	72.22	72.18	72.17	72.17	72.16
90013007	Connecticut	Fairfield	73.89	73.83	73.81	73.81	73.80
90019003	Connecticut	Fairfield	73.62	73.58	73.56	73.57	73.55
90099002	Connecticut	New Haven	72.71	72.65	72.62	72.63	72.61
170310001	Illinois	Cook	71.82	71.80	71.80	71.80	71.80
170314201	Illinois	Cook	71.41	71.37	71.37	71.37	71.37
170317002	Illinois	Cook	71.27	71.17	71.17	71.17	71.17
350130021	New Mexico	Dona Ana	72.13	72.12	72.12	72.12	72.12
350130022	New Mexico	Dona Ana	72.43	72.42	72.42	72.42	72.42
350151005	New Mexico	Eddy					
350250008	New Mexico	Lea					
480391004	Texas	Brazoria	72.69	72.63	72.63	72.62	72.62
481210034	Texas	Denton	71.73	71.70	71.68	71.69	71.68
481410037	Texas	El Paso	71.43	71.42	71.41	71.41	71.41
481671034	Texas	Galveston	73.13	73.05	73.02	73.03	73.01
482010024	Texas	Harris	76.93	76.87	76.87	76.85	76.85
482010055	Texas	Harris	72.20	72.13	72.12	72.12	72.10
482011034	Texas	Harris	71.52	71.46	71.46	71.45	71.45
482011035	Texas	Harris	71.52	71.46	71.46	71.45	71.45
490110004	Utah	Davis	74.08	74.07	74.07	74.07	74.07
490353006	Utah	Salt Lake	74.07	74.06	74.06	74.06	74.06
490353013	Utah	Salt Lake	73.71	73.70	73.70	73.70	73.70
550590019	Wisconsin	Kenosha	71.65	71.55	71.55	71.55	71.55
551010020	Wisconsin	Racine	71.39	71.25	71.25	71.25	71.25
551170006	Wisconsin	Sheboygan	73.54	73.36	73.36	73.36	73.36

Table C-5. Representative 2023 Ozone DVs (ppb) for for NOX Emissions Cost Threshold Levels ($/ton) Assessed Using the Relative Percent Change from the Engineering Analysis Base using AQAT for Violating-Monitor Receptors.

Site	state	county	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize
40070010	Arizona	Gila	76.00	75.99	75.98	75.98	75.97
40130019	Arizona	Maricopa	77.00	76.99	76.98	76.97	76.97
40131003	Arizona	Maricopa	80.00	79.98	79.97	79.96	79.95
40131004	Arizona	Maricopa	81.00	80.98	80.97	80.97	80.96
40131010	Arizona	Maricopa	80.00	79.98	79.96	79.95	79.93
40132001	Arizona	Maricopa	78.00	77.99	77.98	77.97	77.96
40132005	Arizona	Maricopa	79.00	78.98	78.97	78.97	78.96
40133002	Arizona	Maricopa	75.00	74.99	74.98	74.97	74.97
40134004	Arizona	Maricopa	73.00	72.99	72.99	72.99	72.99
40134005	Arizona	Maricopa	75.00	74.98	74.98	74.97	74.96
40134008	Arizona	Maricopa	74.00	73.99	73.98	73.97	73.96
40134010	Arizona	Maricopa	76.00	75.98	75.97	75.97	75.96
40137020	Arizona	Maricopa	77.00	76.98	76.97	76.96	76.95
40137021	Arizona	Maricopa	77.00	76.98	76.97	76.96	76.95
40137022	Arizona	Maricopa	78.00	77.98	77.97	77.96	77.95
40137024	Arizona	Maricopa	76.00	75.98	75.97	75.96	75.95
40139702	Arizona	Maricopa	77.00	76.98	76.98	76.97	76.96
40139704	Arizona	Maricopa	77.00	76.99	76.98	76.97	76.96
40139997	Arizona	Maricopa	79.00	78.99	78.98	78.97	78.97
40213001	Arizona	Pinal	74.00	73.98	73.98	73.97	73.96
40218001	Arizona	Pinal	76.00	75.98	75.97	75.97	75.96
80013001	Colorado	Adams	77.00	76.99	76.99	76.99	76.99
80050002	Colorado	Arapahoe	80.00	79.98	79.98	79.98	79.98
80310002	Colorado	Denver	74.00	73.98	73.98	73.98	73.98
80310026	Colorado	Denver	77.00	76.99	76.99	76.99	76.99
90079007	Connecticut	Middlesex	73.00	72.92	72.90	72.91	72.88
90110124	Connecticut	New London	72.00	71.94	71.93	71.93	71.92
170310032	Illinois	Cook	75.00	74.96	74.95	74.96	74.96
170311601	Illinois	Cook	73.00	72.96	72.96	72.95	72.95
181270024	Indiana	Porter	73.00	72.97	72.97	72.97	72.97
260050003	Michigan	Allegan	75.00	74.79	74.79	74.79	74.78
261210039	Michigan	Muskegon	79.00	78.89	78.87	78.87	78.85
320030043	Nevada	Clark	75.00	74.97	74.97	74.97	74.97
350011012	New Mexico	Bernalillo	73.00	72.99	73.00	73.00	73.00
350130008	New Mexico	Dona Ana	76.00	75.99	75.99	75.98	75.98
361030002	New York	Suffolk	74.00	73.94	73.92	73.93	73.91
390850003	Ohio	Lake	74.00	73.89	73.86	73.88	73.85
480290052	Texas	Bexar	75.00	74.95	74.95	74.94	74.94
480850005	Texas	Collin	74.00	73.97	73.96	73.96	73.95
481130075	Texas	Dallas	71.00	70.97	70.95	70.96	70.94
481211032	Texas	Denton	77.00	76.94	76.92	76.93	76.91
482010051	Texas	Harris	73.00	72.94	72.92	72.93	72.91
482010416	Texas	Harris	73.00	72.94	72.92	72.92	72.91
484390075	Texas	Tarrant	76.00	75.97	75.95	75.97	75.94
484391002	Texas	Tarrant	77.00	76.97	76.95	76.96	76.95
484392003	Texas	Tarrant	72.00	71.97	71.95	71.97	71.94
484393009	Texas	Tarrant	76.00	75.97	75.95	75.96	75.94
490571003	Utah	Weber	74.00	73.99	73.99	73.99	73.99
550590025	Wisconsin	Kenosha	73.00	72.90	72.90	72.90	72.90
550890008	Wisconsin	Ozaukee	72.00	71.87	71.87	71.86	71.86

Table C-6. 2026 Average Ozone DVs (ppb) for NO$_X$ Emissions Cost Threshold Levels ($/ton) Assessed Using the Ozone AQAT for All Receptors.

Site	state	county	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize + SCR/SNCR Retrofit ("Full Step 3 – EGU only")	SCR Optimize + SOA CC + SNCR Optimize + SCR/SNCR Retrofit + non-EGU ("Full Step 3")
40278011	Arizona	Yuma	69.87	69.86	69.86	69.86	69.86	69.84	69.80
80590006	Colorado	Jefferson	71.70	71.69	71.69	71.69	71.69	71.36	71.34
80590011	Colorado	Jefferson	72.06	72.05	72.05	72.05	72.05	71.59	71.57
80690011	Colorado	Larimer	69.84	69.83	69.83	69.83	69.83	69.54	69.53
90013007	Connecticut	Fairfield	71.25	71.20	71.18	71.18	71.17	70.98	70.66
90019003	Connecticut	Fairfield	71.58	71.53	71.52	71.52	71.51	71.34	71.06
350130021	New Mexico	Dona Ana	70.06	70.05	70.05	70.05	70.05	69.89	69.86
350130022	New Mexico	Dona Ana	69.17	69.16	69.15	69.15	69.15	69.00	68.95
350151005	New Mexico	Eddy							
350250008	New Mexico	Lea							
480391004	Texas	Brazoria	69.89	69.84	69.84	69.82	69.82	68.96	68.50
481671034	Texas	Galveston	71.29	71.22	71.19	71.20	71.17	70.02	69.28
482010024	Texas	Harris	74.83	74.77	74.77	74.76	74.76	73.86	73.39
490110004	Utah	Davis	69.90	69.90	69.90	69.90	69.90	69.34	69.28
490353006	Utah	Salt Lake	70.50	70.49	70.49	70.49	70.49	69.96	69.91
490353013	Utah	Salt Lake	71.91	71.91	71.91	71.91	71.91	71.45	71.40
551170006	Wisconsin	Sheboygan	70.83	70.66	70.66	70.65	70.65	70.51	70.27

Table C-7. 2026 Maximum Ozone DVs (ppb) for NO_X Emissions Cost Threshold Levels ($/ton) Assessed Using the Ozone AQAT for All Receptors.

Site	state	county	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize + SCR/SNCR Retrofit ("Full Step 3 – EGU only")	SCR Optimize + SOA CC + SNCR Optimize + SCR/SNCR Retrofit + non-EGU ("Full Step 3")
40278011	Arizona	Yuma	71.47	71.46	71.46	71.46	71.46	71.44	71.39
80590006	Colorado	Jefferson	72.30	72.29	72.29	72.29	72.29	71.95	71.93
80590011	Colorado	Jefferson	72.66	72.65	72.65	72.65	72.65	72.19	72.16
80690011	Colorado	Larimer	71.04	71.03	71.03	71.03	71.03	70.73	70.72
90013007	Connecticut	Fairfield	72.06	72.00	71.98	71.99	71.97	71.78	71.46
90019003	Connecticut	Fairfield	71.78	71.73	71.72	71.72	71.71	71.54	71.26
350130021	New Mexico	Dona Ana	71.36	71.35	71.35	71.35	71.35	71.19	71.16
350130022	New Mexico	Dona Ana	71.77	71.76	71.76	71.76	71.76	71.60	71.55
350151005	New Mexico	Eddy							
350250008	New Mexico	Lea							
480391004	Texas	Brazoria	72.02	71.96	71.96	71.95	71.95	71.06	70.58
481671034	Texas	Galveston	72.51	72.44	72.41	72.42	72.39	71.22	70.47
482010024	Texas	Harris	76.45	76.39	76.39	76.38	76.38	75.46	74.98
490110004	Utah	Davis	72.10	72.10	72.10	72.10	72.10	71.52	71.46
490353006	Utah	Salt Lake	72.10	72.09	72.09	72.09	72.09	71.55	71.50
490353013	Utah	Salt Lake	72.31	72.31	72.31	72.31	72.31	71.84	71.80
551170006	Wisconsin	Sheboygan	71.73	71.55	71.55	71.55	71.55	71.41	71.17

Table C-8. 2023 Maximum Air Quality Contribution (ppb) to any Violating-Monitor Receptors.[47]

state	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize
Alabama	0.80	0.80	0.80	0.80	0.80
Arizona	1.60	1.60	1.61	1.61	1.61
Arkansas	1.13	1.13	1.13	1.13	1.13
California	6.89	6.87	6.87	6.87	6.87
Illinois	16.55	16.55	16.55	16.55	16.55
Indiana	9.31	9.28	9.28	9.28	9.28
Iowa	1.13	1.13	1.13	1.13	1.13
Kansas	0.83	0.82	0.82	0.82	0.82
Kentucky	1.59	1.58	1.57	1.58	1.57
Louisiana	5.18	5.16	5.16	5.15	5.15
Maryland	1.17	1.17	1.17	1.17	1.17
Michigan	3.50	3.50	3.50	3.50	3.50
Minnesota	<0.70	<0.70	<0.70	<0.70	<0.70
Mississippi	1.10	1.10	1.08	1.10	1.08
Missouri	2.98	2.93	2.93	2.93	2.93
Nevada	1.06	1.06	1.06	1.06	1.06
New Jersey	8.00	8.00	8.00	8.00	8.00
New Mexico	<0.70	<0.70	<0.70	<0.70	<0.70
New York	12.10	12.10	12.10	12.10	12.10
Ohio	2.24	2.21	2.21	2.21	2.21
Oklahoma	1.60	1.60	1.59	1.60	1.59
Pennsylvania	5.18	5.16	5.16	5.16	5.16
Tennessee	0.86	0.86	0.86	0.86	0.86
Texas	3.85	3.84	3.84	3.84	3.84
Utah	1.45	1.45	1.45	1.45	1.45
Virginia	1.43	1.43	1.43	1.43	1.43
West Virginia	1.82	1.81	1.79	1.79	1.78
Wisconsin	5.12	5.12	5.12	5.12	5.12

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[47] Values greater than or equal to 0.70 ppb indicate the state remains linked to a remaining downwind receptor.

