NEVADA
Las Vegas Nonattainment Area
Final Area Designations for the
2015 Ozone National Ambient Air Quality Standards
Technical Support Document (TSD)

1.0 Summary

This technical support document (TSD) describes the EPA's final designation for Las Vegas in Nevada as nonattainment for the 2015 ozone National Ambient Air Quality Standards (NAAQS).

On October 1, 2015, the EPA promulgated revised primary and secondary ozone NAAQS (80 FR 65292; October 26, 2015). The EPA strengthened both standards to a level of 0.070 parts per million (ppm). In accordance with Section 107(d) of the Clean Air Act (CAA), whenever the EPA establishes a new or revised NAAQS, the EPA must promulgate designations for all areas of the country for that NAAQS.

Under section 107(d), states were required to submit area designation recommendations to the EPA for the 2015 ozone NAAQS no later than one year following promulgation of the standards, i.e., by October 1, 2016. Tribes were also invited to submit area designation recommendations and were given an opportunity for consultation.[1] On September 22, 2016, Nevada recommended that portions of Clark County be designated nonattainment for the 2015 ozone NAAQS based on air quality data from 2013-2015.[2] Nevada also recommended that all areas in Washoe County be designated attainment based on data from 2013-2015 and the EPA's potential concurrence with exceptional event demonstrations that were under development. On May 30, 2017, the EPA concurred with exceptional events demonstrations submitted by the Washoe County Health District.[3] The EPA's concurrence on these events brought Washoe County's 2014-2016 design value below the level of the 2015 ozone NAAQS. Accordingly, we are designating all of Washoe County, together with other areas in Nevada, attainment/unclassifiable for the 2015 ozone NAAQS.

In defining the nonattainment area boundary for a portion of Clark County for the 2015 ozone NAAQS, the State and the EPA have followed the longstanding practice in Nevada of using

[1] In 2011, the EPA issued a memorandum outlining the EPA's approach for designating areas of Indian country. If the EPA either does not receive an initial designation recommendation from a tribe, or receives a recommendation that does not specify designation of a separate area, the EPA is designating the relevant tribe's area of Indian country as part of the surrounding area, and to the extent possible, ensuring that a single tribe's areas of Indian country are not inadvertently split based on the use of other jurisdictional boundaries (e.g., county boundaries) when designating the surrounding state areas. Please see EPA Policy for Establishing Separate Air Quality Designations for Areas of Indian Country: https://www.epa.gov/sites/production/files/2016-02/documents/indian-country-separate-area.pdf and EPA Policy on Consultation and Coordination with Indian Tribes: https://www.epa.gov/sites/production/files/2013-08/documents/cons-and-coord-with-indian-tribes-policy.pdf.

[2] Letter from David Emme, Administrator, Nevada Division of Environmental Protection to Alexis Strauss, Acting Regional Administrator, U.S. EPA Region 9, September 22, 2016.

[3] Exceptional events demonstrations were submitted on November 11, 2016, March 17, 2017, and April 14, 2017, by the Washoe County Health District. These demonstrations document that six exceedances of the 2015 ozone NAAQS that occurred in 2015 and 2016 at the Reno3 monitoring station were caused by emissions from wildfires. The EPA reviewed these demonstrations according to the provisions in the Exceptional Events Rule (see 40 CFR 50.14 and 40 CFR 51.930) and communicated the EPA's concurrence on these exceptional events to the Washoe County Health District via letter on May 30, 2017. Documents related to this action, including the demonstrations, the EPA's concurrence letter, and the EPA's TSDs evaluating the demonstrations, are included in the docket to this action.

hydrographic areas (HAs). The State initially recommended that the nonattainment area include the Las Vegas Valley (HA 212) and HAs 164A and 165 to the south, near the Jean ozone monitor. In a December 2017 letter to Governor Brian Sandoval, the EPA notified the State that, based on 2014-2016 monitoring data, we intended to expand the State's recommendation to include a portion of HA 216 with a violating ozone monitor (Apex) and nearby sources.[4] In the letter, the EPA indicated that in order to consider more current (i.e., 2015-2017) air quality data in the final designation decision, certified, quality-assured 2015-2017 air quality monitoring data for the area must be submitted to the EPA by February 28, 2018. On February 1, 2018, the Clark County Department of Air Quality submitted their 2017 ozone data certification to the EPA,[5] and on February 23, 2018, Nevada submitted an updated recommendation for the Las Vegas 2015 ozone nonattainment area boundary based on certified 2015-2017 data.[6] Nevada's updated boundary recommendation limits the nonattainment area to the Las Vegas Valley (HA 212), based in part on the State's 2017 design values showing that the Jean and Apex monitors in Clark County are attaining the 2015 ozone standard. This area is smaller than the boundary previously recommended by the State and smaller than the intended boundary described in the EPA's December 20, 2017 letter.[7]

After considering these recommendations and based on the EPA's technical analysis as described in this TSD, the EPA is designating the area listed in Table 1.1 as nonattainment for the 2015 ozone NAAQS. The EPA must designate an area nonattainment if it has an air quality monitor that is violating the standard or if it has sources of emissions that are contributing to a violation of the NAAQS in a nearby area. A detailed description of the nonattainment boundary for this area is found in the supporting technical analysis in Section 3.

Table 1.1 Nevada State and Tribal Recommended Nonattainment Areas and the EPA's Final Designated Nonattainment Areas for the 2015 Ozone NAAQS.

Area	Nevada's or Tribe's Recommended Nonattainment Counties [or Areas of Indian Country]	Nevada's or Tribe's Updated Recommended Nonattainment Counties [or Areas of Indian Country]	EPA's Final Nonattainment Counties [or Areas of Indian Country]
Las Vegas, NV*	Clark County (partial); HA212, 164A, 165	Clark County (partial); HA212	Clark County (partial)
Las Vegas Tribe of Paiute Indians	Did not submit recommendation	Did not submit recommendation	Las Vegas Tribe of Paiute Indians

*Las Vegas is a multi-jurisdictional nonattainment area that include areas of Indian country of federally-recognized tribes. The areas of Indian country of each tribe that the EPA is designating as part of the nonattainment area are discussed in Section 3, Technical Analysis for Las Vegas, NV.

[4] Letter from Alexis Strauss, Acting Regional Administrator, U.S. EPA Region 9 to Brian Sandoval, Governor of Nevada, December 20, 2017.
[5] Letter from Marci Henson, Director, Clark County Department of Air Quality to Alexis Strauss, Acting Regional Administrator, U.S. EPA Region 9, February 1, 2018.
[6] Letter from Greg Lovato, Administrator, Nevada Division of Environmental Protection to Alexis Strauss, Acting Regional Administrator, U.S. EPA Region 9, February 23, 2018.
[7] See Section 3 of this document for more information.

In its recommendation letters, Nevada recommended that the EPA designate as "unclassifiable/attainment" all other areas in the state of Nevada not identified in the State's Recommended Nonattainment Counties column of Table 1.1. On November 6, 2017 (82 FR 54232; November 16, 2017), the EPA signed a final rule designating the counties listed in Table 1.2 below as attainment/unclassifiable.[8] The EPA is not modifying Nevada's recommendation and is designating the remainder of Nevada areas not listed in Table 1.1 or Table 1.2 as attainment/unclassifiable based on Nevada's recommendation; ambient monitoring data collected during the 2014-2016 period, where available, showing compliance with the 2015 ozone NAAQS; and, the EPA's assessment that these areas are not contributing to a violation in a nearby area.[9] EPA explains in section 2.0 the approach it is now taking to designate the remaining areas in the State.

Table 1.2 Nevada Counties Designated on November 16, 2017.

County	Designation
Churchill County	Attainment/Unclassifiable
Elko County	Attainment/Unclassifiable
Esmeralda County	Attainment/Unclassifiable
Eureka County	Attainment/Unclassifiable
Humboldt County	Attainment/Unclassifiable
Lander County	Attainment/Unclassifiable
Lyon County	Attainment/Unclassifiable
Mineral County	Attainment/Unclassifiable
Pershing County	Attainment/Unclassifiable
Storey County	Attainment/Unclassifiable
White Pine County	Attainment/Unclassifiable

The EPA will designate all tribes in accordance with two guidance documents issued in December 2011 by the EPA Office of Air Quality Planning and Standards titled, "Guidance to Regions for Working with Tribes during the National Ambient Air Quality Standards (NAAQS)) Designations Process,"[10] and "Policy for Establishing Separate Air Quality Designations for Areas of Indian Country."[11] As discussed in these policies, tribes retain sovereign authorities over their members and territories, and jurisdiction in Indian country generally rests with the relevant tribe and the federal government, not with states. As such, designating areas of Indian country as part of a multi-jurisdictional area has no effect on tribal sovereignty over those areas.

2.0 Nonattainment Area Analyses and Boundary Determination

The EPA evaluated and determined the boundaries for each nonattainment area on a case-by-case basis, considering the specific facts and circumstances of the area. In accordance with the CAA section 107(d), the EPA is designating as nonattainment the areas with the monitors that are violating the 2015 ozone NAAQS and nearby areas with emissions sources (i.e., stationary, mobile, and/or area sources) that contribute to the violations. As described in the EPA's designations guidance for the 2015

[8] See Federal Register, vol. 82, p. 54232.

[9] In previous ozone designations and in the designation guidance for the 2015 ozone NAAQS, the EPA used the designation category label Unclassifiable/Attainment to identify both areas that were monitoring attainment and areas that did not have monitors but for which the EPA had reason to believe were likely attainment and were not contributing to a violation in a nearby area. The EPA is now reversing the order of the label to be Attainment/Unclassifiable so that the category is more clearly distinguished from the separate Unclassifiable category.

[10] https://www.epa.gov/sites/production/files/2016-02/documents/ozone-designation-tribes.pdf

[11] https://www.epa.gov/sites/production/files/2016-02/documents/indian-country-separate-area.pdf

NAAQS (hereafter referred to as the "ozone designations guidance"),[12] after identifying each monitor indicating a violation of the ozone NAAQS in an area, the EPA analyzed those nearby areas with emissions potentially contributing to the violating area. In guidance issued in February 2016, the EPA provided that using the Core Based Statistical Area (CBSA) or Combined Statistical Area (CSA)[13] as a starting point for the contribution analysis is a reasonable approach to ensure that the nearby areas most likely to contribute to a violating area are evaluated. The area-specific analyses may support nonattainment boundaries that are smaller or larger than the CBSA or CSA.

On November 6, 2017, the EPA issued attainment/unclassifiable designations for approximately 85% of the United States and one unclassifiable area designation. At that time, consistent with statements in the designations guidance regarding the scope of the area the EPA would analyze in determining nonattainment boundaries, EPA deferred designation for any counties in the larger of a CSA or CBSA where one or more counties in the CSA or CBSA was violating the standard and any counties with a violating monitor not located in a CSA or CBSA. In addition, the EPA deferred designation for any other counties adjacent to a county with a violating monitor. The EPA also deferred designation for any county that had incomplete monitoring data, any county in the larger of the CSA or CBSA where such a county was located, and any county located adjacent to a county with incomplete monitoring data.

The EPA is proceeding to complete the remaining designations consistent with the designations guidance (and EPA's past practice) regarding the scope of the area EPA would analyze in determining nonattainment boundaries for the ozone NAAQS as outlined above. For those deferred areas where one or more counties violating the ozone NAAQS or with incomplete data are located in a CSA or CBSA, in most cases the technical analysis for the nonattainment area includes any counties in the larger of the relevant CSA or CBSA. For counties with a violating monitor not located in a CSA or CBSA, EPA explains in the technical analysis sections, its decision whether to consider in the five-factor analysis for each area any other adjacent counties for which EPA previously deferred action. We are designating all counties not included in five-factor analyses for a specific nonattainment or unclassifiable area analyses, as attainment/unclassifiable. These deferred areas are identified in a separate document entitled "Designations for Deferred Counties and County Equivalents Not Addressed in the Technical Analyses." which is available in the docket. The EPA's analytical approach is detailed in Table 2.1 below and further discussed in Section 3 of this technical support document.

