# Appendix A
# Georgia's Contribution to Ozone in Downwind States

EPA performed air quality modeling to assist states in developing good neighbor state implementation plans for the 2015 ozone National Ambient Air Quality Standard (NAAQS) due on October 1, 2018. Detailed information is documented in EPA's March 2018 memo "Information on the Interstate Transport State Implementation Plan Submissions for the 2015 Ozone National Ambient Air Quality Standards under Clean Air Act Section 110(a)(2)(D)(i)(I)"[1]. This modeling was utilized to assess Georgia's contributions to ozone in downwind states.

The base year for this modeling is 2011 due to the ozone-conducive meteorological conditions and availability of nationwide emission inventories. The future year is 2023 since it aligns with the anticipated attainment year for the moderate nonattainment areas for the 2015 ozone NAAQS. Ozone concentrations were simulated using the Comprehensive Air Quality Model with Extensions (CAMx) version 6.40. The CAMx model domain covers the 48 contiguous states along with the southern portions of Canada and the northern portions of Mexico using a horizontal grid resolution of 12 x 12 km. An operational model performance evaluation for ozone was conducted by EPA to examine the ability of the CAMx v6.40 modeling system to replicate 2011 measured ozone concentrations. The 2023 future year emissions used by EPA were reviewed by Georgia EPD and deemed appropriate for SIP quality modeling.

Ozone concentrations at individual ozone monitoring sites in 2023 were projected from the average and maximum of design values from 2009-2011, 2010-2012, and 2011-2013. If a site violates the NAAQS based on 2014-2016 design values and had a projected 2023 average design value that exceeds the NAAQS (i.e., 2023 average design value is equal to or higher than 71 ppb), this site was considered a nonattainment site. If a site had a projected 2023 average design values above the NAAQS and was measuring clean data based on 2014-2016 design values; or if the projected average design value was below the NAAQS but had a projected maximum design values of 71 ppb or greater, this site was considered a maintenance-only site.

The 2023 design values included in this analysis are based on a modified version of the "3 x 3" approach for those monitoring sites located in coastal areas. In this alternative approach, modeling data in grid cells that are dominated by water (i.e., more than 50 percent of the area in the grid cell is water) and that do not contain a monitoring site were excluded from the calculation of Relative Response Factors used to project the 2009-2013 base period design values to 2023 (i.e., if a grid cell is more than 50 percent water but contains an air quality monitor, that cell would remain in the calculation). According to the projected 2023 ozone concentrations, there are 10 nonattainment sites and 15 maintenance sites outside of California in the continental U.S. [1]

Ozone source contributions from emissions in each upwind state to ozone concentrations at projected 2023 nonattainment and maintenance sites in downwind states were simulated using the CAMx Anthropogenic Precursor Culpability Assessment (APCA) technique for the period May 1 through September 30. EPA's Excel spreadsheet "APPENDIX_B_2023_Ozone_DVs_and_Contributions.xlsx"[1] (see Appendix B) contains Georgia's contributions to ozone concentrations at monitoring sites across the Continental U.S.

[1] https://www.epa.gov/airmarkets/march-2018-memo-and-supplemental-information-regarding-interstate-transport-sips-2015

Georgia's contribution to ozone concentrations at nonattainment sites outside of California in the continental U.S. are listed in Table A-1. The largest ozone contribution from Georgia to downwind 2023 projected nonattainment sites was 0.26 ppb. Georgia's contribution to ozone concentrations at maintenance-only sites outside of California in the continental U.S. are listed in Table A-2. The largest ozone contribution from Georgia to downwind 2023 projected maintenance-only sites was 0.34 ppb.

As part of the CSAPR and CSAPR Update analysis, EPA used 1% of the NAAQS level to define the threshold for "significant contribution". Applying this approach for the 2015 ozone NAAQS results in a "significant contribution" threshold of 0.70 ppb. However, EPA's April 17, 2018 memorandum titled "Guidance on Significant Impact Levels for Ozone and Fine Particles in the PSD Permitting Program" recommends an ozone Significant Impact Level (SIL) value of 1.0 ppb based on an air quality variability analysis and the $4^{th}$ highest daily maximum 8-hour concentration (averaged over three years). Since the CSAPR and CSAPR Update approach for determining a "significant contribution" threshold is arbitrary and has never been supported by any scientific analysis, GA EPD will use a "significant contribution" threshold of 1.0 ppb based on EPA's recently published SIL value.