Table C-9. 2023 Maximum Air Quality Contribution (ppb) to any Modeled Receptor.[48]

state	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize
Alabama	0.77	0.77	0.77	0.77	0.77
Arizona	1.71	1.71	1.71	1.71	1.70
Arkansas	1.18	1.18	1.18	1.18	1.18
California	6.27	6.26	6.26	6.26	6.26
Illinois	19.08	19.08	19.08	19.08	19.08
Indiana	9.88	9.82	9.82	9.82	9.82
Iowa	0.90	0.90	0.90	0.90	0.90
Kansas	<0.70	<0.70	<0.70	<0.70	<0.70
Kentucky	0.85	0.85	0.84	0.85	0.84
Louisiana	9.70	9.66	9.66	9.66	9.66
Maryland	1.31	1.31	1.31	1.31	1.31
Michigan	1.60	1.60	1.60	1.60	1.60
Minnesota	0.85	0.85	0.85	0.85	0.85
Mississippi	1.42	1.42	1.39	1.42	1.39
Missouri	1.95	1.82	1.82	1.82	1.82
Nevada	1.05	1.05	1.05	1.05	1.05
New Jersey	8.37	8.38	8.38	8.38	8.38
New Mexico	1.60	1.60	1.60	1.60	1.60
New York	16.12	16.12	16.12	16.12	16.12
Ohio	2.04	2.02	2.02	2.02	2.02
Oklahoma	1.03	1.02	1.02	1.02	1.02
Pennsylvania	5.99	5.97	5.97	5.97	5.97
Tennessee	<0.70	<0.70	<0.70	<0.70	<0.70
Texas	4.75	4.75	4.75	4.75	4.75
Utah	1.29	1.29	1.29	1.29	1.29
Virginia	1.82	1.81	1.81	1.81	1.81
West Virginia	1.52	1.50	1.49	1.50	1.48
Wisconsin	2.87	2.87	2.87	2.87	2.87

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[48] Values greater than or equal to 0.70 ppb indicate the state remains linked to a remaining downwind receptor.

Table C-10. 2026 Maximum Air Quality Contribution (ppb) to All Receptors.[49]

State	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize + SCR/SNCR Retrofit ("Full Step 3 – EGU only")	SCR Optimize + SOA CC + SNCR Optimize + SCR/SNCR Retrofit + non-EGU ("Full Step 3")
Arizona	0.88	0.88	0.88	0.88	0.88	0.84	0.83
Arkansas	1.12	1.12	1.12	1.12	1.12	1.01	0.97
California	6.09	6.08	6.08	6.08	6.08	6.08	6.04
Illinois	13.60	13.60	13.60	13.60	13.60	13.59	13.57
Indiana	8.34	8.27	8.27	8.27	8.27	8.22	8.05
Kentucky	0.81	0.80	0.80	0.80	0.80	0.75	0.72
Louisiana	9.67	9.64	9.64	9.63	9.63	9.29	8.82
Maryland	1.08	1.08	1.08	1.08	1.08	1.08	1.08
Michigan	1.47	1.47	1.47	1.47	1.47	1.46	1.45
Mississippi	1.32	1.32	1.29	1.32	1.29	1.21	1.14
Missouri	1.78	1.65	1.65	1.65	1.65	1.59	1.55
Nevada	0.90	0.90	0.90	0.90	0.90	0.90	0.90
New Jersey	8.09	8.10	8.10	8.10	8.10	8.10	8.11
New York	12.68	12.67	12.67	12.67	12.67	12.66	12.64
Ohio	1.92	1.90	1.90	1.90	1.90	1.90	1.85
Oklahoma	0.77	0.77	0.77	0.77	0.77	0.72	<0.70
Pennsylvania	5.70	5.68	5.68	5.68	5.68	5.65	5.55
Texas	4.44	4.44	4.44	4.43	4.43	4.34	4.30
Utah	1.07	1.07	1.07	1.07	1.07	0.89	0.88
Virginia	1.14	1.14	1.14	1.14	1.13	1.13	1.10
West Virginia	1.36	1.35	1.34	1.34	1.33	1.28	1.24

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[49] Values greater than or equal to 0.70 ppb indicate the state remains linked to a remaining downwind receptor.

Table C-11. Description of the Various Scenarios Evaluated in AQAT.

Scenario	Cost Threshold Level	Description
0	$0	Baseline Engineering Analysis 202x OS NO_X + engineering non-CEMs
1	$1,600	Baseline Engineering Analysis 202x OS NO_X + engineering non-CEMs +SCR optimize
2	$1,600	Baseline Engineering Analysis 202x OS NO_X + engineering non-CEMs +SCR optimize + SOA CC
3	$1,800	Baseline Engineering Analysis 202x OS NO_X + engineering non-CEMs +SCR/SNCR optimize
4	$1,800	Baseline Engineering Analysis 202x OS NO_X + engineering non-CEMs +SCR/SNCR optimize + SOA CC
5	$11,000	Baseline Engineering Analysis 202x OS NO_X + engineering non-CEMs +SCR/SNCR optimize + SOA CC + SCR Retrofit
8	$11,000 +_ non-EGUs	Baseline Engineering Analysis 202x OS NO_X + engineering non-CEMs +SCR/SNCR optimize + SOA CC + SCR Retrofit + non-EGUs
9	$1,800 +_ non-EGUs	Baseline Engineering Analysis 202x OS NO_X + engineering non-CEMs +SCR/SNCR optimize + SOA CC + non-EGUs
14	$0 w/IRA	Baseline Engineering Analysis 202x OS NO_X + engineering non-CEMs + delta in emissions between IPM base and IPM base w/IRA
15	$11,000 w/IRA	Baseline Engineering Analysis 202x OS NO_X + engineering non-CEMs +SCR/SNCR optimize + SOA CC + SCR Retrofit + delta in emissions between IPM final policy and IPM final policy w/IRA
16	$11,000 +_ non-EGUs w/IRA	Baseline Engineering Analysis 202x OS NO_X + engineering non-CEMs +SCR/SNCR optimize + SOA CC + SCR Retrofit + non-EGUs + delta in emissions between IPM final policy and IPM final policy w/IRA

D. Selection of Backstop Emission Rate

The backstop rate analysis for the Federal Good Neighbor Plan, including the 50-ton buffer analysis, was done for the entire country, so all units from the 5 supplemental states were included. See the Ozone Transport Policy Analysis Final Rule TSD for the Federal Good Neighbor Plan for a full description of that analysis.

E. Preliminary Environmental Justice Screening Analysis for EGUs

EPA conducted a screening analysis regarding potential environmental justice concerns associated with emissions from EGUs.[50] This analysis, discussed in this section, is distinct from the EJ impacts analysis for the full rule in Chapter 7 of the RIA. EPA's EJ Technical Guidance[51] states that: "A regulatory action may involve potential environmental justice concerns if it could: (1) create new disproportionate impacts on minority populations, low-income populations, and/or indigenous peoples; (2) exacerbate existing disproportionate impacts on minority populations, low-income populations, and/or indigenous peoples; or (3) present opportunities to address existing disproportionate impacts on minority populations, low-income populations, and/or indigenous peoples through the action under development." In this TSD, EPA uses a screening analysis to identify the potential for coal-fired EGUs to contribute to air pollution in areas with potential EJ concerns.

This initial screening analysis examines two groups of coal-fired EGUs within the geography: those EGUs with existing SCRs that will receive a backstop rate in 2024 (or 2025 for the states included in this supplemental proposal), and those EGUs currently lacking SCRs that will receive a backstop rate by no later than 2030. It considers whether each group demonstrates a greater potential to expose areas of potential EJ concern to air pollution, relative to the national coal-fired EGU fleet. This screening-level analysis helped EPA identify potential EJ concerns during the process of rule development, while subsequent analysis presented in the RIA provides an evaluation of the distributional impacts of the requirements finalized in this action. These two sets of analyses are distinct but complementary – the screening analysis presented in this TSD evaluates the potential for environmental justice concerns associated particularly with EGUs, and the environmental justice analyses presented in the RIA estimate the ultimate impacts of the final rule.

Based on this screening analysis, both groups of EGUs demonstrated relatively high potential to expose areas of potential EJ concern to further pollution. While this screening analysis does not identify all potentially impacted downwind areas or quantify the downwind air quality impacts, exposures, and potential health effects of these sources (the aggregate impact of which is evaluated and discussed in the RIA), it does demonstrate that a relatively high potential exists for the sources in these two groups to affect areas facing pre-existing disproportionate susceptibility to exposure. Ultimately, all final rule determinations are justified under the EPA's interstate transport framework for implementing the good neighbor provision for the 2015 ozone NAAQS. This analysis indicates whether two groups of EGUs receiving backstop rates under the final rule exhibit a relatively high potential to expose areas of potential EJ concern to further pollution. An overview of the methodology is described below.

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[50] A potential EJ concern is defined as "the actual or potential lack of fair treatment or meaningful involvement of minority populations, low-income populations, tribes, and indigenous peoples in the development, implementation and enforcement of environmental laws, regulations and policies" (U.S. EPA, 2015). For analytic purposes, this concept refers more specifically to "disproportionate impacts on minority populations, low-income populations, and/or indigenous peoples that may exist prior to or that may be created by the proposed regulatory action" (U.S. EPA, 2015).