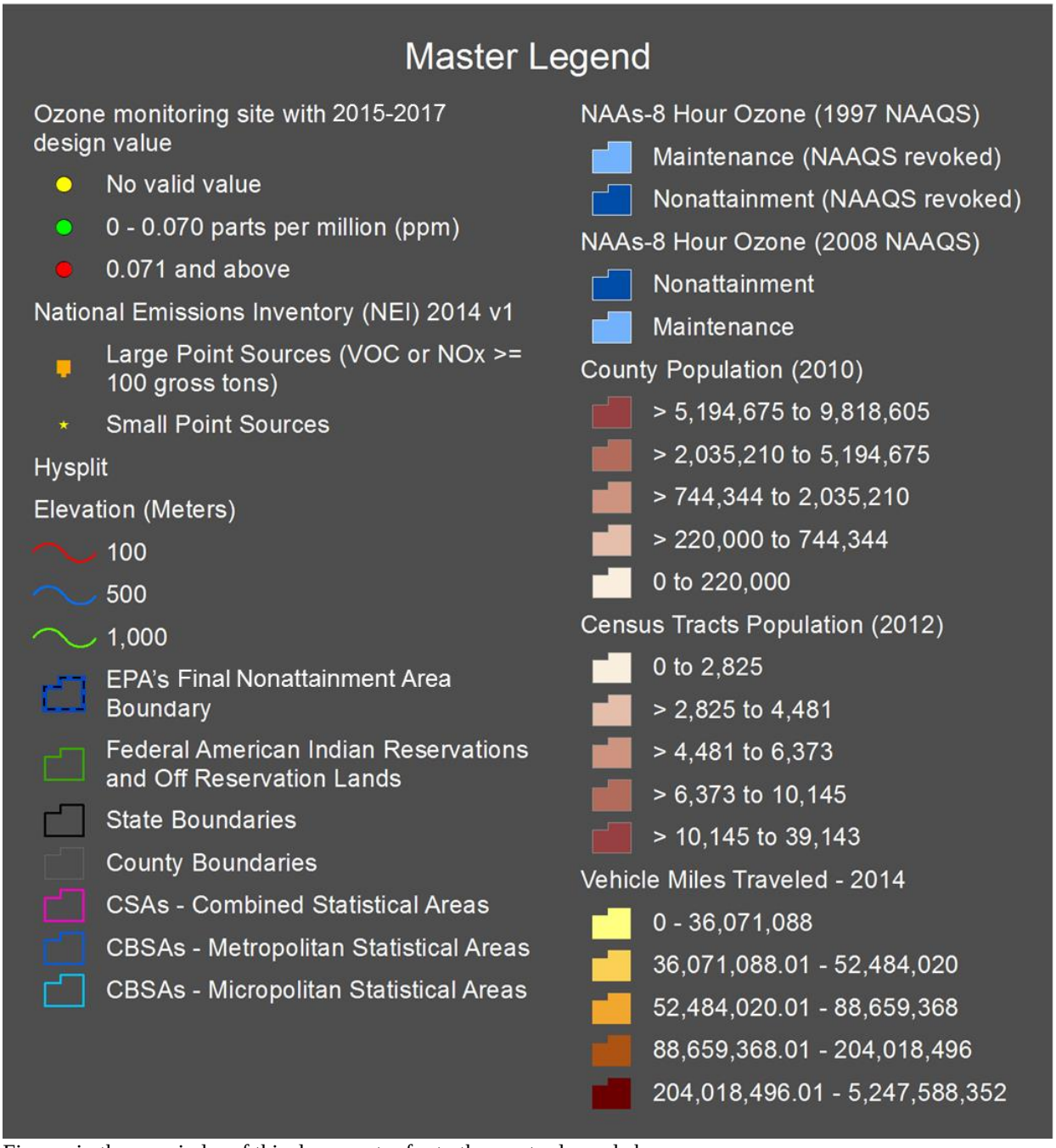
[12] The EPA issued guidance on February 25, 2016 that identified important factors that the EPA evaluated in determining appropriate area designations and nonattainment boundaries for the 2015 ozone NAAQS. Available at *https://www.epa.gov/ozone-designations/epa-guidance-area-designations-2015-ozone-naaqs*

[13] Lists of CBSAs and CSAs and their geographic components are provided at www.census.gov/population/www/metroareas/metrodef.html. The Office of Management and Budget (OMB) adopts standards for defining statistical areas. The statistical areas are delineated based on U.S. Census Bureau data. The lists are periodically updated by the OMB. The EPA used the most recent July 2015 update (OMB Bulletin No. 15-01), which is based on application of the 2010 OMB standards to the 2010 Census, 2006-2010 American Community Survey, as well as 2013 Population Estimates Program data.

Table 2.1 Area of Analysis for Nonattainment Areas in Nevada

Nonattainment Area	Area of Analysis	Associated CBSA	Associated CSA
Las Vegas, NV	Clark County	Las Vegas-Henderson-Paradise, NV CBSA	Las Vegas-Henderson, NV-AZ CSA (partial)*

*Only the Las Vegas-Henderson-Paradise, NV CBSA portion of the Las Vegas-Henderson, NV-AZ CSA was included in the area of analysis. See Section 3 of this document for more information.



Figures in the remainder of this document refer to the master legend above.

3.0 Technical Analysis for Las Vegas, NV

This technical analysis identifies the area with monitors that violate the 2015 ozone NAAQS. It also provides the EPA's evaluation of this area and nearby areas to determine whether those nearby areas have emissions sources that potentially contribute to ambient ozone concentrations at the violating monitors in the area.

Table 3.1 identifies the area of analysis for the Las Vegas nonattainment area. For the EPA's nonattainment boundary for Las Vegas, the area of analysis included all of Clark County, which has the same boundary as the Las Vegas-Henderson-Paradise Core Based Statistical Area (CBSA). Clark County is one of three counties in the Las Vegas-Henderson Combined Statistical Area (CSA), however the other two counties (Nye County, NV and Mohave County, AZ) were not included in the area of analysis because Clark County itself encompasses over 8,000 square miles with the major population, sources, and violating monitors located within or near the center of the county. In addition, the two other counties together comprise only approximately 10% of the total population of the CSA across a combined 31,000 square miles (Nye County is over 18,000 square miles, Mohave County is over 13,000 square miles) and have no violating monitors or major stationary sources. Clark County was therefore used as the area of analysis.

Table 3.1 Area of Analysis.

Nonattainment Area	Area of Analysis	Associated CBSA	Associated CSA
Las Vegas, NV	Clark County	Las Vegas-Henderson-Paradise, NV	Las Vegas-Henderson, NV-AZ (partial)*

*Only the Las Vegas-Henderson-Paradise, NV CBSA portion of the Las Vegas-Henderson, NV-AZ CSA was included in the area of analysis.

This analysis was based on the weight-of-evidence of the five factors recommended in the EPA's ozone designations guidance and other relevant information. In developing this technical analysis, the EPA used the latest data and information available to the EPA (and to the states and tribes through the Ozone Designations Mapping Tool and the EPA Ozone Designations Guidance and Data web page).[1] In addition, the EPA considered all additional data or information provided to the EPA by states or tribes.

The five factors recommended in the EPA's guidance are:

1. Air Quality Data (including the design value calculated for each Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitor);
2. Emissions and Emissions-Related Data (including locations of sources, population, amount of emissions, and urban growth patterns);
3. Meteorology (weather/transport patterns);
4. Geography/Topography (including mountain ranges or other physical features that may influence the fate and transport of emissions and ozone concentrations); and
5. Jurisdictional Boundaries (e.g., counties, air districts, existing nonattainment areas, areas of Indian country, Metropolitan Planning Organizations (MPOs)).

[1] The EPA's Ozone Designations Guidance and Data web page can be found at *https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data*.

As discussed in Section 1.0 of this TSD, the State and the EPA have followed the longstanding practice in Nevada of using hydrographic areas (HAs) to define nonattainment area boundaries. Figure 3.0 shows the EPA's December 2017 intended boundary for the Las Vegas nonattainment area and Nevada's February 2018 updated recommendation, which is based on certified 2015-2017 data for Clark County. The State's 2017 design values show that the Jean and Apex monitors in Clark County are attaining the 2015 ozone standard, and Nevada's updated boundary recommendation limits the nonattainment area to the Las Vegas Valley (HA 212). This area is smaller than the boundary previously recommended by the State and smaller than the EPA's December 2017 intended boundary (see Figure 3.0). The EPA considered the State's early-certified 2017 monitoring data, along with other information, in the technical analysis that follows and for finalizing the Las Vegas nonattainment area boundary.

Figure 3.0 The EPA's December 2017 Intended Nonattainment Area Boundary ("Las Vegas intended boundary") and Nevada's February 2018 Updated Recommendation ("Nevada's Clark County nonattainment area recommendation (Feb. 23, 2018)") for Las Vegas, NV.

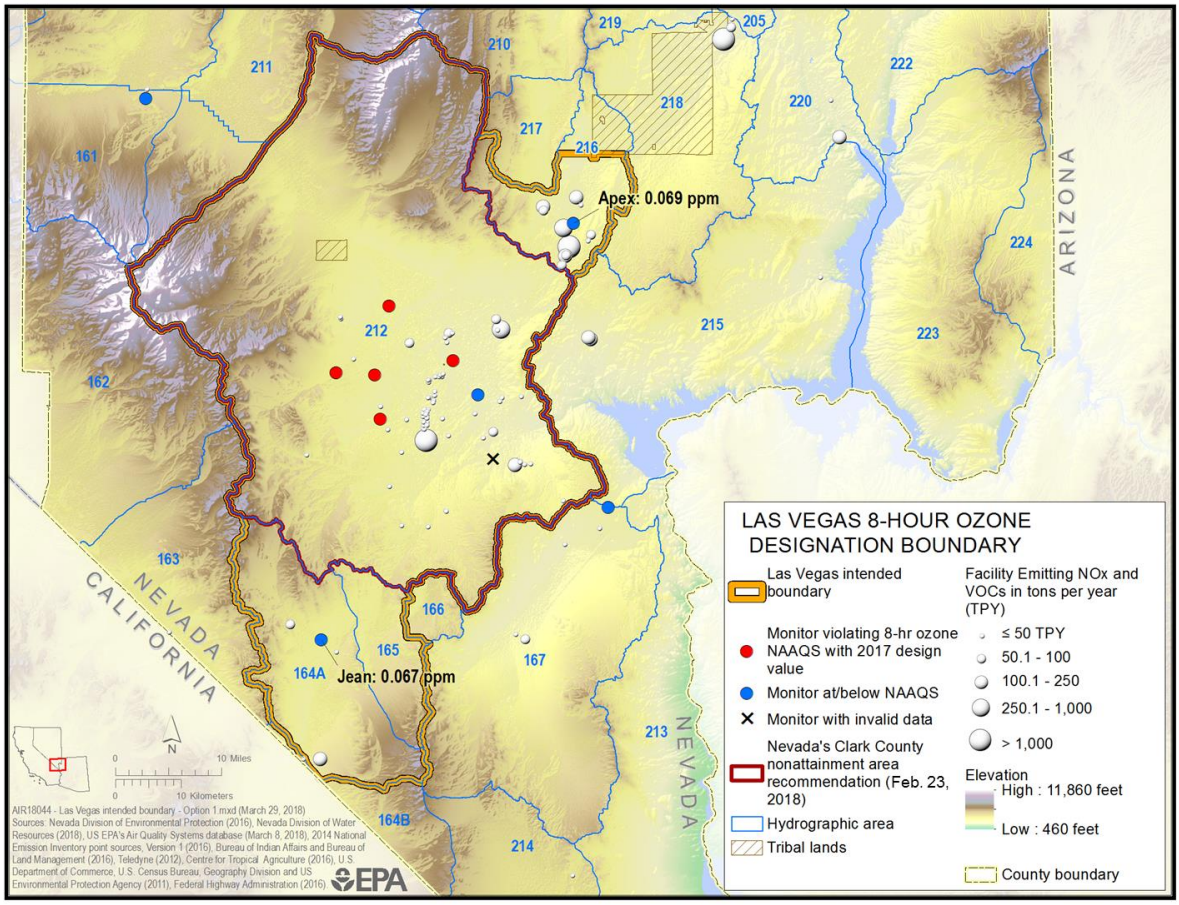


Figure 3.0 shows the EPA's December 2017 intended nonattainment boundary as a yellow line and Nevada's updated February 2018 recommendation as a red line. The northwestern, western, and eastern boundaries are the same. Monitors are shown as red (violating) or blue (attaining) dots based on 2015-2017 design values; an invalid monitor is shown by a black "x". Point sources are shown as circles; larger circles indicate sources with higher emissions. Tribal land boundaries are outlined in yellow.