GA EPD's choice to use a 1.0 ppb threshold is based on EPA's "Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program", "Technical Basis for the EPA's Development of the Significant Impact Thresholds for $PM_{2.5}$ and Ozone", "Legal Memorandum - Application of Significant Impact Levels in the Air Quality Demonstration for Prevention of Significant Deterioration Permitting under the Clean Air Act", and "Peer Review Report for the Technical Basis for the EPA's Development of Significant Impact Thresholds for $PM_{2.5}$ and Ozone". In these documents, EPA lays out the technical and legal justification for the new ozone and $PM_{2.5}$ SILs. The technical justification is based on a statistical analysis of the variability of air quality, using data from the U.S. ambient monitoring network for ozone and $PM_{2.5}$. Due to fluctuating meteorological conditions and changes in day-to-day operations of all air pollution sources in an area, there is an inherent variability in the air quality in the area surrounding a monitoring site. This variability can be characterized through the application of a well-established statistical framework for quantifying uncertainty. The analysis described in EPA's technical document quantifies the inherent variability in pollutant concentrations (as measured by design values) and informs the EPA's choice of a value for a change in concentrations that the EPA does not consider significant or meaningful because changes of this magnitude are well within the inherent variability of observed design values. Once the precautionary choices described in EPA's SILs guidance document are built into the calculation, this degree of change in concentration is indistinguishable from the inherent variability in the measured atmosphere and may be observed even in the absence of the increased emissions from a new or modified source. Based on this analysis, EPA had determined that 1.0 ppb is an appropriate SIL for ozone.

EPA's statistical analysis of the variability of air quality is independent of the number of sources, location of sources, and size of sources in the area. In addition, the variability analysis was based upon data collected from all ozone monitors in the U.S. (including both attainment and nonattainment monitors). Therefore, EPA's air quality variability analysis is applicable for significance contribution determinations for interstate transport in addition to PSD permitting analyses. Although the EPA guidance was written for a single source (consisting of multiple emission units) impacting local ozone monitors, the same approach can be applied for a single state (consisting of multiple emission sources) impacting ozone monitors located in other states.

In addition, GA EPD feels that the 1.0 ppb ozone SIL is conservative because EPA selected the lowest value from the network to make it nationally applicable. If the ozone SIL were based on a regional network of monitors, the SIL would likely have been higher in some areas of the country. In addition, the ozone SIL could be higher than 1.0 ppb if the variability analysis were to use a 90% (or higher) confidence interval instead of a 50% confidence interval to determine "significant contributions" from sources. For these reasons, GA EPD feels that 1.0 ppb is appropriate as the significant contribution threshold for interstate transport. Georgia's contribution is less than 1.0 ppb at all monitoring sites listed in Tables A-1 and A-2. Therefore, Georgia does not contribute significantly to nonattainment in, or interfere with maintenance by, any other state.

**Table A-1.** Georgia's contribution to ozone concentrations at nonattainment sites outside of California in the continental U.S

| Monitor ID | State | County | 2023 Average DVs (ppb) | 2023 Maximum DVs (ppb) | Georgia's Contribution (ppb) |
|---|---|---|---|---|---|
| 48-439-2003 | Texas | Tarrant | 72.5 | 74.8 | 0.26 |
| 09-001-3007 | Connecticut | Fairfield | 71.0 | 75.0 | 0.17 |
| 09-001-9003 | Connecticut | Fairfield | 73.0 | 75.9 | 0.17 |
| 48-039-1004 | Texas | Brazoria | 74.0 | 74.9 | 0.14 |
| 36-103-0002 | New York | Suffolk | 74.0 | 75.5 | 0.12 |
| 55-117-0006 | Wisconsin | Sheboygan | 72.8 | 75.1 | 0.07 |
| 55-079-0085 | Wisconsin | Milwaukee | 71.2 | 73.0 | 0.06 |
| 08-035-0004 | Colorado | Douglas | 71.1 | 73.2 | 0.00 |
| 08-059-0006 | Colorado | Jefferson | 71.3 | 73.7 | 0.00 |
| 08-069-0011 | Colorado | Larimer | 71.2 | 73.0 | 0.00 |

**Table A-2.** Georgia's contribution to ozone concentrations at maintenance-only sites outside of California in the continental U.S

| Monitor ID | State | County | 2023 Average DVs (ppb) | 2023 Maximum DVs (ppb) | Georgia's Contribution (ppb) |
|---|---|---|---|---|---|
| 48-121-0034 | Texas | Denton | 69.7 | 72.0 | 0.34 |
| 24-025-1001 | Maryland | Harford | 70.9 | 73.3 | 0.32 |
| 48-201-0024 | Texas | Harris | 70.4 | 72.8 | 0.26 |
| 26-005-0003 | Michigan | Allegan | 69.0 | 71.7 | 0.18 |
| 36-081-0124 | New York | Queens | 70.2 | 72.0 | 0.16 |
| 48-201-1034 | Texas | Harris | 70.8 | 71.6 | 0.16 |
| 48-201-1039 | Texas | Harris | 71.8 | 73.5 | 0.13 |
| 09-001-0017 | Connecticut | Fairfield | 68.9 | 71.2 | 0.09 |
| 26-163-0019 | Michigan | Wayne | 69.0 | 71.0 | 0.09 |
| 09-009-9002 | Connecticut | New Haven | 69.9 | 72.6 | 0.07 |
| 08-123-0009 | Colorado | Weld | 70.2 | 71.4 | 0.01 |
| 04-013-0019 | Arizona | Maricopa | 69.3 | 71.4 | 0.00 |
| 04-013-1004 | Arizona | Maricopa | 69.8 | 71.0 | 0.00 |
| 08-005-0002 | Colorado | Arapahoe | 69.3 | 71.3 | 0.00 |
| 08-059-0011 | Colorado | Jefferson | 70.9 | 73.9 | 0.00 |