[51] U.S. Environmental Protection Agency (EPA), 2015. Guidance on Considering Environmental Justice During the Development of Regulatory Actions, Docket ID: EPA-HQ-OAR-2021-0668-0087

Methodology

The screening assessment in this TSD is based on EPA's peer-reviewed[52] Power Plant Screening Methodology (PPSM) and is carried out in three parts. First, to estimate which census block groups have some potential to be exposed by emissions from each EGU, EPA used NOAA's Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) model to generate forward trajectories for large coal-fired EGUs located in linked upwind states under this final rule.[53]. A forward trajectory is a modeled parcel of air that moves forward (i.e., downwind) due to winds and other meteorological factors. For each EGU, we used the HYSPLIT model to simulate the downwind path of air parcels passing individual EGUs four times per day—12:00 AM, 6:00 AM, 12:00 PM, and 6:00 PM (local standard time). For simplicity, EPA limited the modeling to the period June 1 to August 31 (the period over which ozone concentrations are the most likely to be elevated) for the years 2018 to 2020. In addition, EPA ran each trajectory for only 24 hours. While the horizontal spatial resolution of the HYSPLIT model is based on 12-km meteorology (in some respects limiting our ability to resolve spatial differences less than 12 kilometers), we ran model simulations over 1,100 times for each facility (4 runs a day across 92 ozone season days for 3 years). These trajectories reflect a modeled air parcel's coordinates and elevation at every hour downwind of each EGU stack.[54] For simplicity in this initial screen, we limit our evaluation to coordinates of those trajectories that are within the contiguous United States. While the 24-hour transport time used in this screening analysis identifies many of the near-source areas that are most frequently impacted, emissions can travel over larger distances and longer times and have substantive air quality impacts downwind, particularly when contributions from individual sources from geographically distinct areas (each of which could be relatively small) are aggregated to have a larger collective impact. Those collective air quality impacts are analyzed using photochemical air quality modeling in this final rule's RIA.[55]

It is important to note that unlike the other models used to quantify downwind ozone concentrations related to this rule, the HYSPLIT model is not a photochemical model – the model does not include chemical transformation and does not provide estimates of downwind pollutant concentrations.[56] We are using HYSPLIT trajectories in a qualitative way to examine

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[52] The Peer Review Summary Report and EPA's Response will be available on EPA's website.

[53] The HYSPLIT model determines the pathway of a modeled parcel of air using the NOAA's National Center for Environmental Information North American Mesoscale Forecast System 12 kilometer forecast gridded meteorology dataset (NAM-12) (https://www.ncei.noaa.gov/access/metadata/landing-page/bin/iso?id=gov.noaa.ncdc:C00630). The horizontal resolution of the NAM-12 dataset is 12.191 kilometers, the vertical resolution is 26-layers from 1000 to 50 hecto Pascals, and the temporal resolution is 3-hours. (Stein et al., 2015, Draxler and Hess, 1998).

[54] The EPA uploaded into an Oracle database the HYSPLIT model output results for each forward trajectory, including the originating EGU, the coordinates and elevation above ground for each hour of the trajectory, and the trajectory elapsed time since release from the EGU. Within the Oracle database, the trajectory coordinates are used to construct line segments that can be displayed within a geographic information system (GIS) software package to overlay each modeled forward trajectory. The use of GIS allows a user to overlay HYSPLIT trajectories over census blocks of interest display the likely path that EGU emissions may travel in the absence of atmospheric residence time, chemical dispersion, or atmospheric deposition.

[55] For example, in 2016, the EPA used HYSPLIT to examine 96-hour trajectories and altitudes up to 1,500 meters in a corollary analysis to the source apportionment air quality modeling to corroborate upwind state-to-downwind linkages. Details of this analysis can be found in Appendix E ("Back Trajectory Analysis of Transport Patterns") of the Air Quality Modeling Technical Support Document for the Final Cross State Air Pollution Rule Update, which is available at: https://www.epa.gov/sites/default/files/2017-05/documents/aq_modeling_tsd_final_csapr_update.pdf

[56] The HYSPLIT model is run assuming the air parcel is neutrally buoyant and inert (i.e., without any dispersion, deposition velocity, or atmospheric residence time constraints).

the spatial patterns of pollutant transport from EGUs.[57] The model results simply simulate the path that the wind would carry a modeled parcel of air from the stack(s) of each EGU.[58]

Next, EPA screened each of the downwind areas that intersected with a HYSPLIT trajectory to identify census block groups with potential environmental justice concerns. The intent of this screen in this application is to generally identify areas of potentially higher susceptibility to environmental factors such as air pollution. The screen was performed using data from EPA's EJScreen, an environmental justice mapping and screening tool that includes 11 different environmental indicators and 6 different demographic indicators.[59] For this analysis, EPA evaluated the available information at the census block group level and calculated the average of the following four socioeconomic indicators found in EJScreen: low-income, unemployment rate, limited English speaking, and less than high school education. This average, converted to a percentile, is similar to the supplemental demographic index in EJScreen. However, unlike the supplemental demographic index, the index used in this screen does not include low-life expectancy, which was not available at the time the assessment was conducted. Note that the index used in this screen does not consider the exposure and vulnerability of communities to multiple environmental burdens and their cumulative impacts, nor does it quantify ozone-specific health risks. Rather, this aggregate indicator offers a general look at the relative potential susceptibility of each block group to environmental exposure. For further discussion of these indicators and the other indicators currently available in the EJScreen tool, see the EJScreen Technical Documentation available at https://www.epa.gov/ejscreen.

In the final step of the screening analysis, EPA combined the results of the previous two steps by layering the modeled HYSPLIT trajectories over census block groups and associated combined socioeconomic values to produce a relative score for each EGU that considers the population-weighted average combined socioeconomic value of the population that is potentially affected by that EGU. This score is calculated for each EGU by identifying each block that intersects with each trajectory originating from that EGU, summing the product of each block group's combined socioeconomic value and its population, and then dividing that aggregated total by the total population of all those intersected block groups. The resulting value is converted to a percentile relative to the scores generated for the entire coal steam fleet. Higher scores are assigned to EGUs with trajectories that intersect areas with higher population weighted average combined socioeconomic values. The intent of this approach is to highlight EGUs with the potential to affect areas where people who might be more vulnerable on average might live. While these values are useful in a screening context to identify relative differences across the EGU fleet, they do not provide any absolute or relative measure of exposure or risk.

EPA compared the relative scores across each group of EGUs to the fleet to determine whether the groups exhibit a higher potential to expose areas of EJ concern than the fleet on average. The scores for the fleet are distributed such that half of the EGUs score above the 50th percentile, and half score below the 50th percentile. For each of the two groups of EGUs screened in this analysis, more than half score higher than the 50th percentile. This distribution suggests that each of these two groups demonstrates a higher relative potential to expose people who

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[57] In general, pollutant concentrations are the result of transport, dispersion, and transformation. As noted, this analysis does not consider photochemical transformations.

[58] Consistent with the intent of this screening analysis, this model provides information about where non-reactive pollutants might initially travel from each EGU over a limited 24-hour period but does not quantify the magnitude of impact at any given location.

[59] U.S. Environmental Protection Agency (EPA), 2022. EJSCREEN Technical Documentation and EJScreen Technical Document Appendix.

might be more susceptible to air pollution, on average, compared with the EGU fleet assessed across the entire contiguous United States.

Furthermore, EPA found that each group contained many individual EGUs with scores above the 80th percentile (46 EGUs with existing SCRs and 11 EGUs lacking SCRs). This means that these EGUs rank among the top 20% of EGUs in the country based on the scoring approach described above. The 80th percentile threshold has been identified by the Agency in early applications of EJScreen as an initial screening filter and has been used in past screening experience to identify areas that may warrant further review, analysis, or outreach.[60]

The findings of this screening analysis suggest that this rule's imposition of a backstop emissions rate on the EGUs included in these two groups may benefit areas of potential environmental justice concern.

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[60] U.S. Environmental Protection Agency (EPA), 2022. EJSCREEN Technical Documentation.

F. Assessment of the Effects of Ozone on Forest Health

The ecological and environmental analysis in the Federal Good Neighbor Plan was done for the entire country and was based on historical monitored data. Consequently, impacts from all units within the 5 supplemental states were included in the Federal Good Neighbor Plan assessment (see the OTPA Final Rule TSD for details).

Appendix A: State Emission Budget Calculations and Engineering Analytics

See Excel workbook titled “Proposed Supplemental Rule State Emission Budget Calculations and Engineering Analytics” on EPA’s website and in the docket for this rulemaking

Appendix B: Description of Excel Spreadsheet Data Files Used in the AQAT

EPA placed the Ozone_AQAT_proposal_supplemental.xlsx Excel workbook file in the docket that contains all the emission and CAMx air quality modeling inputs and resulting air quality estimates from the AQAT. The AQAT is the same as that from the final Federal Good Neighbor Plan, with the exception of the addition of the non-EGU emissions reductions in Arizona (which were added to the "non-EGU emiss" worksheet which then carry through the tool) and for the 2023 and 2026 "full geography" simulations where the appropriate Supplemental states were added as being "linked." Consistent with minimizing the changes between the AQAT from the final Federal Good Neighbor Plan and the AQAT used here, on the "Summary_DV" pages, the lists of receptors are those from the final Federal Good Neighbor Plan (and therefore do not automatically pull out and display the data for the violating-monitor receptors). The values for all receptors are calculated and displayed on the worksheets within the AQAT. The full suite of results were taken from the AQAT and aggregated in the "Ozone_AQAT_proposal_results_supplemental.xlsx" workbook. The following bullets describe the contents of various worksheets within the AQAT workbook:

State-level emissions

- "2026_EA" and "2023_EA" contain EGU emissions measurements and estimates for each state. Various columns contain the 2021 OS measured emissions, and then emissions for the engineering base along with each of the cost thresholds.
- "NO_X_non-CEM" has a breakdown of the point EGU non-CEM emission inventory component used in the air quality modeling.
- "non-EGU emiss" has the total anthropogenic emission reductions from non-EGUs by state and has been updated to include reductions from Arizona.
- "2026_OS NO_X" and "2023_OS NO_X" each of these worksheets reconstructs total anthropogenic emissions for the year, with various EGU emission inventories for different cost threshold (including the engineering base case). The total anthropogenic emissions can be found for each state in columns AG through AL. These totals are then compared to the 2026gf emission level (column Y on the "2026_OS NOx" worksheet) to make a fractional change in emissions in columns AV through BA. For 2026, Non-EGU emissions change and fractional change) are found in columns BC through BF.

Air quality modeling design values and contributions from CAMx

- "2023gf_All" contains average and maximum design values as well as state by state contributions for the 2023gf base case from the Federal Good Neighbor Plan modeled in CAMx.
- "2026gf_All" contains average and maximum design values as well as state by state contributions for the 2026gf base case from the Federal Good Neighbor Plan modeled in CAMx.
- "23gf_days.2026gf_cntl" contains average and maximum design values as well as state by state contributions for the 2026gf final policy control case from the Federal Good Neighbor Plan modeled in CAMx.

- “2026fj_All_proposal_calib” contains average and maximum design values as well as state by state contributions for the 2026fj base case modeled in CAMx from proposal of the Federal Good Neighbor Plan.
- “2026fj_30NOx_proposal_calib” contains average and maximum design values as well as state by state contributions for the case modeled in CAMx where EGU and non-EGU emissions were reduced by 30% from proposal of the Federal Good Neighbor Plan.
- ”receptor_list” contains a list of the receptors whose average and/or maximum design values are greater than or equal to 71 ppb in 2023 and 2026 in the final federal Good Neighbor Plan base case air quality modeling. This list is incomplete as it does not include the “violating-monitor receptors. It is retained in the interest of minimizing the changes between the AQAT used for the final Federal Good Neighbor Plan and this rule.