Figure 3.1 is a map of the EPA's final nonattainment boundary for the Las Vegas nonattainment area, which is the same as the State's February 2018 updated recommendation. The map shows the location of the ambient air quality monitors, county boundaries, tribal boundaries, and existing 1997 ozone

NAAQS nonattainment boundaries. The final nonattainment area is smaller than the existing 1997 Las Vegas maintenance area.

For purposes of the 1997 ozone NAAQS, portions of Clark County were designated nonattainment. In 2013, the EPA approved the maintenance plan for and redesignated the Las Vegas, NV 1997 ozone NAAQS nonattainment area from nonattainment to maintenance. For purposes of the 2008 ozone NAAQS, the EPA designated the entire State of Nevada as unclassifiable/attainment. The Las Vegas area also includes areas of Indian country belonging to the Las Vegas Tribe of Paiute Indians (Las Vegas Paiute Tribe). The nonattainment area boundary for the 2015 ozone NAAQS is smaller than the corresponding boundary for the 1997 ozone NAAQS.

Figure 3.1 The EPA's Nonattainment Boundaries for Las Vegas, NV.

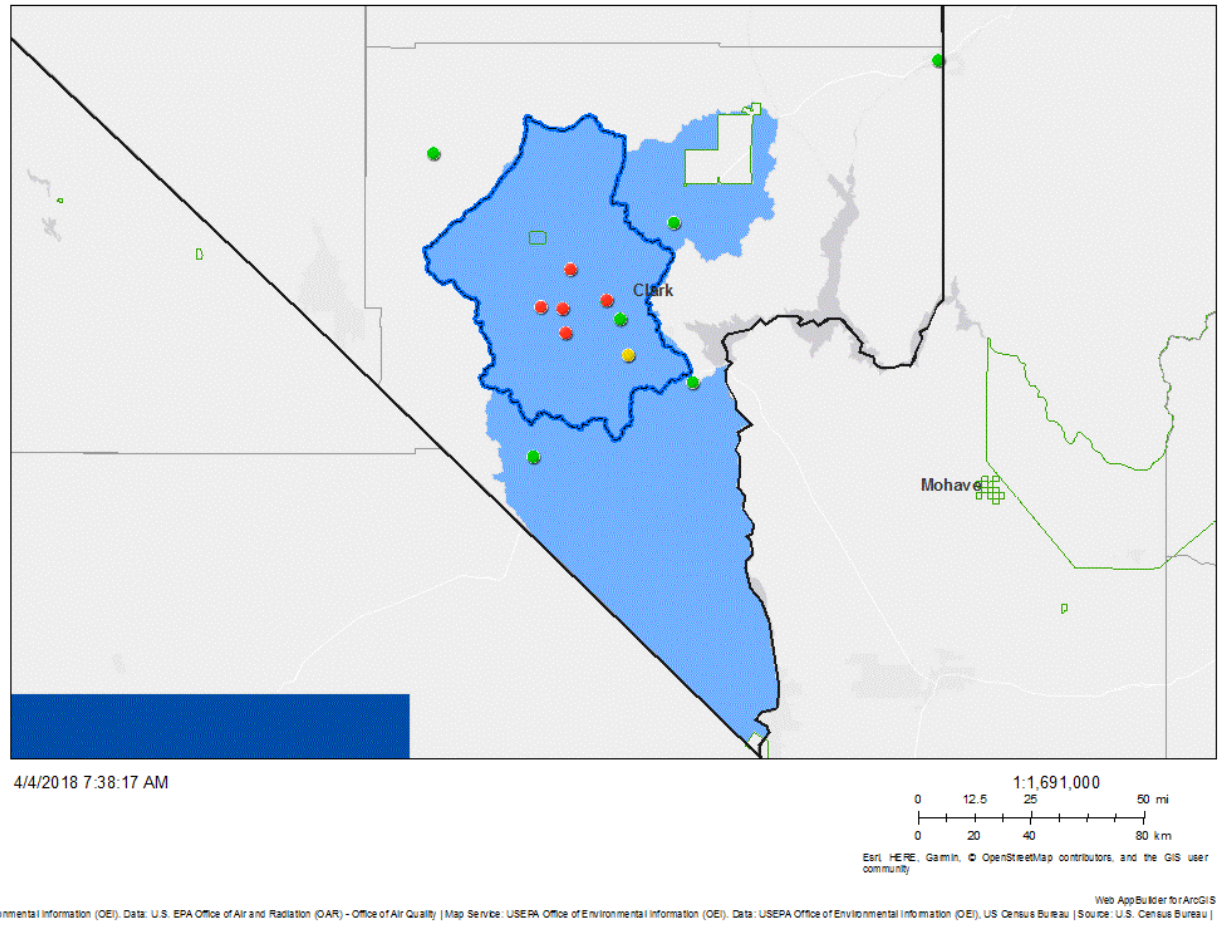


Figure 3.1 shows the EPA's final nonattainment boundary for Las Vegas, NV as a blue line with a dashed black center. Nonattainment areas for the 1997 and 2008 ozone NAAQS are shown in blue. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2015-2017 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The EPA must designate as nonattainment any area that violates the NAAQS and any nearby areas that contribute to the violation in the violating area. Clark County has monitors in violation of the 2015 ozone NAAQS, therefore portions of this county are included in the final nonattainment area. The following sections describe the five factor analysis. While the factors are presented individually, they are not independent. The five factor analysis process carefully considers the interconnections among the different factors and the dependence of each factor on one or more of the others, such as the interaction between emissions and meteorology for the area being evaluated.

Factor Assessment

Factor 1: Air Quality Data

The EPA considered 8-hour ozone design values in ppm for air quality monitors in Clark County, NV based on data for the 2015-2017 period (i.e., the 2017 design value, or DV). This is the most recent three-year period with fully-certified air quality data.[2] The design value is the 3-year average of the annual 4th highest daily maximum 8-hour average ozone concentration.[3] The 2015 NAAQS are met when the design value is 0.070 ppm or less. Only ozone measurement data collected in accordance with the quality assurance (QA) requirements using approved (FRM/FEM) monitors are used for NAAQS compliance determinations.[4] The EPA uses FRM/FEM measurement data residing in the EPA's Air Quality System (AQS) database to calculate the ozone design values.
Individual exceedances or violations of the 2015 ozone NAAQS that the EPA determines have been caused by an exceptional event that meets the administrative and technical criteria in the Exceptional Events Rule[5] are not included in these calculations. Whenever several monitors are located in a county (or designated nonattainment area), the design value for the county or area is determined by the monitor with the highest valid design value. The presence of one or more violating monitors (i.e., monitors with design values greater than 0.070 ppm) in a county or other geographic area forms the basis for designating that county or area as nonattainment. The remaining four factors are then used as the technical basis for determining the spatial extent of the designated nonattainment area surrounding the violating monitor(s) based on a consideration of what nearby areas are contributing to a violation of the NAAQS.

The EPA identified monitors where the most recent design values violate the NAAQS, and examined historical ozone air quality measurement data (including previous design values) to understand the nature of the ozone ambient air quality problem in the area. Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) that are operated in accordance with 40 CFR part 58 Appendices A, C, D, and E and operating with an FRM or FEM monitor. These requirements must be met in order to be acceptable for comparison to the 2015 ozone NAAQS for designation purposes. All data from Special Purpose Monitors (SPMs) using an FRM or FEM are eligible for comparison to the NAAQS, subject to the requirements given in the March 28, 2016 Revision to Ambient Monitoring Quality Assurance and Other Requirements Rule (81 FR 17248). Modeling and information from non-regulatory monitors may not be used to determine a violation, but may be used in boundary determinations. There is one SPM that operated during parts of 2015 in Clark County which cannot be used to determine a violation because it was discontinued within 24 months of start-up, but which the EPA considered in the context of the proposed boundary for the Las Vegas area. This monitor (Logandale, AQS ID 32-003-7780) is located outside the Las Vegas nonattainment area approximately 40 miles northeast of the Las Vegas urban area, and

[2] As discussed earlier in this document, the EPA considered 2014-2016 monitoring data for the December 2017 intended boundary. The Clark County Department of Air Quality submitted their 2017 ozone data certification to the EPA on February 1, 2018. Therefore, the EPA considered 2015-2017 monitoring data when finalizing the Las Vegas nonattainment area boundary. Air quality data used in this technical analysis were pulled from the EPA's Air Quality System on April 5, 2018.
[3] The specific methodology for calculating the ozone design values, including computational formulas and data completeness requirements, is described in 40 CFR part 50 Appendix U.
[4] The QA requirements for ozone monitoring data are specified in 40 CFR part 58 Appendix A. The performance test requirements for candidate FEMs are provided in 40 CFR part 53 Subpart B.
[5] The EPA finalized the rule on the Treatment of Data Influenced by Exceptional Events (81 FR 68513) and the guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events in September of 2016. For more information, see *https://www.epa.gov/air-quality-analysis/exceptional-events-rule-and-guidance*.

approximately 28 miles northeast of the nearest violating regulatory monitor; it measured one exceedance of the 2015 ozone NAAQS in 2015.

The 2015-2017 design values for counties in the area of analysis are shown in Table 3.2.

Table 3.2 Air Quality Data (all values in ppm).

County, State	State Recommended Nonattainment?	AQS Site ID	2015-2017 DV	2015 4th highest daily max value	2016 4th highest daily max value	2017 4th highest daily max value
Clark, NV	Yes (partial)	32-003-0022	0.069	0.072	0.068	0.069
		32-003-0023	0.061	0.065	0.058	0.062
		32-003-0043	0.071	0.073	0.071	0.070
		32-003-0071	0.072	0.068	0.073	0.075
		32-003-0073	0.072	0.072	0.072	0.074
		32-003-0075	**0.074**	0.071	0.077	0.076
		32-003-0298	N/A	0.070	0.068	0.070
		32-003-0540	0.067	0.069	0.069	0.065
		32-003-0601	0.065	0.068	0.062	0.067
		32-003-1019	0.067	0.071	0.066	0.066
		32-003-2002	0.072	0.073	0.073	0.072
		32-003-7772	0.068	0.070	0.068	0.066

The highest design value in each county is indicated in bold type.
N/A means that the monitor did not meet the completeness criteria described in 40 CFR part 50 Appendix U, or no data exists for the county.

Clark County shows a violation of the 2015 ozone NAAQS, therefore portions of this county are included in the final nonattainment area. A county (or partial county) must also be designated nonattainment if it contributes to a violation in a nearby area.