Calibration factor creation and assessment

- “primary_calibration” includes the state-by-state and receptor-by-receptor calculation of the calibration factors based on the 2026 base and 2026 air quality modeling where EGU and non-EGU NO_X emissions were reduced by 30% from proposed Federal Good Neighbor Plan. The calibration factors can be found in columns I through BF.

- “alternative_calibration” includes the state-by-state and receptor-by-receptor calculation of the calibration factors based on the 2026 base and 2023 base contributions and emissions using the air quality modeling from the final Federal Good Neighbor Plan. The calibration factors can be found in columns I through BF.
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Air quality estimates

- ”summary_DVs_2026” contains the average and maximum design value estimates (rounded to two decimal places) for receptors that were nonattainment or maintenance in the 2026 air quality modeling base case. Currently, violating-monitor receptors are not shown in these tables. Values using the Step 3 configuration and primary calibration factor for each cost threshold level are shown starting in column L. Under this approach, the maximum contribution to remaining receptors is shown in columns AG through AR. Furthermore, a set of design value estimates are shown (columns AT through BG) for the full geography configuration scenarios, where all states that are originally linked in the base make adjustments to different cost levels. Adjustment to cells I1 and I2 will result in interactive adjustment for the other worksheets and will adjust the design values in columns I (the Step 3 configuration) and J (a “full geography” configuration where the geography remains fixed) and the maximum contributions to remaining linkages in column AE. The alternative calibration factor simulation results are shown in columns BJ through CC. See the “2026_DV_summary_sup” worksheet in the “Ozone_AQAT_proposal_results_supplemental.xlsx” workbook for the results for the proposed supplemental rule.
- ”summary_DVs_2023” contains the average and maximum design value estimates (rounded to two decimal places) for receptors that were nonattainment or maintenance in the 2023 air quality modeling base case. Currently violating-monitor receptors are not shown in these tables. Values using the Step 3 configuration and primary calibration factor for each cost threshold level are shown starting in column L. Under this approach, the maximum contribution to remaining receptors is shown in columns AF through AM.

Furthermore, a set of design value estimates are shown (columns AO through BE) for the full geography configuration scenarios, where all states that are originally linked in the base make adjustments to different cost levels. Adjustment to cells I1 and I2 will result in interactive adjustment for the other worksheets and will adjust the design values in columns I (the Step 3 configuration) and J (a "full geography" configuration where the geography remains fixed) and the maximum contributions to remaining linkages in column AD. See the "2023_DV_summary_sup" worksheet in the "Ozone_AQAT_proposal_results_supplemental.xlsx" workbook for the results for the proposed Supplemental rule for all receptors (including the violating-monitor receptors).

- "2023_scenario_primary"and "2026_scenario_primary" contains the average and maximum design value estimates (as well as the individual state's air quality contributions) for a particular scenario identified in cells H2 and H3 using the primary AQAT calibration factor. These worksheets contain results for all monitors, including those that are currently violating-monitor receptors. The fractional emission changes for each of the linked and unlinked states are shown in rows 2 and 3.
- "2023_scenario_primary_links" and "2026_scenario_primary_links" contains the individual state's air quality contributions for a particular receptors that remain at or above 71 ppb for the scenario identified in cells I1 and I2. These worksheets are from the final Federal Good Neighbor Plan and do not represent the full suite of monitors and linkages. See the comparable worksheets in the "Ozone_AQAT_proposal_results_supplemental.xlsx" workbook for all receptors (including the violating-monitor receptors).
- "2026_full_geo_primary" and "2023_full_geo_primary" contains the average and maximum design value estimates (as well as the individual state's air quality contributions) for a particular scenario identified in cells H2 and H3. States that are "linked" to any receptor in the geography are assigned the values in row 2 while nonlinked states are assigned the values in row 3. Note that, only the "home" states, that are linked to receptors in other states are assigned the "linked" state values in row 2. These simulations include states from the Supplemental rule as well as the final Federal Good Neighbor Plan.
- "2026_scenario_alt" contains the average and maximum design value estimates (as well as the individual state's air quality contributions) for a particular scenario identified in cells H2 and H3. The fractional emission changes for each of the linked and unlinked states are shown in rows 2 and 3. This uses the "alternative" calibration factor based on the 2023 air quality modeling, rather than the "primary" calibration factor based on the proposal 2026 air quality modeling with the 30% reduction from EGUs and non-EGUs.
- Within the "Ozone_AQAT_proposal_results_supplemental.xlsx" workbook, where the results from the Ozone AQAT for the Supplemental rule are compiled, there are a suite of worksheets. Results created during the original Federal Good Neighbor Plan are labeled with a suffix of "_gnp", while results created for this proposed supplemental rule are labeled "_sup." The individual scenario worksheets are labeled and, generally, contain static air quality contributions and design value estimates for all monitors for the particular year and scenario. A few of the worksheets contain emissions values (e.g., "2026_EA_gnp") or contain summaries of design values or contributions from various scenarios (e.g., "2026_DV_summary_sup" or "2026_linkages_sup")
    - "Index"

- “2023gf_All_gnp”
- “2026gf_All_gnp”
- “2023_DV_summary_sup”
- “2026_DV_summary_sup”
- “2023_gf_links_sup”
- “2023_ step3_base_gnp”,
- “2023_ step3_SCRopt_gnp”,
- “2023_ step3_SCRoptwCC_gnp”,
- “2023_ step3_SNCRopt_gnp”,
- “2023_ step3_SNCRoptwCC_gnp”,
- “2023_ step3_newSCR_gnp”,
- “2026_ step3_eng_base gnp”,
- “2026_ step3_SCRopt”_gnp,
- “2026_ step3_SCRoptwCC_gnp”,
- “2026_ step3_SNCRopt_gnp”,
- “2026_ step3_SNCRoptwCC_gnp”,
- “2026_ step3_newSCR_gnp”,
- “2026_ step3_nonEGU_gnp” (note that this does not include non-EGU reductions from Arizona,
- “2023_step3_base_link_sup”
- “2023_step3_SCRopt_link_sup”
- “2023_step3_SCRoptwCC_link_sup”
- “2023_step3_SNCRopt_link_sup”
- “2023_step3_SNCRoptwCC_link_sup”
- “2023_step3_newSCR_link_sup”
- “2023_step3_base_wIRA_link_sup”
- “2023_step3_newSCR_wIRA_link_sup”
- “2023_linkages_sup”
- “2026_linkages_sup”
- “2026_step3_newSCRwnon_sup”
- “2026_step3_nonegu1st_sup”
- “2026_step3_SCRnon_IRA_sup”
- “2023_full_geo_base_sup”,
- “2023_full_geo_SCRopt_sup”,
- “2023_full_geo_SCRoptCC_sup”,
- “2023_full_geo_SNCRopt_sup”,
- “2023_full_geo_SNCRoptCC_sup”,
- “2023_full_geo_newSCR_sup”,
- “2023_full_geo_IRA_base_sup”
- “2023_full_geo_IRA_SCR_sup”
- “2026_full_geo_base_sup”,
- “2026_full_geo_SCRopt_sup”,
- “2026_full_geo_SCRoptCC_sup”,
- “2026_full_geo_SNCRopt_sup”,
- “2026_full_geo_SNCRoptCC_sup”,
- “2026_full_geo_newSCR_sup”,

- “2026_full_geo_newSCRnon_sup”,
- “2026_full_geo_nonEGU_1st_sup”,
- “2026_full_geo_IRA_base_sup”
- “2026_full_geo_IRA_SCR_sup”
- “2026_full_geo_IRA_SCRnon_sup”
- “2023_ step3_base_wIRA_gnp”,
- “2023_ step3_newSCR_wIRA_gnp”,
- “2026_ step3_base_wIRA_gnp”,
- “2026_ step3_newSCR_wIRA_gnp”,
- “2026_ step3_nonEGU_wIRA_gnp” (note that this does not include non-EGU reductions from Arizona,
- “2026_ step3_nonEGU_1st_gnp” (note that this does not include non-EGU reductions from Arizona,
- “2026_gf_links_sup”
- “2026_step3_base_links_sup”
- “2026_step3_SCR_links_sup”
- “2026_step3_SCRoptwCC_links_sup”
- “2026_step3_SNCRopt_links_sup”
- “2026_step3_SNCRopwCC_links_sup”
- “2026_step3_newSCR_links_sup”
- “2026_step3_SCRnonEGU_links_sup”
- “2026_step3_nonEGU1st_links_sup”
- “2026_step3_IRA_base_links_sup”
- “2026_step3_SCRnon_IRA_links_sup”
- “2023_gf_links_wflag_sup”
- “2026_DV_summary_shortlist_sup”
- “2023_full_geo_SNCRCC_links_sup”
- “2023_linkages_linked_states_sup”
- “2026_linkages_linked_states_sup”
- “2023_EA_gnp”
- “2026_EA_gnp”

Appendix C: IPM Runs Used in Transport Rule Significant Contribution Analysis

Table Appendix C-1 lists IPM runs used in analysis for this proposed rule. The first four IPM runs can be found in the docket for the Federal Good Neighbor Rule (EPA-HQ-OAR-2021-0668) under the IPM file name listed in square brackets in Table Appendix C-1. The last run appears in the docket for this rulemaking (EPA-HQ-OAR-2023-0402).

Table Appendix C-1. IPM Runs Used in Transport Rule Significant Contribution Analysis

Run Name **[IPM File Name]**	**Description**
Air Quality Modeling Base Case [EPA620_TR_14c]	Model run used for the air quality modeling base case at steps 1 and 2, which includes the national Title IV SO2 cap-and-trade program; NO_X SIP Call; the Cross-State Air Pollution trading programs, and settlements and state rules. It also includes key fleet updates regarding new units, retired units, and control retrofits that were known by Summer of 2022.
Illustrative Final Rule [EPA620_TR_21]	Model run used for 2026 air quality analysis of the final Federal Good Neighbor Plan (GNP). Includes the national Title IV SO2 cap-and-trade program; NO_X SIP Call; the Cross-State Air Pollution trading programs, and settlements and state rules. It also includes key fleet updates regarding new units, retired units, and control retrofits that were known by Summer of 2022. Includes the illustrative final rule. For details, please see Chapter 4 of the RIA for the GNP.
Sensitivity Air Quality Modeling Base Case with IRA [EPA620_TR_19]	Model run used for the air quality modeling base case sensitivity analysis in the presence of the IRA at steps 1 and 2, which includes all information from the Air Quality Modeling Base Case [EPA620_TR_14c] as well as parameters reflecting the key provisions of the Inflation Reduction Act of 2022. For details please see Appendix 4A of the RIA for the GNP.
Sensitivity Final Rule with IRA [EPA620_TR_20]	Model run used for 2026 air quality sensitivity analysis of the GNP. Includes the national Title IV SO2 cap-and-trade program; NO_X SIP Call; the Cross-State Air Pollution trading programs, and settlements and state rules. It also includes key fleet updates regarding new units, retired units, and control retrofits that were known by Summer of 2022. Includes the illustrative final rule. For details please see Appendix 4A of the RIA for the GNP. This is the baseline used in the EIA for the evaluation of this proposed rule.
Sensitivity Final Rule with IRA and Proposed Rule [EPA620_TR_25b]	Model run used for 2026 air quality sensitivity analysis of the proposed rule. Includes the national Title IV SO2 cap-and-trade program; NO_X SIP Call; the Cross-State Air Pollution trading programs, and settlements and state rules. It also includes key fleet updates regarding new units, retired units, and control retrofits that were known by Summer of 2022. Includes the illustrative final rule. For details, please see Sections 3 and 4 of the EIA for this rulemaking.

Appendix D: Description of the Analytic Results using the Primary Approach for the "Full Geography" AQAT Configuration

As an alternative assessment, it was possible to estimate air quality concentrations in what we call a "full geography" configuration at each downwind receptor using the ozone AQAT. Here, we apply an approach where all states covered by the final GNP and Supplemental rules (regardless of whether they are linked to a particular receptor or to a different receptor in the geography) have the same cost threshold scenario "full geography" estimates.[61] We also kept the states containing the receptor (such as Colorado and Connecticut) that are not linked to receptors in other states at the base case emission levels (rather than modulate them up to the same cost threshold level as the linked upwind states). This allows us to assess the effects of the rule as a whole, and only the rule, in that year on the receptors. In this assessment, we used the primary calibration factor for all scenarios. In practice, in addition to modulating all the final GNP states, this means for the 2023 estimates that all five Supplemental states are also modulated, while for the 2026 estimates, only Arizona is modulated along with the final GNP states that are also linked in 2026.

In general, assessed across the scenarios, the receptor differences between the Step 3 configuration and the "full geography" configuration are relatively small. The average and maximum design values for 2023 are shown in Tables Appendix D-1 and Appendix D-2. As explained in Section C of this document, representative 2023 design values for violating-monitor receptors are obtained using 2022 certified design values as a proxy. These are adjusted in a relative way using the change in air quality from the engineering base case relative to the engineering base case are shown in Table Appendix D-3. In other words, using AQAT, the air quality change from the engineering analysis base to one of the other scenarios is divided by the engineering analysis base resulting in a fractional change. This fractional change is multiplied by the 2022 design value to get a change in air quality that is subtracted from the 2022 design value, allowing for a reasonable approximation of the effects of the assessed scenarios in 2023. The average and maximum design values for 2026 are shown in Tables Appendix D-4 and Appendix D-5. Appendix D of the OTPA Final Rule TSD discusses some differences that were seen between the Step 3 and "full geography" configuration. In this Supplemental rule, we looked at the air quality contributions for the five Supplemental states. We observe that contributions did not drop below the 1% threshold to all of the receptors to which those states are linked above the contribution threshold. See sheet "2023_full_geo_SNCRCC_links" in the Ozone_AQAT_proposal_results_supplemental.xlsx Excel workbook. Consequently, we conclude that there is no evidence in the "full geography" scenario at the full level of control in Step 3 that these emissions reductions would result in overcontrol. Similarly, in 2026, we observe that Arizona's air quality contributions also did not drop below the 1% threshold at the full level of control (see, for example, several New Mexico receptors on sheet "2026_full_geo_newSCRnon_supp" in the Ozone_AQAT_proposal_results_supplemental.xlsx Excel workbook).

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[61] For the purposes of the AQAT "Full Geography" estimates, we included California as being included in the rule and making any available reductions. See the preamble section I of the final GNP rule for how that state was treated in that rule.

Table Appendix D-1. 2023 Average Ozone DVs (ppb) for NO_X Emissions Cost Threshold Levels ($/ton) Assessed Using the Ozone AQAT for Modeled Receptors using the "Full Geography" AQAT Configuration.

Site	state	county	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize
40278011	Arizona	Yuma	70.36	70.35	70.34	70.34	70.34
80350004	Colorado	Douglas	71.12	71.11	71.11	71.11	71.11
80590006	Colorado	Jefferson	72.63	72.62	72.62	72.62	72.62
80590011	Colorado	Jefferson	73.29	73.28	73.28	73.28	73.28
80690011	Colorado	Larimer	70.79	70.79	70.79	70.79	70.79
90010017	Connecticut	Fairfield	71.62	71.55	71.54	71.54	71.52
90013007	Connecticut	Fairfield	72.99	72.90	72.88	72.89	72.87
90019003	Connecticut	Fairfield	73.32	73.25	73.23	73.24	73.22
90099002	Connecticut	New Haven	70.61	70.52	70.50	70.51	70.48
170310001	Illinois	Cook	68.13	68.07	68.07	68.07	68.07
170314201	Illinois	Cook	67.92	67.85	67.84	67.85	67.84
170317002	Illinois	Cook	68.47	68.37	68.36	68.37	68.36
350130021	New Mexico	Dona Ana	70.83	70.82	70.82	70.82	70.82
350130022	New Mexico	Dona Ana	69.73	69.72	69.72	69.72	69.71
350151005	New Mexico	Eddy					
350250008	New Mexico	Lea					
480391004	Texas	Brazoria	70.59	70.50	70.49	70.49	70.48
481210034	Texas	Denton	69.93	69.87	69.84	69.86	69.84
481410037	Texas	El Paso	69.82	69.81	69.81	69.81	69.81
481671034	Texas	Galveston	71.82	71.72	71.69	71.70	71.67
482010024	Texas	Harris	75.33	75.25	75.24	75.24	75.23
482010055	Texas	Harris	71.19	71.11	71.09	71.09	71.07
482011034	Texas	Harris	70.32	70.24	70.22	70.22	70.21
482011035	Texas	Harris	68.01	67.93	67.91	67.91	67.90
490110004	Utah	Davis	71.88	71.87	71.87	71.87	71.87
490353006	Utah	Salt Lake	72.48	72.47	72.47	72.46	72.46
490353013	Utah	Salt Lake	73.21	73.20	73.20	73.20	73.20
550590019	Wisconsin	Kenosha	70.75	70.64	70.64	70.64	70.63
551010020	Wisconsin	Racine	69.59	69.45	69.44	69.45	69.44
551170006	Wisconsin	Sheboygan	72.64	72.45	72.44	72.45	72.44

Table Appendix D-2. 2023 Maximum Ozone DVs (ppb) for NOX Emissions Cost Threshold Levels ($/ton) Assessed Using the Ozone AQAT for Modeled Receptors using the "Full Geography" AQAT Configuration.

Site	state	county	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize
40278011	Arizona	Yuma	72.05	72.04	72.04	72.04	72.04
80350004	Colorado	Douglas	71.71	71.71	71.71	71.71	71.70
80590006	Colorado	Jefferson	73.32	73.32	73.32	73.32	73.32
80590011	Colorado	Jefferson	73.89	73.88	73.88	73.88	73.88
80690011	Colorado	Larimer	71.99	71.99	71.98	71.98	71.98
90010017	Connecticut	Fairfield	72.22	72.15	72.13	72.14	72.12
90013007	Connecticut	Fairfield	73.89	73.80	73.78	73.79	73.76
90019003	Connecticut	Fairfield	73.62	73.55	73.53	73.54	73.52
90099002	Connecticut	New Haven	72.71	72.62	72.60	72.61	72.58
170310001	Illinois	Cook	71.82	71.76	71.76	71.76	71.76
170314201	Illinois	Cook	71.41	71.34	71.33	71.34	71.33
170317002	Illinois	Cook	71.27	71.16	71.16	71.16	71.16
350130021	New Mexico	Dona Ana	72.13	72.12	72.12	72.12	72.12
350130022	New Mexico	Dona Ana	72.43	72.42	72.42	72.42	72.41
350151005	New Mexico	Eddy					
350250008	New Mexico	Lea					
480391004	Texas	Brazoria	72.69	72.61	72.59	72.59	72.58
481210034	Texas	Denton	71.73	71.67	71.65	71.66	71.64
481410037	Texas	El Paso	71.43	71.41	71.41	71.41	71.41
481671034	Texas	Galveston	73.13	73.02	72.99	73.01	72.97
482010024	Texas	Harris	76.93	76.86	76.85	76.84	76.83
482010055	Texas	Harris	72.20	72.11	72.09	72.10	72.07
482011034	Texas	Harris	71.52	71.44	71.42	71.42	71.41
482011035	Texas	Harris	71.52	71.43	71.42	71.42	71.41
490110004	Utah	Davis	74.08	74.07	74.07	74.07	74.07
490353006	Utah	Salt Lake	74.07	74.06	74.06	74.06	74.06
490353013	Utah	Salt Lake	73.71	73.70	73.70	73.70	73.70
550590019	Wisconsin	Kenosha	71.65	71.54	71.53	71.54	71.53
551010020	Wisconsin	Racine	71.39	71.24	71.24	71.24	71.23
551170006	Wisconsin	Sheboygan	73.54	73.35	73.34	73.34	73.33

Table Appendix D-3. Representative 2023 Ozone DVs (ppb) for NOX Emissions Cost Threshold Levels ($/ton) Assessed Using the Relative Percent Change from the Engineering Analysis Base using AQAT for Violating-Monitor Receptors using the “Full Geography” Configuration.