Figure 3.1, shown previously, identifies the Las Vegas nonattainment area and the violating monitors. Figure 3.1a provides a more detailed map of the ambient air quality monitor names and locations relative to the Las Vegas urban area.

Table 3.2 identifies the design values for all monitors in the area of analysis. Figure 3.2 shows the historical trend of design values for the violating monitors, as well as for two attaining monitors (Apex and Jean) in areas that were part of the EPA's initial December 2017 intended boundary, but were excluded by the State in its updated recommendation. As indicated on the map, there are five violating monitors that are located in Clark County. The violating monitors are generally located within the western and northeastern portions of the Las Vegas urban area in Clark County, while monitors that are attaining the 2015 ozone NAAQS are located in the southeastern portion of the Las Vegas urban area and elsewhere in Clark County outside of the Las Vegas urban area. Regulatory and non-regulatory monitoring data available in the northeast and northwest portions of the county and the towns of Mesquite and Moapa Valley, including data from the Logandale non-regulatory SPM, are below the NAAQS or, when non-regulatory or incomplete, have low numbers of exceedances.

Figure 3.1a Las Vegas Valley Ozone Monitors.

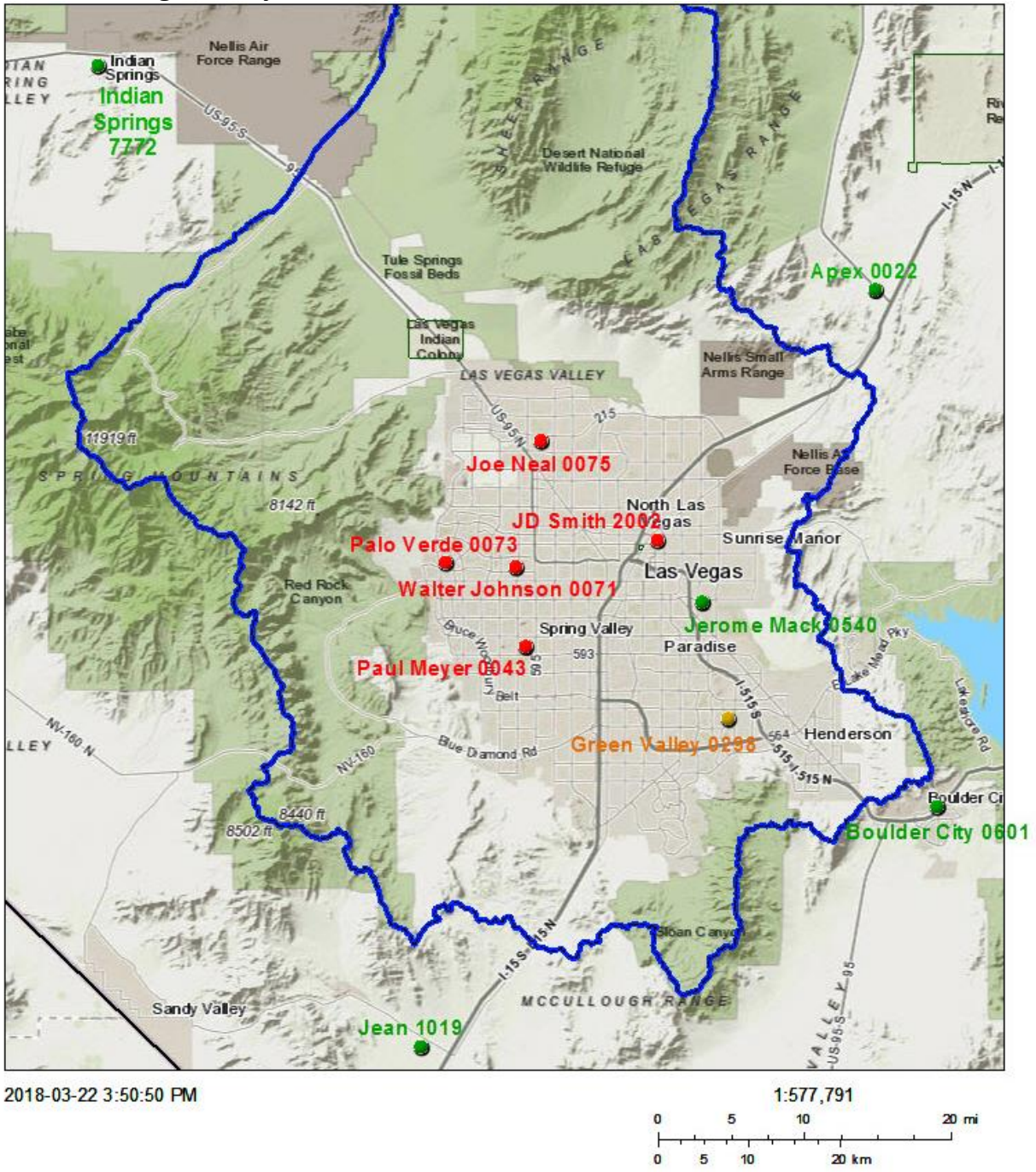
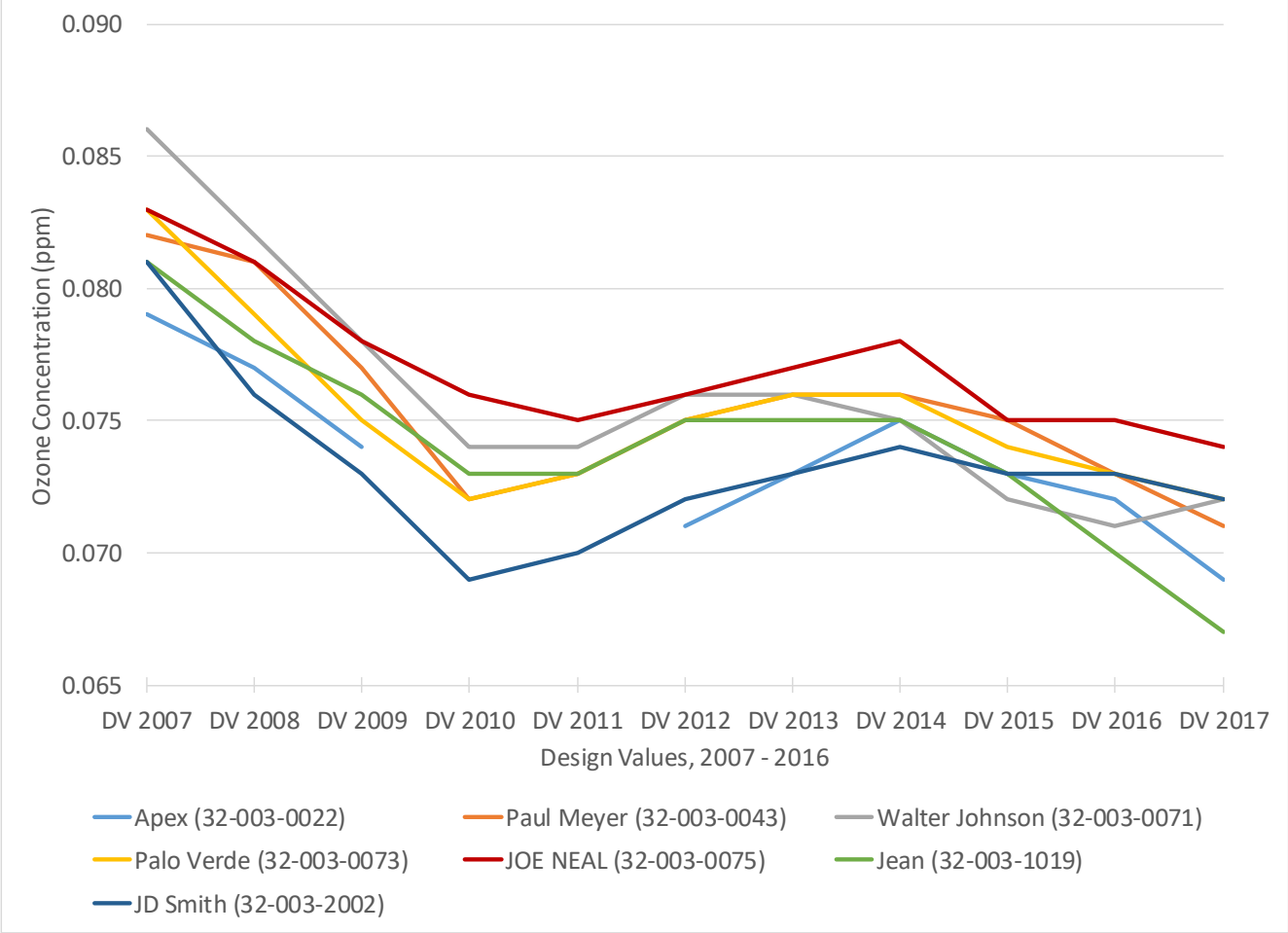


Figure 3.1a shows the EPA's nonattainment boundary for Las Vegas, NV as a blue line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2015-2017 design values; monitor names are followed by the last four-digits of their AQS ID numbers, all of which start with 32-003 (e.g. the JD Smith site has AQS ID 32-003-2002). Please refer to the master legend near the beginning of this document. The urbanized portion of Las Vegas is shown as the light gray area in the center of the figure, with gray lines representing the road network grid.

As shown in Figure 3.2, the trends for previous design values at monitoring sites located within the area of analysis have shown that concentrations generally trended down between 2007 and 2010, then trended up between 2010 and 2014, before trending down again between 2014 and 2017. Upward and downward trends in concentrations between 2010 and 2017 were generally less steep than the downward trend observed between 2007 and 2010.

Figure 3.2 Three-Year Design Values for Monitors in the Area of Analysis (2007 – 2017).



Clark County has five monitoring sites showing a violation of the 2015 ozone NAAQS based on 2015-2017 data. These violating monitors are located within portions of Clark County that were included as part of the designated nonattainment area for the 1997 ozone NAAQS.

Factor 2: Emissions and Emissions-Related Data

The EPA evaluated ozone precursor emissions of nitrogen oxides (NO_x) and volatile organic compounds (VOC) and other emissions-related data that provide information on areas contributing to violating monitors.

Emissions Data

The EPA reviewed data from the 2014 National Emissions Inventory (NEI). For each county in the area of analysis, the EPA examined the magnitude of large sources (NO_x or VOC emissions greater than 100 tons per year), small sources, and the magnitude of county-level emissions reported in the NEI. These county-level emissions represent the sum of emissions from the following general source categories: point sources, non-point (i.e., area) sources, non-road mobile, on-road mobile, and fires. Emissions levels from sources in a nearby area indicate the potential for the area to contribute to monitored violations.

Table 3.3 provides a county-level emissions summary of NO_x and VOC (given in tons per year (tpy)) emissions for the area of analysis considered for inclusion in the Las Vegas nonattainment area.

Table 3.3 Total County-Level NO_x and VOC Emissions.

County, State	State Recommended Nonattainment?	Total NO_x (tpy)	Total VOC (tpy)
Clark, NV	Yes (partial)	48,112	42,558
	Area wide:	48,112	42,558

For state-recommended partial counties, the emissions shown are for the entire county.

In addition to reviewing county-wide emissions of NO_x and VOC in the area of analysis, the EPA also reviewed emissions from large and small point sources. The location of these sources, together with the other factors, can help inform nonattainment boundaries. The locations of the large point sources are shown as square orange icons in Figure 3.3 below. Small point sources are depicted with yellow icons. The nonattainment boundary is also shown.

Figure 3.3 Large and Small Point Sources in the Area of Analysis.