Site	state	county	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize
40070010	Arizona	Gila	76.00	75.99	75.98	75.98	75.97
40130019	Arizona	Maricopa	77.00	76.99	76.98	76.97	76.96
40131003	Arizona	Maricopa	80.00	79.98	79.97	79.96	79.95
40131004	Arizona	Maricopa	81.00	80.98	80.97	80.97	80.96
40131010	Arizona	Maricopa	80.00	79.97	79.96	79.95	79.93
40132001	Arizona	Maricopa	78.00	77.98	77.98	77.97	77.96
40132005	Arizona	Maricopa	79.00	78.98	78.97	78.97	78.96
40133002	Arizona	Maricopa	75.00	74.99	74.98	74.97	74.97
40134004	Arizona	Maricopa	73.00	72.99	72.99	72.99	72.99
40134005	Arizona	Maricopa	75.00	74.98	74.97	74.97	74.96
40134008	Arizona	Maricopa	74.00	73.98	73.98	73.97	73.96
40134010	Arizona	Maricopa	76.00	75.98	75.97	75.96	75.95
40137020	Arizona	Maricopa	77.00	76.98	76.97	76.96	76.95
40137021	Arizona	Maricopa	77.00	76.98	76.97	76.96	76.95
40137022	Arizona	Maricopa	78.00	77.98	77.97	77.96	77.95
40137024	Arizona	Maricopa	76.00	75.98	75.97	75.96	75.95
40139702	Arizona	Maricopa	77.00	76.98	76.97	76.97	76.96
40139704	Arizona	Maricopa	77.00	76.98	76.98	76.97	76.96
40139997	Arizona	Maricopa	79.00	78.99	78.98	78.97	78.97
40213001	Arizona	Pinal	74.00	73.98	73.98	73.97	73.96
40218001	Arizona	Pinal	76.00	75.98	75.97	75.96	75.95
80013001	Colorado	Adams	77.00	76.99	76.99	76.99	76.99
80050002	Colorado	Arapahoe	80.00	79.99	79.99	79.99	79.99
80310002	Colorado	Denver	74.00	73.99	73.99	73.99	73.99
80310026	Colorado	Denver	77.00	76.99	76.99	76.99	76.99
90079007	Connecticut	Middlesex	73.00	72.90	72.87	72.88	72.85
90110124	Connecticut	New London	72.00	71.91	71.89	71.90	71.88
170310032	Illinois	Cook	75.00	74.92	74.91	74.92	74.92
170311601	Illinois	Cook	73.00	72.92	72.91	72.91	72.90
181270024	Indiana	Porter	73.00	72.93	72.93	72.93	72.92
260050003	Michigan	Allegan	75.00	74.79	74.77	74.78	74.76
261210039	Michigan	Muskegon	79.00	78.87	78.84	78.86	78.83
320030043	Nevada	Clark	75.00	74.97	74.97	74.97	74.97
350011012	New Mexico	Bernalillo	73.00	72.99	73.00	73.00	73.00
350130008	New Mexico	Dona Ana	76.00	75.99	75.99	75.98	75.98
361030002	New York	Suffolk	74.00	73.91	73.89	73.90	73.88
390850003	Ohio	Lake	74.00	73.84	73.80	73.82	73.79
480290052	Texas	Bexar	75.00	74.94	74.93	74.93	74.92
480850005	Texas	Collin	74.00	73.93	73.91	73.92	73.90
481130075	Texas	Dallas	71.00	70.92	70.89	70.91	70.88
481211032	Texas	Denton	77.00	76.93	76.90	76.92	76.89
482010051	Texas	Harris	73.00	72.92	72.89	72.90	72.88
482010416	Texas	Harris	73.00	72.91	72.89	72.90	72.88
484390075	Texas	Tarrant	76.00	75.93	75.91	75.93	75.90
484391002	Texas	Tarrant	77.00	76.93	76.90	76.92	76.89
484392003	Texas	Tarrant	72.00	71.93	71.91	71.92	71.90
484393009	Texas	Tarrant	76.00	75.93	75.90	75.92	75.89
490571003	Utah	Weber	74.00	73.99	73.99	73.99	73.99
550590025	Wisconsin	Kenosha	73.00	72.89	72.88	72.88	72.88
550890008	Wisconsin	Ozaukee	72.00	71.86	71.85	71.85	71.84

Table Appendix D-4. 2026 Average Ozone DVs (ppb) for Each Scenario Assessed using the “Full Geography” AQAT Configuration.

Site	**state**	**county**	**Engineering Analysis Base**	**SCR Optimize**	**SCR Optimize + SOA CC**	**SCR Optimize + SNCR Optimize**	**SCR Optimize + SOA CC + SNCR Optimize**	**SCR Optimize + SOA CC + SNCR Optimize + SCR/SNCR Retrofit (“Full Step 3 – EGU only”)**	**SCR Optimize + SOA CC + SNCR Optimize + SCR/SNCR Retrofit + non-EGU (“Full Step 3”)**
40278011	Arizona	Yuma	69.87	69.86	69.86	69.86	69.86	69.82	69.77
80590006	Colorado	Jefferson	71.70	71.70	71.70	71.70	71.69	71.52	71.50
80590011	Colorado	Jefferson	72.06	72.06	72.06	72.06	72.06	71.79	71.76
80690011	Colorado	Larimer	69.84	69.84	69.84	69.84	69.84	69.66	69.64
90013007	Connecticut	Fairfield	71.25	71.17	71.15	71.16	71.14	70.89	70.52
90019003	Connecticut	Fairfield	71.58	71.51	71.49	71.50	71.48	71.25	70.93
350130021	New Mexico	Dona Ana	70.06	70.05	70.05	70.05	70.05	69.88	69.83
350130022	New Mexico	Dona Ana	69.17	69.16	69.15	69.15	69.15	68.98	68.93
350151005	New Mexico	Eddy							
350250008	New Mexico	Lea							
480391004	Texas	Brazoria	69.89	69.81	69.80	69.80	69.79	68.85	68.32
481671034	Texas	Galveston	71.29	71.19	71.16	71.18	71.15	69.95	69.17
482010024	Texas	Harris	74.83	74.76	74.75	74.75	74.74	73.74	73.22
490110004	Utah	Davis	69.90	69.90	69.89	69.89	69.89	69.32	69.26
490353006	Utah	Salt Lake	70.50	70.49	70.49	70.49	70.49	69.94	69.89
490353013	Utah	Salt Lake	71.91	71.90	71.90	71.90	71.90	71.43	71.38
551170006	Wisconsin	Sheboygan	70.83	70.65	70.64	70.64	70.64	70.39	70.07

Table Appendix D-5. 2026 Maximum Ozone DVs (ppb) for Each Scenario Assessed using the "Full Geography" AQAT Configuration.

Site	state	county	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize + SCR/SNCR Retrofit ("Full Step 3 – EGU only")	SCR Optimize + SOA CC + SNCR Optimize + SCR/SNCR Retrofit + non-EGU ("Full Step 3")
40278011	Arizona	Yuma	71.47	71.46	71.46	71.46	71.46	71.41	71.37
80590006	Colorado	Jefferson	72.30	72.29	72.29	72.29	72.29	72.12	72.09
80590011	Colorado	Jefferson	72.66	72.66	72.66	72.65	72.65	72.38	72.35
80690011	Colorado	Larimer	71.04	71.04	71.03	71.03	71.03	70.86	70.84
90013007	Connecticut	Fairfield	72.06	71.97	71.95	71.96	71.94	71.69	71.31
90019003	Connecticut	Fairfield	71.78	71.71	71.69	71.70	71.68	71.45	71.13
350130021	New Mexico	Dona Ana	71.36	71.36	71.35	71.35	71.35	71.18	71.13
350130022	New Mexico	Dona Ana	71.77	71.76	71.76	71.76	71.76	71.58	71.53
350151005	New Mexico	Eddy							
350250008	New Mexico	Lea							
480391004	Texas	Brazoria	72.02	71.94	71.92	71.92	71.91	70.94	70.39
481671034	Texas	Galveston	72.51	72.41	72.38	72.39	72.36	71.15	70.35
482010024	Texas	Harris	76.45	76.38	76.37	76.36	76.35	75.33	74.80
490110004	Utah	Davis	72.10	72.10	72.09	72.09	72.09	71.50	71.44
490353006	Utah	Salt Lake	72.10	72.09	72.09	72.09	72.08	71.53	71.47
490353013	Utah	Salt Lake	72.31	72.30	72.30	72.30	72.30	71.83	71.78
551170006	Wisconsin	Sheboygan	71.73	71.55	71.54	71.54	71.53	71.29	70.96

Appendix E: Feasibility Assessment for Engineering Analytics Baseline

Similar to the Federal Good Neighbor Plan and the Revised CSAPR Update Final Rule, EPA analyzed and confirmed that the assumed power sector fleet operations in its baseline emissions and emission control stringency control levels as implemented through estimated budgets were compatible with future load requirements by verifying that new units in addition to the existing fleet would provide enough generation, assuming technology-specific capacity factors, to replace the retiring generation that is assumed to occur in years 2025 through 2029. EPA assessed generation adequacy specific to the five states covered under this proposed action—i.e., the five Supplemental states. EPA uses these observations to determine whether any assumed replacement generation from the existing fleet is necessary to offset the announced retirements and continue to satisfy electricity load. Additionally, EPA looked at whether the combination of new units (both fossil and non-fossil) provide sufficient new generation to replace retiring generation. In this case, EPA found that the new unit generation from fossil and renewable generation would exceed the generation from retiring units in all three scenarios examined, indicating that no further replacement generation from existing units is needed. Moreover, EPA found the change in generation from the covered fossil units to be within the observed historical trend.

- EPA first identified the collective Engineering Analytics baseline heat input and generation for 2025-2029 from the states covered in this action and compared it to historical trends between 2019-2022 for these same five states (Scenario 1). This illustrated that the assumed heat input and generation from fleet turnover reflected in the Engineering Analytics was well within with recent historical trends (see tables Appendix E-1, and Appendix E-2 below).
- EPA then compared the collective baseline heat input and generation from the states covered in this action to a scenario where fossil generation remains at 2022 levels instead of continuing to decline (Scenario 2).
- Finally, EPA identified the 2023 Energy Information Administration's Annual Energy Outlook (EIA AEO) annual growth projections from 2022 through 2029 total electricity demand levels (0.47%) from its reference case and estimated an upper bound future year scenario where covered fossil generation grew at levels matching this fleet-wide total growth rate (Scenario 3).[62]
- EPA's assessment illustrates the amount of generation in its Engineering Analytics baseline, factoring in retirements and new fossil units, is more than sufficient to accommodate all three scenarios.[63] For instance, generation from fossil sources in these states has dropped at an average rate of 2% per year between 2019 and 2022 (91 TWh to 86 TWh). However, EPA's assumed baseline generation from covered fossil sources for the states reflects a rate of decline of 2.7% per year between 2025 and 2029. See Table Appendix E-2.

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[62] Department of Energy, Annual Energy Outlook 2022. Available at https://www.eia.gov/outlooks/aeo/data/browser/#/?id=62-AEO2022&cases=ref2022&sourcekey=0

[63] Based on historical trends, modeling, and company statements, EPA expects levels similar to scenario 1 and scenario 2 to be most likely.

- EPA then identified new RE capacity under construction, testing, or in site prep by 2022. For years beyond 2022, EPA also identified new RE capacity that was planned but with regulatory approvals pending for years 2023 and beyond (as this capacity is unlikely to have yet started construction).[64]
- EPA calculated and added the RE generation values to the fossil baseline to estimate future year generation in the state (see Table Appendix E-2). EPA used a capacity factor of 42.7% for wind, 21.6% for solar.
- Using these technology-specific capacity factors based on past performance and IPM documentation, EPA anticipated 15 TWh from new non-fossil generation already under construction or being planned with regulatory approval received. This level of expected new generation combined with the baseline generation from existing units exceeds the expected load for the states under all three scenarios.[65]
- Not only is the future baseline generation level assumed in EPA's engineering analysis well within the recent historical fossil generation trend (See Table Appendix E-2) on its own (which illustrates no need for replacement generation), but when added to the amount of potential new generation from RE (15 TWh), exceeds the generation assuming no change (scenario 2) and the upper bound analysis for future covered fossil generation that assumes 0.47% growth from the existing fossil fleet (scenario 3). This indicates that available capacity and generation assumed would serve load requirements in this upper bound scenario.

Not included in the tables below nor in EPA's baseline, but listed in the latest EIA 860m is even more planned NGCC combined cycle for years 2023 and 2024 that is pending regulatory approval. Assuming some of this generation becomes available in the outer years, that constitutes additional generation that further exceeds EPA's upper bound generation levels below – further bolstering the observation that no replacement generation from existing units needs to be assumed to fill generation from retiring units.

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[64] Department of Energy, EIA Form 860, Generator Form 3-1. 2020. Available at https://www.eia.gov/electricity/data/eia860/

[65] While EPA notes the baseline generation exceeds the covered fossil load in all three scenarios in Table F-3, EPA anticipates scenarios 1 and 2 being more representative of likely covered fossil load based on historical trends, future modeling, and utility resource plans.