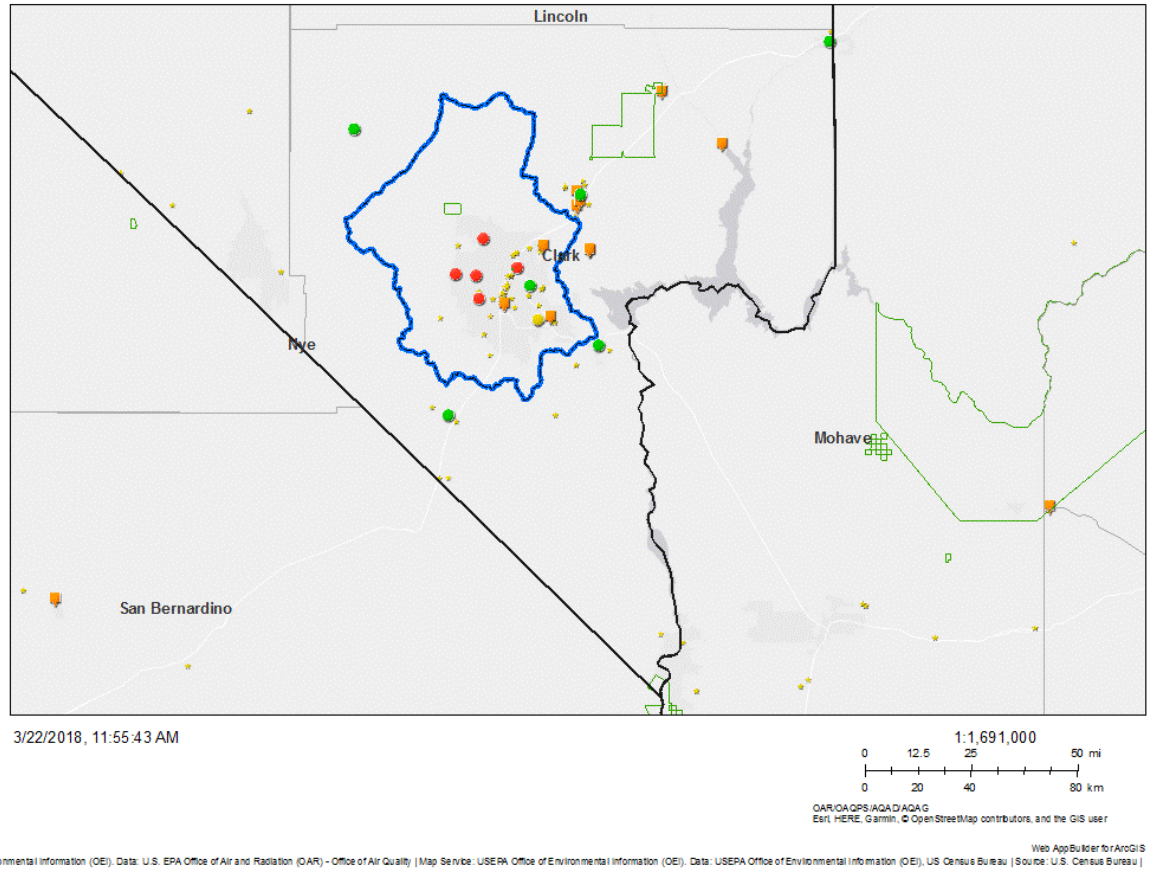


Figure 3.3 shows large point sources in the area of analysis for Las Vegas, NV as orange squares. Small point sources are shown as yellow stars. The EPA's nonattainment boundary for Las Vegas, NV is shown as a blue line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2015-2017 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

In order to better assess point source emissions for different areas within Clark County, the EPA developed a summary of point source emissions of NO_x and VOCs by HA. This information is

provided in Table 3.3a. The table includes all HAs within the area of analysis containing at least one large point source. The table also includes HAs 164A and 165. These two areas have no large point sources; they are included in the table because they were included in the State's initial recommended boundary and in the EPA's December 2017 intended boundary. Over 96% of Clark County's point source emissions are represented in Table 3.3a.

Table 3.3a. Summary of Point Source Ozone Precursor Emissions by HA.

Hydrographic Area	Number of Major Sources	Number of Minor Sources	Total Point Source NO_x Emissions (tpy)	Total Point Source VOC Emissions (tpy)	% of County Point Source NO_x and VOC Emissions	% of County Point Source Emissions Excluding Reid Gardner[a]
218	1	2	4,167	35	36.5%	1.3%
212	3	45	3,208	724	34.2%	53.1%
216	3	6	2,055	227	19.8%	30.8%
215	2	0	304	58	3.1%	4.9%
164A	0	3	178	27	1.8%	2.8%
220	1	0	134	1	1.2%	1.8%
165	0	0	0	0	0.0%	0.0%

[a] This value provides the percent of Clark County point source emissions of NO_x and VOC in each HA when emissions from the Reid Gardner Generating Station are excluded from the analysis. This source was closed in 2017 as described in the text below.

The EPA's analysis of relevant county-level emissions and the geographic locations of the relevant emissions showed that Clark County has emission levels of 48,112 tpy of NO_x and 42,558 tpy of VOC, based on the 2014 NEI. Approximately 12.7% of all ozone precursor emissions in the County come from point sources, based on category-specific emissions data from the 2014 NEI. The remaining 87.3% come from on-road sources (39.9%), nonpoint sources (30.6%), nonroad sources (16.6%), and fires (0.2%).

Table 3.3a shows the number of major sources, number of minor sources, total point source emissions of NO_x, total point source emissions of VOC, and the percentage of county point source NO_x and VOC emissions for each HA. The point source with the greatest emissions in the County in 2014 was the Reid Gardner Generating Station, located approximately 24 miles to the northeast of the Apex monitor (AQS ID 32-003-0022) in HA 218. While it emitted approximately 4,086 tpy of NO_x and 23 tpy of VOCs in the 2014 NEI, three of its four units were closed at the end of 2014 and the fourth unit was closed in 2017. Therefore, to better understand the distribution of emissions from the remaining sources in the area of analysis, the EPA also calculated the percentage of Clark County point source emissions of NO_x and VOC for each HA when emissions from the Reid Gardner Generating Station are excluded, as shown in the final column of Table 3.3a.

When emissions from the Reid Gardner Generating Station are excluded, the areas contributing the greatest percentage of point source emissions of NO_x and VOC in the County are HAs 212 and 216. Point sources in the Las Vegas urban area (HA 212) and the Apex Valley (HA 216), make up approximately 53% and 31% of point source emissions in the County, respectively. There are also large sources in HA 215 (2 sources) and 220 (1 source); point sources in these areas account for approximately 4.9% and 1.8% of point source emissions in the County, respectively. The area around the Jean monitor (AQS ID 32-003-1019) in HA 164A has no large point sources; small point sources

in HA 164A account for approximately 1.8% of point source emissions in the County. HA 165 has no large or small point sources.

Population density and degree of urbanization

In this part of the factor analysis, the EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include emissions of NO_x and VOC from on-road and non-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NO_x and VOC emissions that may contribute to violations of the NAAQS. Table 3.4 shows the population, population density, and population growth information for each county in the area of analysis.

Table 3.4 Population and Growth.

County, State	State Recommended Nonattainment?	2010 Population	2015 Population	2015 Population Density (per sq. mi.)	Absolute Change in Population (2010-2015)	Population % Change (2010-2015)
Clark, NV	Yes (partial)	1,951,269	2,114,801	268	163,532	8%
	Area wide:	1,951,269	2,114,801	268	163,532	8%

For state-recommended partial counties, the population shown is for the entire county.
Source: U.S. Census Bureau population estimates for 2010 and 2015 https://www.census.gov/data.html.

Figure 3.4 shows the 2012 census tract-level population information for Clark County. The census tracts in the figure show population, not population density, but some information about population density can be inferred by the relative size of the census tracts. The most densely populated area in Clark County is within the urban core of the Las Vegas urban area in the center of the county; this area is visible in the figure as the center of the county, where census tracts are much smaller than elsewhere in the county. This area also contains the census tracts with the highest population in the county. Census tracts to the east and west of the Las Vegas urban area cover much larger areas and have moderate total populations as compared to other census tracts in the county. Areas in the north and south of Clark County are generally sparsely populated, with census tracts covering a large area and with low total populations, as compared to other regions in the central, eastern, and western portions of the county. In comparison with the census tracts in the Las Vegas urban area, census tracts around the Apex monitor in HA 216, and around the Jean monitor in HAs 164A and 165, are generally very large in area and have small to moderate total populations.

Figure 3.4 Census Tract-Level Population.

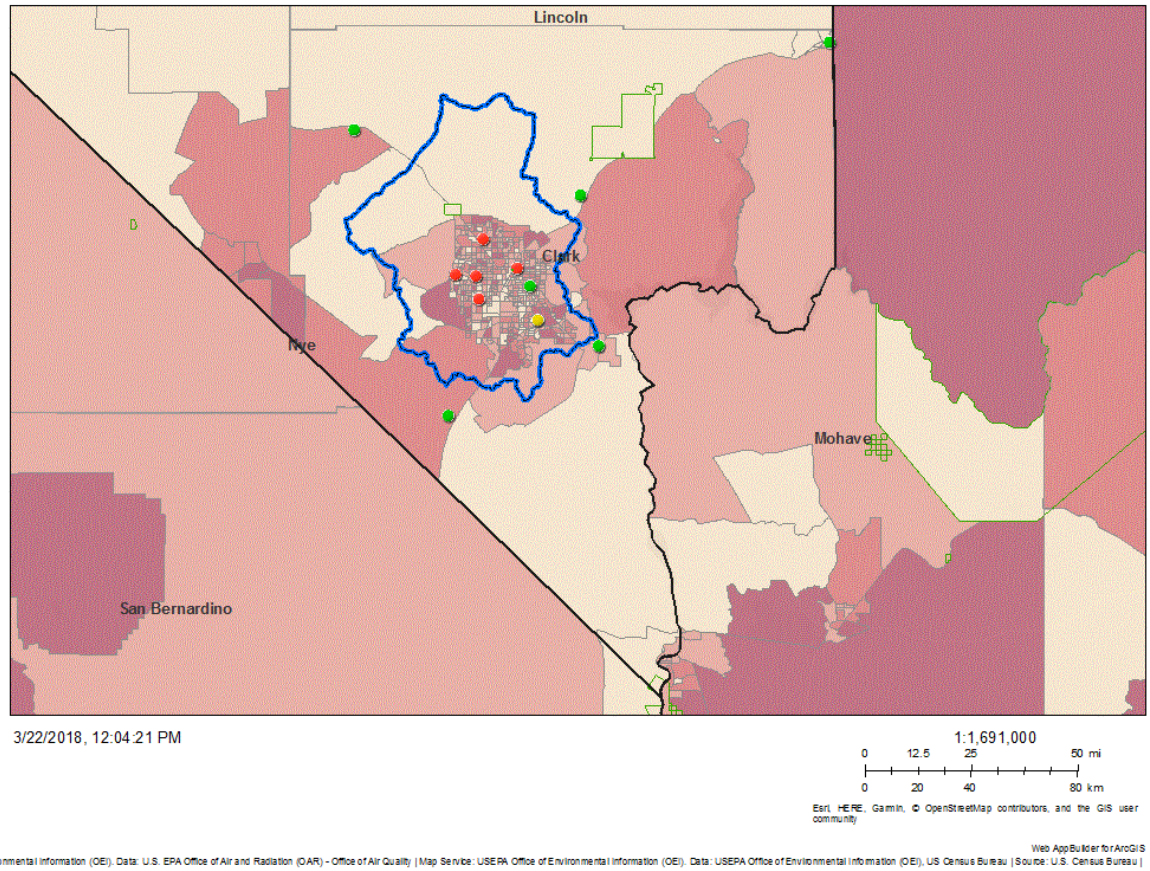


Figure 3.4 shows census tract population in the area of analysis for Las Vegas, NV. Lighter shades of red indicate areas with smaller populations; darker shades of red indicate areas with larger populations. The EPA's nonattainment boundary for Las Vegas, NV is shown as a blue line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2015-2017 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Traffic and Vehicle Miles Travelled (VMT)

The EPA evaluated the commuting patterns of residents, as well as the total vehicle miles traveled (VMT) for each county in the area of analysis. In combination with the population/population density data and the location of main transportation arteries, this information helps identify the probable location of non-point source emissions. A county with high VMT and/or a high number of commuters is generally an integral part of an urban area and high VMT and/or high number of commuters indicates the presence of motor vehicle emissions that may contribute to violations of the NAAQS. Rapid population or VMT growth in a county on the urban perimeter may signify increasing integration with the core urban area, and thus could indicate that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. In addition to VMT, the EPA evaluated worker data collected by the U.S. Census Bureau for the area of analysis. Table 3.5 shows the traffic and commuting pattern data, including total VMT for Clark county, number of residents who work in the county, number of residents that work in the county with a violating monitor, and the percent of residents working in the county with a violating monitor. The data in Table 3.5 are 2014 data.

Table 3.5 Traffic and Commuting Patterns.

County, State	State Recommended Nonattainment?	2014 Total VMT (Million Miles)	Number of County Residents Who Work	Number Commuting To or Within Counties with Violating Monitor(s) within Area of Analysis	Percentage Commuting To or Within Counties with Violating Monitor(s) within Area of Analysis
Clark, NV	**Yes (partial)**	**17,414**	**859,408**	**821,500**	**95.6%**
	Area wide:	17,414	859,408	821,500	95.6%

For state-recommended partial counties, the data provided are for the entire county.
Counties with a monitor(s) violating the NAAQS are indicated in bold.

To show traffic and commuting patterns, Figure 3.5 overlays twelve-kilometer gridded VMT from the 2014 NEI with a map of the transportation arteries.

Figure 3.5 Twelve Kilometer Gridded VMT (Miles) Overlaid with Transportation Arteries.

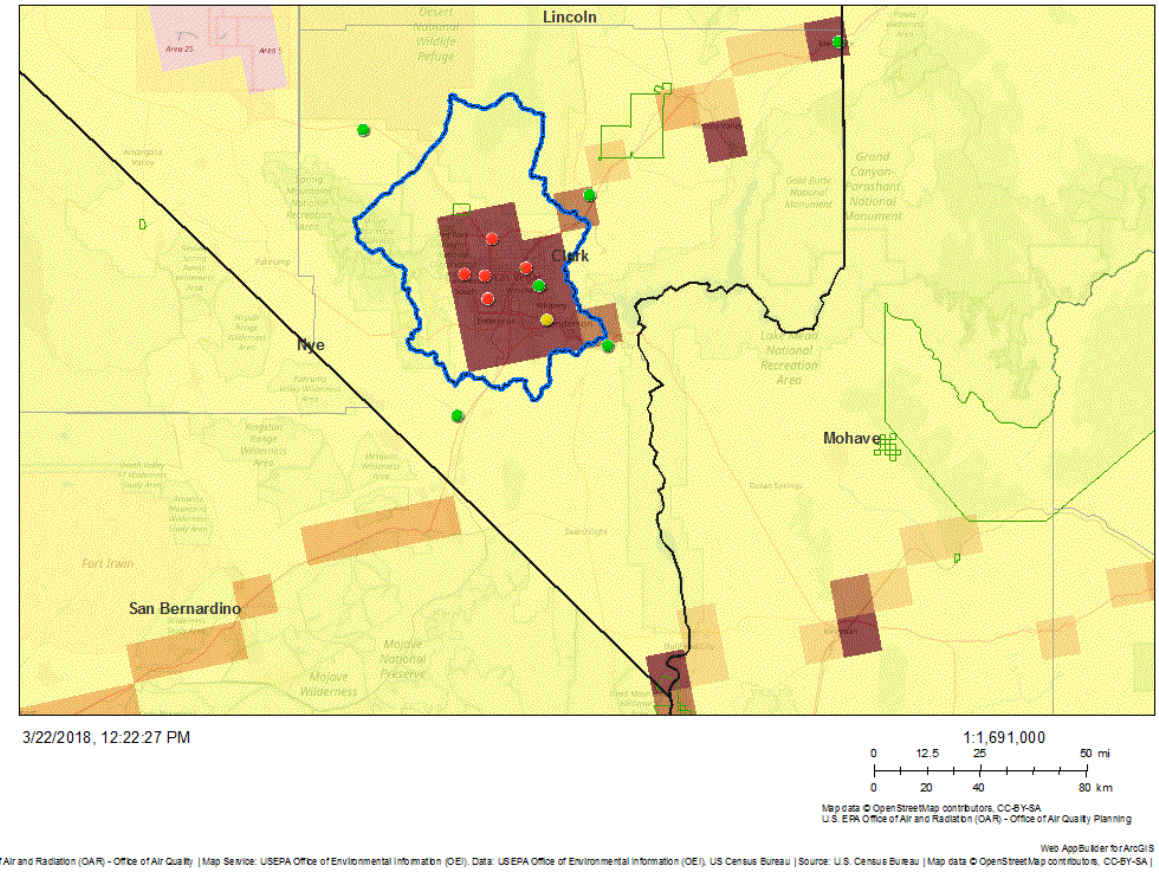


Figure 3.5 shows gridded VMT in the area of analysis for Las Vegas, NV. Lighter shades of yellow indicate areas with lower VMT; darker shades of red indicate areas with higher VMT. The EPA's nonattainment boundary for Las Vegas, NV is shown as a blue line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2015-2017 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The EPA's analysis of traffic and commuting patterns is based on data from the VMT spreadsheet on the Ozone Designations webpage (see footnote 1) and On the Map data from the Census Bureau[6] and

[6] The Census Bureau's On The Map web page can be found at https://onthemap.ces.census.gov/.

shows that the Las Vegas urban area has the highest total VMT levels within the area of analysis. There is also a grid cell with moderate VMT between the Las Vegas urban area and the area around the Apex monitor to the northeast, in HA 216. Areas around the Jean monitor, within HAs 164A and 165 to the south of the Las Vegas urban area, have low VMT relative to other areas of the county. The data also show that over 95 percent of residents who work in Clark County are commuting from or within the area of analysis. Some areas in the northeastern corner of the county contain isolated areas of high VMT relative to other areas in the county, located near Moapa Valley and Mesquite (visible as dark brown squares in Figure 3.5). The isolated nature of these areas of relatively high VMT suggest that this is primarily local traffic, not commuter traffic to the Las Vegas urban area.

Factor 3: Meteorology

Evaluation of meteorological data helps to assess the fate and transport of emissions contributing to ozone concentrations and to identify areas potentially contributing to the monitored violations. Results of meteorological data analysis may inform the determination of nonattainment area boundaries. In order to determine how meteorological conditions, including, but not limited to, weather, transport patterns, and stagnation conditions, could affect the fate and transport of ozone and precursor emissions from sources in the area, the EPA evaluated 2015-2017 HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) trajectories at 100, 500, and 1000 meters above ground level (AGL) that illustrate the three-dimensional paths traveled by air parcels to a violating monitor. Figures 3.6a through 3.6e show the 24-hour HYSPLIT back trajectories for each exceedance day (i.e., daily maximum 8 hour values that exceed the 2015 ozone NAAQS) for each of the violating monitors.

Figure 3.6a. HYSPLIT Back Trajectories for Paul Meyer (32-003-0043).

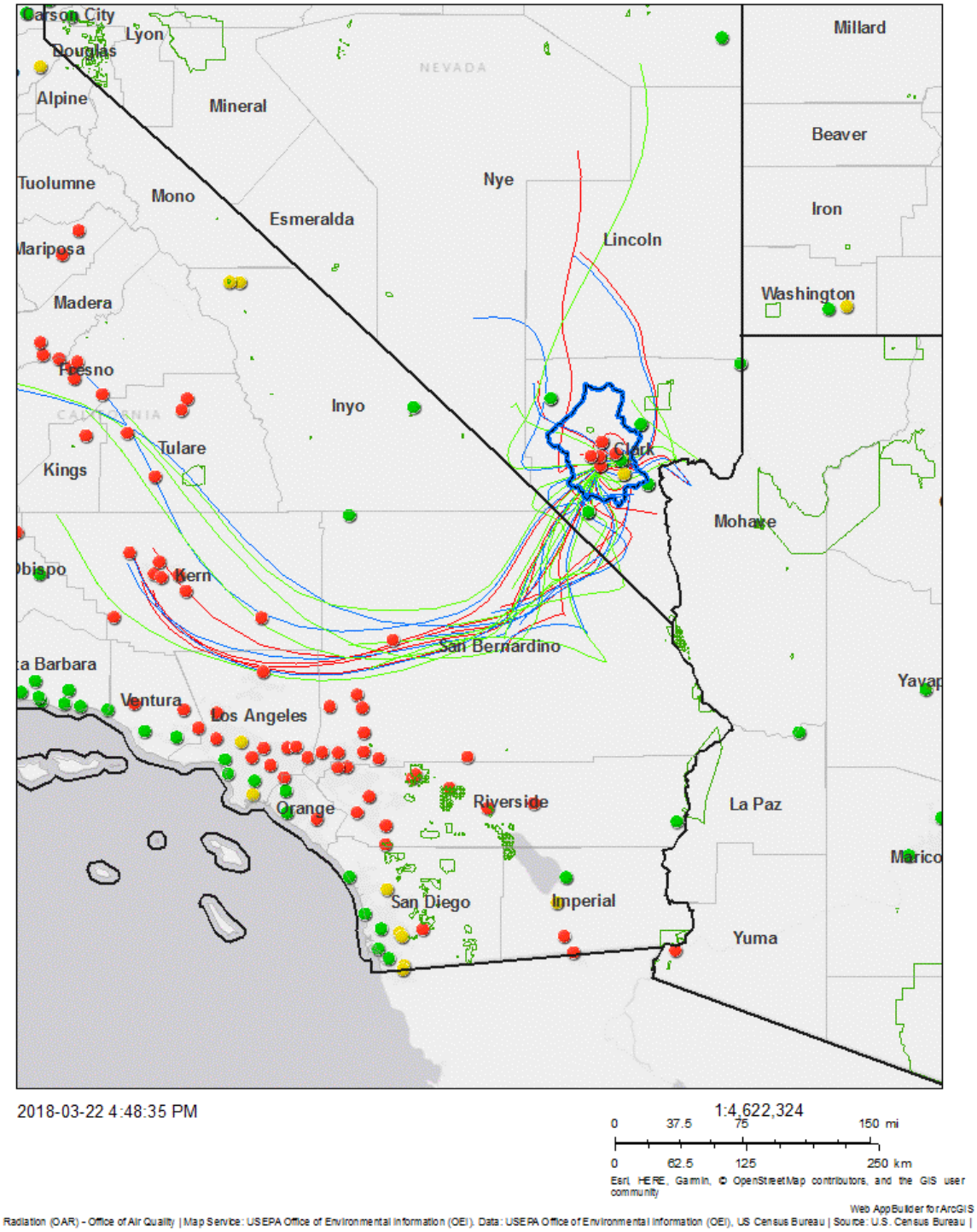


Figure 3.6a shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's nonattainment boundary for Las Vegas, NV is shown as a blue line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2015-2017 design values within Clark County, and 2014-2016 design values elsewhere. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 3.6b. HYSPLIT Back Trajectories for Walter Johnson (32-003-0071).