Table Appendix E-1: Heat Input (TBtu) Change Due to Fleet Turnover (Historical and Future). Values for 2019-2025 reflect reported data, while 2025-2029 reflects assumed heat input.

Region	2019	2020	2021	2022	2025	2026	2027	2028	2029
Arizona	297	267	266	242	266	253	253	250	250
Iowa	134	105	148	127	143	143	143	143	141
Kansas	108	111	116	137	105	105	105	105	105
New Mexico	124	119	108	109	82	79	79	79	79
Tennessee	190	165	180	181	152	152	115	100	77
Total	852	768	818	797	748	732	695	677	652

Table Appendix E-2: Assumed Baseline OS Generation and Expected New Build Generation from Covered Fossil Units (TWh)

	2025	**2026**	**2027**	**2028**	**2029**
Scenario 1 - Generation Levels (with continued pace of 3.4% decline)	80	79	77	75	74
Scenario 2 - Generation Levels (no change from 2022)	86	86	86	86	86
Scenario 3 - Generation Levels (0.47% growth from covered fossil)	87	87	88	88	88
Assumed Baseline Fossil Generation with Reported Fossil Retirement and Reported New Build	84	82	79	77	75
New Build (Non-Fossil)	14	15	15	15	15
Total Baseline Generation	**98**	**98**	**94**	**92**	**90**

Appendix F: Proposed Rule Preset State Emission Budgets

State	2025 Emission Budgets (tons)	2026 Preset Emission Budgets (tons)	2027 Preset Emission Budgets (tons)	2028 Preset Emission Budgets (tons)	2029 Preset Emission Budgets (tons)
Arizona	8,195	5,814	4,913	3,949	3,949
Iowa	9,752	9,713	9,713	9,713	9,077
Kansas	4,763	4,763	4,763	4,763	4,763
New Mexico	2,211	2,008	2,008	2,008	2,008
Tennessee	3,983	3,983	2,666	2,130	1,198

Appendix G: Figures Related to Preamble Section VI.D

As discussed in section VI.D of the preamble, the EPA further examined air quality metrics specific to the five states in this action. Specifically, it assessed the average air quality improvement as a function of stringency level across the geography of identified receptors. This builds on the analysis done in the final Federal Good Neighbor Plan, but expands it to look at different aggregations of receptors (particularly in 2023) to examine the incremental effect of including the five Supplemental states. Each value in Tables Appendix G-1 and G-2 show the average air quality improvement relative to the Engineering Analysis base for a particular group of receptors. The average air quality values were calculated by averaging the "average" design values from the AQAT Step 3 analyses for a group of receptors and then subtracting that value from the average calculated using the Engineering Base average design values for the same group of receptors (which for purposes of this proposed rule is inclusive of the ozone reductions achieved by the Federal Good Neighbor Plan). The averaging occurred over various groupings of receptors based on the various flags shown in Table C-1 (showing All Receptors (both violating-monitor receptors as well as modeled), violating-monitor receptors, all modeled receptors, as well as all receptors to which any supplemental state is linked).

Table Appendix G-1 for Supplemental Rule Preamble Section VI.D – Average Reductions in Downwind Ozone Concentration for Various Aggregations of Nonattainment and Maintenance Receptors for Each Cost Threshold Level Evaluated for 2023.

	Engineering Analysis Base	**SCR Optimize**	**SCR Optimize + SOA CC**	**SCR Optimize + SNCR Optimize**	**SCR Optimize + SOA CC + SNCR Optimize**
Receptors modeled to have AQ problems (Flag 2 in Table C-1)	0.00	0.05	0.05	0.05	0.06
All receptors, including violating-monitor receptors and modeled receptors (Flags 1 or 2 in Table C-1)	0.00	0.04	0.04	0.05	0.05
Receptors to which any Supplemental state is linked (Flag 4 in Table C-1)	0.00	0.04	0.04	0.04	0.04

Table Appendix G-2 for Supplemental Rule Preamble Section VI.D – Average Reductions in Downwind Ozone Concentration for Various Aggregations of Modeled Nonattainment and Maintenance Receptors for Each Cost Threshold Level Evaluated for 2026.

	Engineering Analysis Base	SCR Optimize	SCR Optimize + SOA CC	SCR Optimize + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize	SCR Optimize + SOA CC + SNCR Optimize + SCR/SNCR Retrofit ("Full Step 3 – EGU only")	SCR Optimize + SOA CC + SNCR Optimize + SCR/SNCR Retrofit + non-EGU ("Full Step 3")
Receptors modeled to have AQ problems	0.00	0.04	0.04	0.04	0.05	0.47	0.66

In the final Federal Good Neighbor Plan, the EPA created a number of graphical analyses examining the relationships between the cost threshold levels and the average air quality improvements and emissions reductions. The analyses from the final Federal Good Neighbor Plan are presented below. When we look at the information in Tables Appendix G-1 and G-2 and compare those air quality improvements and patterns to the data presented in the final Federal Good Neighbor Plan (the original figures from the final Federal Good Neighbor Plan from the OTPA Final Rule TSD Appendix I Figures 1, 2, and 3 are repropoduced below for convenience of the reader of this TSD), we find that they are consistent with and reinforce the conclusions regarding Step 3 stringency.

Figure 1 from Appendix I of the OTPA Final Rule TSD from the final Federal Good Neighbor Plan (Relevant to Preamble Section V.D.1 of that Rule – EGU Ozone Season NO_X Reduction Potential in 22 Linked States and Corresponding Total Reductions in Downwind Ozone Concentration at Nonattainment and Maintenance Receptors for Each Cost Threshold Level Evaluated (2023)

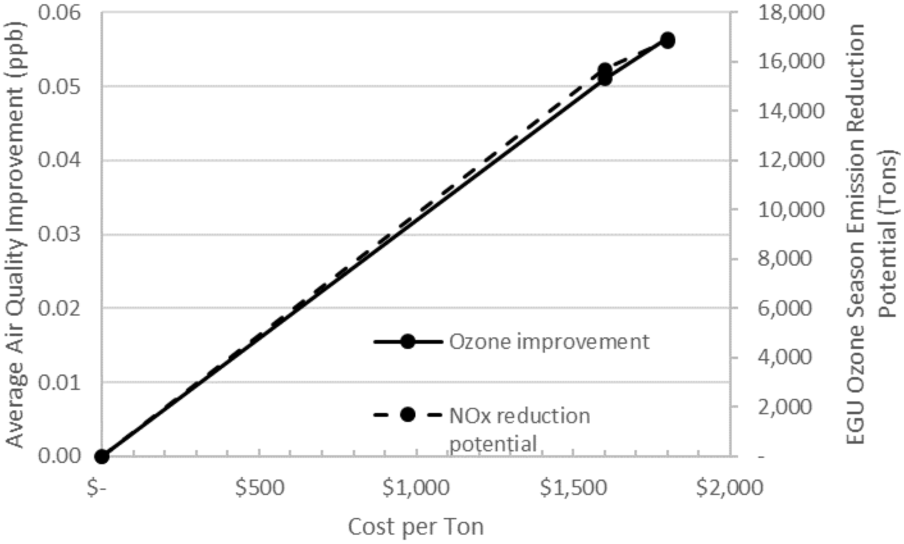


Figure 2 from Figure 2 of Appendix I of the OTPA Final Rule TSD from the final Federal Good Neighbor Plan (Relevant to Preamble Section V.D.1 of that Rule EGU Ozone Season NO_X Reduction Potential in 19 Linked States and Corresponding Total Reductions in Downwind Ozone Concentration at Nonattainment and Maintenance Receptors for Each Cost Threshold

Level Evaluated (2026)

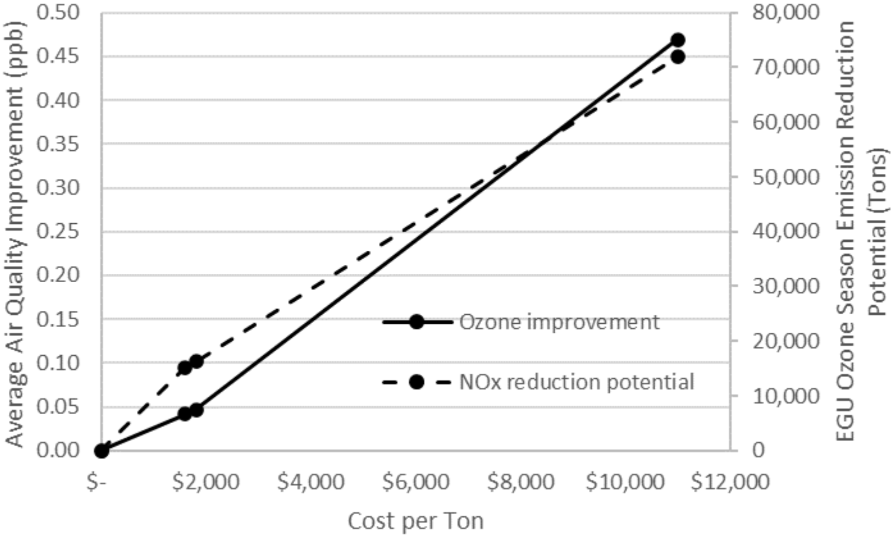
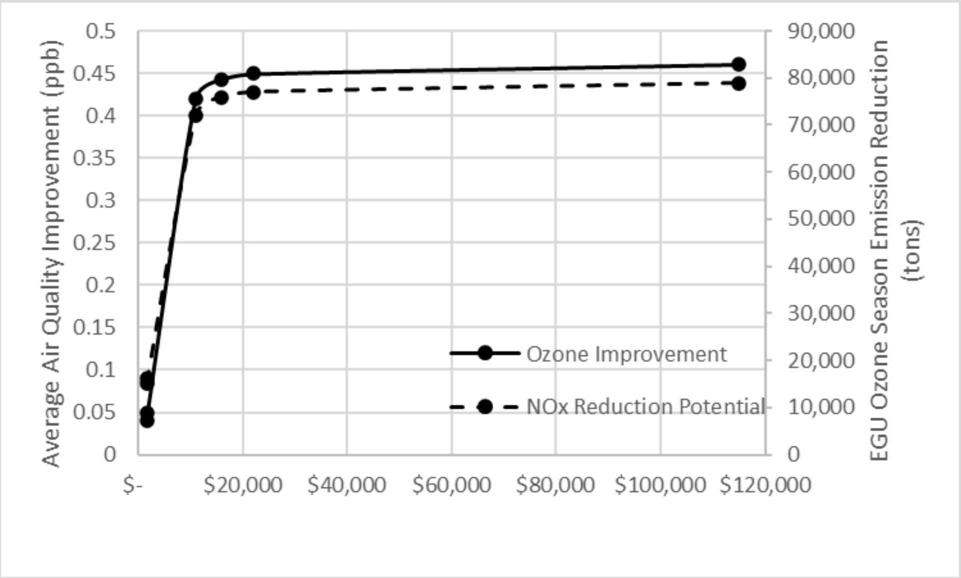


Figure 3 from Figure 3 of Appendix I of the OTPA Final Rule TSD from the final Federal Good Neighbor Plan (Relevant to Preamble Section V.D.1 of that Rule: EGU Ozone Season NO_X Reduction Potential in 19 Linked States and Corresponding Total Reductions in Downwind Ozone Concentration at Nonattainment and Maintenance Receptors for Each Cost Threshold Level Evaluated and Illustrative Evaluation of Cost Thresholds beyond Identified Technology Breakpoints (2026)[66]



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[66] As described in the final Federal Good Neighbor Plan, for the evaluation of air quality impacts for the cost levels beyond our technology breakpoints (i.e., beyond $11,000 per ton), the EPA relies on an average air quality per ton reduction factor derived from its AQAT analysis. The EPA notes that these illustrative points (those beyond $11,000 per ton) reflect SCRs on steam units less than 100 MW and oil/gas steam units < 150 tons per season, combustion control upgrade on combustion turbines, and SCRs on combustion turbines > 100 MW respectively. Although, not shown above, EPA also observes that we evaluated SCR on combined cycle unit and identified higher cost and higher resource intensity (i.e., higher ratio of retrofit projects per ton reduced). These mitigation measures and costs are further discussed in the EGU NO_X Mitigation Strategies Final Rule TSD for the Federal Good Neighbor Plan.

Appendix H: Additional AQAT sensitivity including the IRA

As described in preamble section V.D of the final Federal Good Neighbor Plan, the EPA assessed the effects of including the Inflation Reduction Act (IRA) on the emissions projections. The EPA then assessed the effects of these potential IRA-related emissions changes on air quality using AQAT to verify it did not alter EPA's geographic or overcontrol findings. We repeat the evaluation in this rule focusing on the Supplemental states. The EPA evaluated air quality contributions and receptor status for the base case in 2023, for the base case in 2026, and the "Full Step 3" scenario in 2026 using the Step 3 configuration of AQAT with the primary calibration factor. These are the scenarios that are most relevant for the evaluation of the policy. For these scenarios, following the methodology in the final Federal Good Neighbor Plan and using the same emissions inputs, the EPA accounted for the effects of the IRA by calculating the emission differences (i.e., deltas) for each state between the IPM case without the IRA and then with the same IPM case but including the IRA. It then applied this delta to the respective AQAT scenario. See the worksheet "IRA_cases" in the ozone_AQAT_proposal_supplemental.xlsx to see the calculations of how these emissions differences were applied. In short, we took the difference in expected emissions (an IPM case with and without the IRA). To create the engineering analysis base including the IRA, we subtracted the state emission deltas (from the IPM base case with and without the IRA) from the engineering analysis base emissions for that state. For the final cost threshold case (i.e., "Full Step 3" Scenario), the emission difference was similarly obtained by identifying the difference between the IPM Final Policy Case with and without the IRA.

The air quality contributions for the scenarios incorporating the IRA are shown in Table Appendix H-1. Comparing these values with the respective cases (without the IRA) from Tables C-9 and C-10, we observe that while there are minor differences in contributions there are no differences in which states remain linked in either 2023 or 2026. Comparing the 2023 average and maximum design values for the respective cases with and without IRA using Tables C-3, C-4, and Appendix H-2, we can observe that there are no changes in receptor status. Next, comparing the 2026 average and maximum design values for the base cases, from the "Full Step 3" cases with and without the IRA using Tables C-6, C-7, and Appendix H-3 and Appendix H-4, we can observe that, again, there are no changes in receptor status (i.e., the receptor is consistently above or below 71 ppb comparing the with- and without-IRA cases). Consequently, EPA concludes that even factoring in the projected effects of the IRA the conclusions in the final rule regarding geographic scope and overcontrol remain valid.

Table Appendix H-1. 2023 and 2026 Maximum Air Quality Contribution (ppb) to a Remaining Receptor.[67]

State	2023 Base Case w/ IRA	2026 Base Case w/ IRA	2026 "Full Step 3" Case w/ IRA
Alabama	0.80		
Arizona	1.71	0.90	0.85
Arkansas	1.18	1.12	0.97
California	6.89	6.10	6.05
Illinois	19.08	13.60	13.56
Indiana	9.90	8.31	8.05
Iowa	1.13		
Kansas	0.83		
Kentucky	1.59	0.82	0.72
Louisiana	9.68	9.64	8.82
Maryland	1.31	1.09	1.09
Michigan	3.49	1.46	1.45
Minnesota	0.85		
Mississippi	1.41	1.32	1.14
Missouri	2.98	1.78	1.55
Nevada	1.08	0.90	0.90
New Jersey	8.37	8.09	8.11
New Mexico	1.60		
New York	16.12	12.68	12.64
Ohio	2.24	1.90	1.85
Oklahoma	1.60	0.77	0.00
Pennsylvania	5.93	5.66	5.52
Tennessee	0.86		
Texas	4.75	4.45	4.31
Utah	1.45	1.07	0.89
Virginia	1.83	1.14	1.10
West Virginia	1.82	1.35	1.24
Wisconsin	5.13	4.45	4.31

Note: The contribution for Arizona excludes the contributions to Lea and Eddy counties in New Mexico.

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[67] Values greater than or equal to 0.70 ppb indicate the state remains linked to a remaining downwind receptor.

Table Appendix H-2. 2023 Average and Maximum Ozone DVs (ppb) for the Engineering Analysis Base Case Including the IRA Assessed Using the Ozone AQAT for Modeled Receptors.

Site	State	County	2023 Engineering Analysis Base Case (Avg. DV)	2023 Engineering Analysis Base Case w/IRA (Avg. DV)	2023 Engineering Analysis Base Case (Max. DV)	2023 Engineering Analysis Base Case w/IRA (Max. DV)
40278011	Arizona	Yuma	70.36	70.36	72.05	72.06
80350004	Colorado	Douglas	71.12	71.17	71.71	71.77
80590006	Colorado	Jefferson	72.63	72.67	73.32	73.37
80590011	Colorado	Jefferson	73.29	73.35	73.89	73.95
80690011	Colorado	Larimer	70.79	70.83	71.99	72.02
90010017	Connecticut	Fairfield	71.62	71.57	72.22	72.17
90013007	Connecticut	Fairfield	72.99	72.95	73.89	73.85
90019003	Connecticut	Fairfield	73.32	73.28	73.62	73.58
90099002	Connecticut	New Haven	70.61	70.59	72.71	72.69
170310001	Illinois	Cook	68.13	68.14	71.82	71.83
170314201	Illinois	Cook	67.92	67.93	71.41	71.42
170317002	Illinois	Cook	68.47	68.47	71.27	71.27
350130021	New Mexico	Dona Ana	70.83	70.83	72.13	72.13
350130022	New Mexico	Dona Ana	69.73	69.73	72.43	72.43
350151005	New Mexico	Eddy				
350250008	New Mexico	Lea				
480391004	Texas	Brazoria	70.59	70.56	72.69	72.67
481210034	Texas	Denton	69.93	69.91	71.73	71.72
481410037	Texas	El Paso	69.82	69.82	71.43	71.42
481671034	Texas	Galveston	71.82	71.79	73.13	73.09
482010024	Texas	Harris	75.33	75.30	76.93	76.91
482010055	Texas	Harris	71.19	71.16	72.20	72.17
482011034	Texas	Harris	70.32	70.29	71.52	71.50
482011035	Texas	Harris	68.01	67.98	71.52	71.49
490110004	Utah	Davis	71.88	71.90	74.08	74.10
490353006	Utah	Salt Lake	72.48	72.50	74.07	74.10
490353013	Utah	Salt Lake	73.21	73.23	73.71	73.73
550590019	Wisconsin	Kenosha	70.75	70.75	71.65	71.65
551010020	Wisconsin	Racine	69.59	69.61	71.39	71.40
551170006	Wisconsin	Sheboygan	72.64	72.65	73.54	73.55

Table Appendix H-3. 2026 Average Ozone DVs (ppb) for the Base, "Full Step 3 – EGU only", and "Full Step 3" Cases with and without the IRA Assessed Using the Ozone AQAT for All Receptors.

Site	state	county	2026 Engineering Analysis Base Case (Avg. DV)	2026 Engineering Analysis Base Case w/ IRA (Avg. DV)	2026 "Full Step 3" Case (Avg. DV)	2026 "Full Step 3" Case w/ IRA (Avg. DV)
40278011	Arizona	Yuma	69.87	69.89	69.80	69.81
80590006	Colorado	Jefferson	71.70	71.73	71.34	71.38
80590011	Colorado	Jefferson	72.06	72.10	71.57	71.62
80690011	Colorado	Larimer	69.84	69.87	69.53	69.56
90013007	Connecticut	Fairfield	71.25	71.18	70.66	70.63
90019003	Connecticut	Fairfield	71.58	71.51	71.06	71.03
350130021	New Mexico	Dona Ana	70.06	70.08	69.86	69.88
350130022	New Mexico	Dona Ana	69.17	69.19	68.95	68.98
350151005	New Mexico	Eddy				
350250008	New Mexico	Lea				
480391004	Texas	Brazoria	69.89	69.90	68.50	68.54
481671034	Texas	Galveston	71.29	71.28	69.28	69.33
482010024	Texas	Harris	74.83	74.85	73.39	73.45
490110004	Utah	Davis	69.90	69.91	69.28	69.33
490353006	Utah	Salt Lake	70.50	70.50	69.91	69.95
490353013	Utah	Salt Lake	71.91	71.92	71.40	71.44
551170006	Wisconsin	Sheboygan	70.83	70.80	70.27	70.27

Table Appendix H-4. 2026 Maximum Ozone DVs (ppb) for the Base and "Full Step 3" Cases with and without the IRA Assessed Using the Ozone AQAT for All Receptors.

Site	state	county	2026 Engineering Analysis Base Case (Max. DV)	2026 Engineering Analysis Base Case w/ IRA (Max. DV)	2026 "Full Step 3" Case (Max. DV)	2026 "Full Step 3" Case w/ IRA (Max. DV)
40278011	Arizona	Yuma	71.47	71.49	71.39	71.41
80590006	Colorado	Jefferson	72.30	72.33	71.93	71.97
80590011	Colorado	Jefferson	72.66	72.70	72.16	72.21
80690011	Colorado	Larimer	71.04	71.07	70.72	70.75
90013007	Connecticut	Fairfield	72.06	71.99	71.46	71.42
90019003	Connecticut	Fairfield	71.78	71.71	71.26	71.23
350130021	New Mexico	Dona Ana	71.36	71.38	71.16	71.18
350130022	New Mexico	Dona Ana	71.77	71.79	71.55	71.57
350151005	New Mexico	Eddy				
350250008	New Mexico	Lea				
480391004	Texas	Brazoria	72.02	72.02	70.58	70.63
481671034	Texas	Galveston	72.51	72.50	70.47	70.52
482010024	Texas	Harris	76.45	76.47	74.98	75.04
490110004	Utah	Davis	72.10	72.11	71.46	71.51
490353006	Utah	Salt Lake	72.10	72.10	71.50	71.54
490353013	Utah	Salt Lake	72.31	72.32	71.80	71.84
551170006	Wisconsin	Sheboygan	71.73	71.70	71.17	71.17