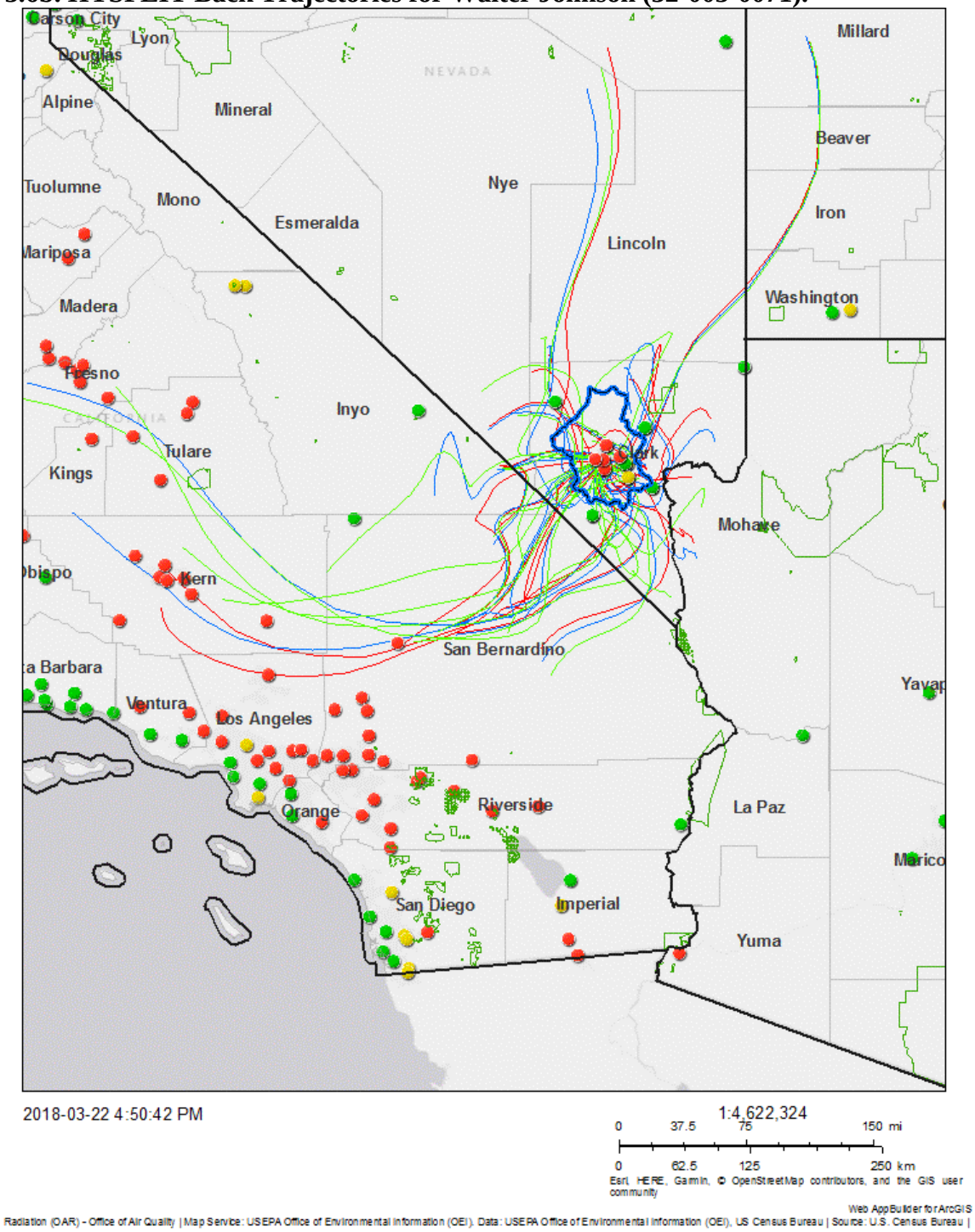


Figure 3.6b shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's nonattainment boundary for Las Vegas, NV is shown as a blue line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2015-2017 design values within Clark County, and 2014-2016 design values elsewhere. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 3.6c. HYSPLIT Back Trajectories for Palo Verde (32-003-0073).

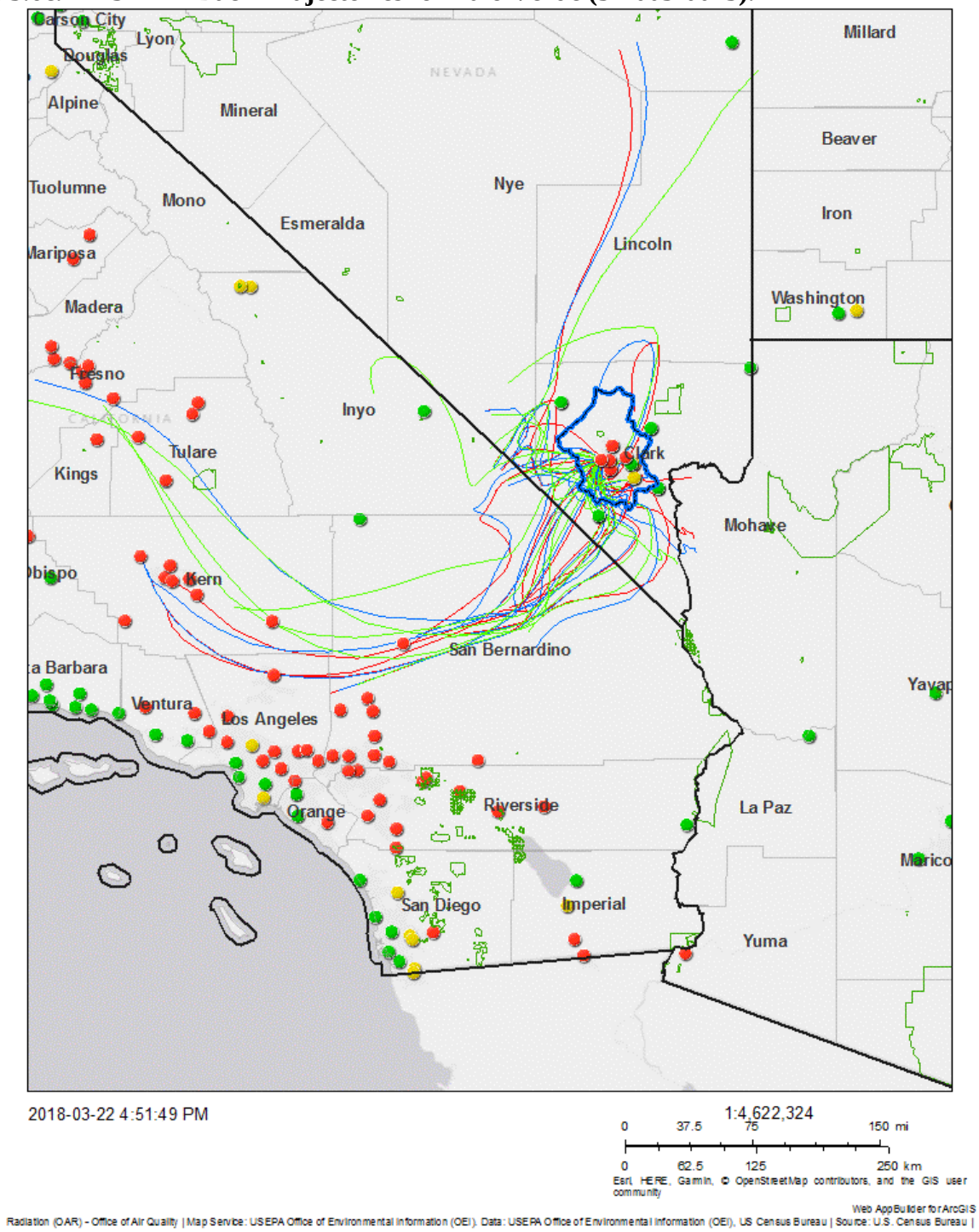


Figure 3.6c shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's nonattainment boundary for Las Vegas, NV is shown as a blue line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2015-2017 design values within Clark County, and 2014-2016 design values elsewhere. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 3.6d. HYSPLIT Back Trajectories for Joe Neal (32-003-0075).

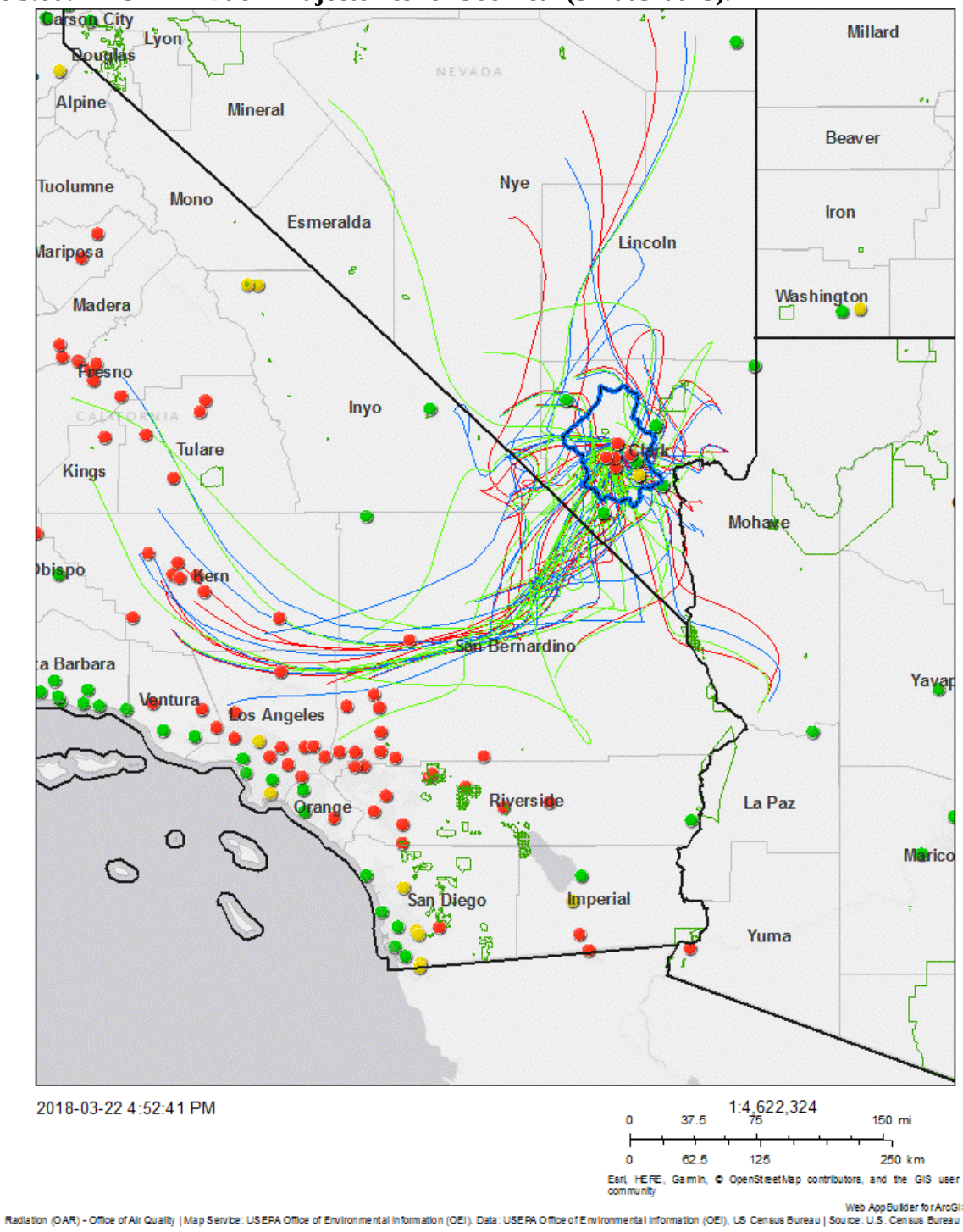


Figure 3.6d shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's nonattainment boundary for Las Vegas, NV is shown as a blue line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2015-2017 design values within Clark County, and 2014-2016 design values elsewhere. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 3.6e. HYSPLIT Back Trajectories for JD Smith (32-003-2002).

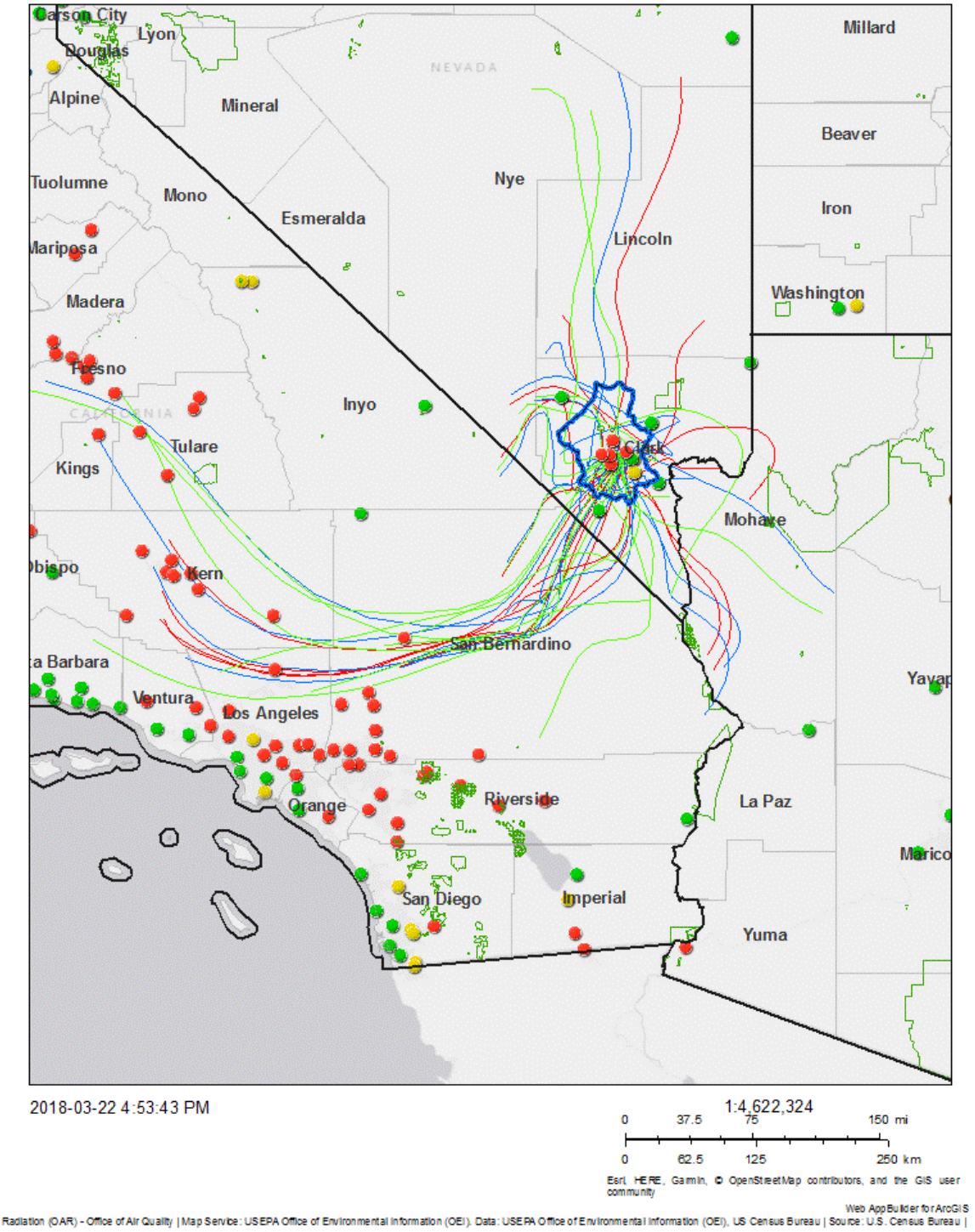


Figure 3.6e shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's nonattainment boundary for Las Vegas, NV is shown as a blue line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2015-2017 design values within Clark County, and 2014-2016 design values elsewhere. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The EPA's HYSPLIT analysis shows that back trajectories for days exceeding the 2015 ozone NAAQS in 2015-2017 generally pass through the southern half of the Clark County area of analysis, which indicates that sources in the Las Vegas urban area previously discussed in Factor 2 in Clark County may be contributing to exceedances or violations of the 2015 ozone NAAQS. The data also show that the winds during exceedance days are predominately from the southwest, passing over the locations in the southern half of Clark County, but originating in southern California, including the Los Angeles area and southern San Joaquin Valley. For a few individual days the trajectories extend northwest, northeast, or southeast, into regions in Nevada or Arizona with low population density and low VMT levels relative to the Las Vegas urban area.

The EPA's Ozone Designation Mapping Tool was used to create Figures 3.6a – 3.6e above. In addition, it was then used to identify individual trajectories that passed near areas with point sources outside of the Las Vegas Valley (HA 212). These point sources are in four HAs adjacent to HA 212 (HAs 164A, 215, 216, and 220), and are visible in Figure 3.3 above. After trajectory dates near source areas were identified, the EPA examined individual trajectories for each day and monitor, using the Navigator HYSPLIT tool on the AirNow – Tech web site.[7] Screen captures of these trajectories are available in the docket for this action. This tool allowed the consideration of the hourly timing and height AGL of trajectories passing near source areas. Notes on these trajectories are provided in the docket for this action, along with a qualitative summary for each source area.

During 2015-2017 there were 49 exceedance days at violating monitors, with a total of 108 exceedances (including exceedances at multiple monitors on some days). Of these, 3 days (3 exceedances) may have some contribution from the Apex area (HA 216); 3 days (10 exceedances) from the Jean area (HA 164A), 4 days (4 exceedances) from west Lake Mead (HA 215), and no days from the north end of Lake Mead (HA 220). These represent 3%, 9%, 4%, and 0%, respectively of all exceedances at violating monitors. The back trajectories imply that locations in the southwest of the county are more frequent contributors to exceedances than other sub-areas within Clark County, such as the Apex area and locations farther northeast. Of those trajectories that pass near these source areas outside HA 212, based locations for each hour available in the AirNow – Tech tool, most do so quickly and spend much more of their time moving slowly within the urbanized portion of HA 212, suggesting that stagnation and emissions within HA 212 are the dominant cause of high ozone there.

The documentation in the State's designation recommendation included a discussion by the Clark County Department of Air Quality of wind patterns in the Las Vegas Valley.[8] The Department discussed the predominant wind flow from the southwest and showed day and night wind roses consistent with daytime upslope flow and nighttime downslope flow that were appropriate to the mountains nearest each respective monitoring station. The winds were also consistent with what the Department calls a "transport corridor," with winds generally from the southwest into the low elevation area of the Las Vegas Valley, and continuing to exit toward the northwest. As discussed below under Factor 4 Geography/topography, the area to the northwest has the widest gap in the mountains that generally surround the Las Vegas Valley.

This predominant wind flow is not consistent with a contribution to violations from sources in HAs 215 and 220, such as the point sources indicated in Figure 3.3 (north of western end of Lake Mead, and

[7] https://www.airnowtech.org

[8] Attachment D, "Area Designation Recommendations for the 2015 Ozone NAAQS for Clark County, Nevada, Clark County Department of Air Quality, September 2016, Section 4 "Meteorology", p.4-1*ff;* and Section 5. "Geography/Topography", pp. 5-3 – 5-4

at northern tip of Lake Mead, respectively), though it does not preclude HYSPLIT trajectories aloft from passing above these HAs. HA 215 and HA 220 are addressed further under Factor 4, below.

Additional information is available from an earlier analysis undertaken by the Moapa Band of Paiute Indians (MBPI) during the 2004 designation process for the 1997 ozone NAAQS, and reviewed by the EPA.[9] The analysis was undertaken to examine whether existing and future sources in and near the Moapa River Indian Reservation, northeast of Apex in HAs 216 and 218, might contribute to ozone NAAQS exceedances. For 14 ozone episodes, MBPI and the EPA examined hourly wind speed and direction from five meteorological stations: Apex, Nellis Air Force Base, Clark County Regional Flood Control District "California Wash 3" monitor (southeast of the reservation), and at two stations at the Reid Gardner Generating Station (northeast of the reservation). These data were examined in conjunction with hourly ozone concentrations in the Las Vegas Valley. The analysis showed that winds generally blew from the southwest (i.e., from the valley toward the reservation). During the few periods that wind blew from the northeast (i.e., from the reservation area toward the valley), the flow was intermittent and inconsistent between the meteorological stations so there was not coherent transport flow toward Las Vegas Valley. At other such periods the timing of the northeast winds made it unlikely that emissions from the reservation or beyond could contribute to elevated ozone concentrations at locations southwest of the reservation. For example, northeast winds at Apex occurred only after locations northeast of Apex had northwest or south winds; that is, emissions from possible emission sources northeast of Apex would have been blown away southeast or north before the flow toward Las Vegas Valley began. This analysis indicates that the Moapa River Indian Reservation, and more generally HA 218, are not likely to contribute to ozone NAAQS violations at monitors in the Las Vegas Valley.

Factor 4: Geography/topography

Consideration of geography or topography can provide additional information relevant to defining nonattainment area boundaries. Analyses should examine the physical features of the land that might define the airshed. Mountains or other physical features may influence the fate and transport of emissions as well as the formation and distribution of ozone concentrations. The absence of any such geographic or topographic features may also be a relevant consideration in selecting boundaries for a given area.

The EPA used geography/topography analysis to evaluate the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area.

In the western U.S., topography can have an impact on pollutant formation and transport, and thus can play an important role in assessing which areas are contributing to monitored violations of the NAAQS.

Figure 3.7 shows the topography for Clark County, including HAs. The Las Vegas urbanized area is located in a broad valley, the Las Vegas Valley, bordered by a number of mountain ranges: the Sheep Range and Las Vegas Range lie to the north; the Sunrise and Frenchman Mountains to the east; McCullough Range to the southeast, and the Spring Mountain Range to the west. The heights of these ranges vary, with peaks ranging from 1,235 m (4,052 ft) to 3,633 m (11,918 ft). These are much higher than the city of Las Vegas at 610 m (2,001 ft). The surrounding mountains follow the boundary of HA 212, and impede pollutant transport.

[9] 69 FR 55956, September 17, 2004; "Technical Support Document, the Las Vegas 8-Hour Ozone Nonattainment Area," EPA Region 9, September 8, 2004

There are some gaps in the mountain ranges surrounding Las Vegas Valley. The widest gap is in the northwest, some 12 km across; U.S. Highway 95 follows this into neighboring HA 211. Flow is not impeded in this direction. There are several narrow mountain passes 1 km wide or less in the south and southeast. Interstate 15 crosses one at about 900 m (2950 ft) elevation on the way south to Ivanpah Valley in neighboring HAs 164A and 165; the Jean monitor (AQS ID 32-003-1019) is in HA 164A. There is also a 2 km wide gap in the southeast that the Las Vegas Wash follows into Lake Mead, leading to HA 215. Although there are two major sources of ozone precursors in HA 215, Nevada Cogeneration Associates #2 (104 tpy NO_x) and PABCO Building Products (200 tpy NO_x), they are separated from Las Vegas Valley by Sunrise Mountain, Frenchman Mountain, and several smaller, generally north-south trending ridges.

Finally, there is a 1 km wide pass in the surrounding mountains in the northeast, where Interstate 15 passes through Apex on the way to neighboring HA 216. That is where the Apex monitor (AQS ID 32-003-0022) is located, and also a number of industrial sources. The pass rises to only 750 m (2,460 ft), so is only a weak barrier to transport into or out of the Las Vegas Valley.

Figure 3.7. Topographic Illustration of the Physical Features.

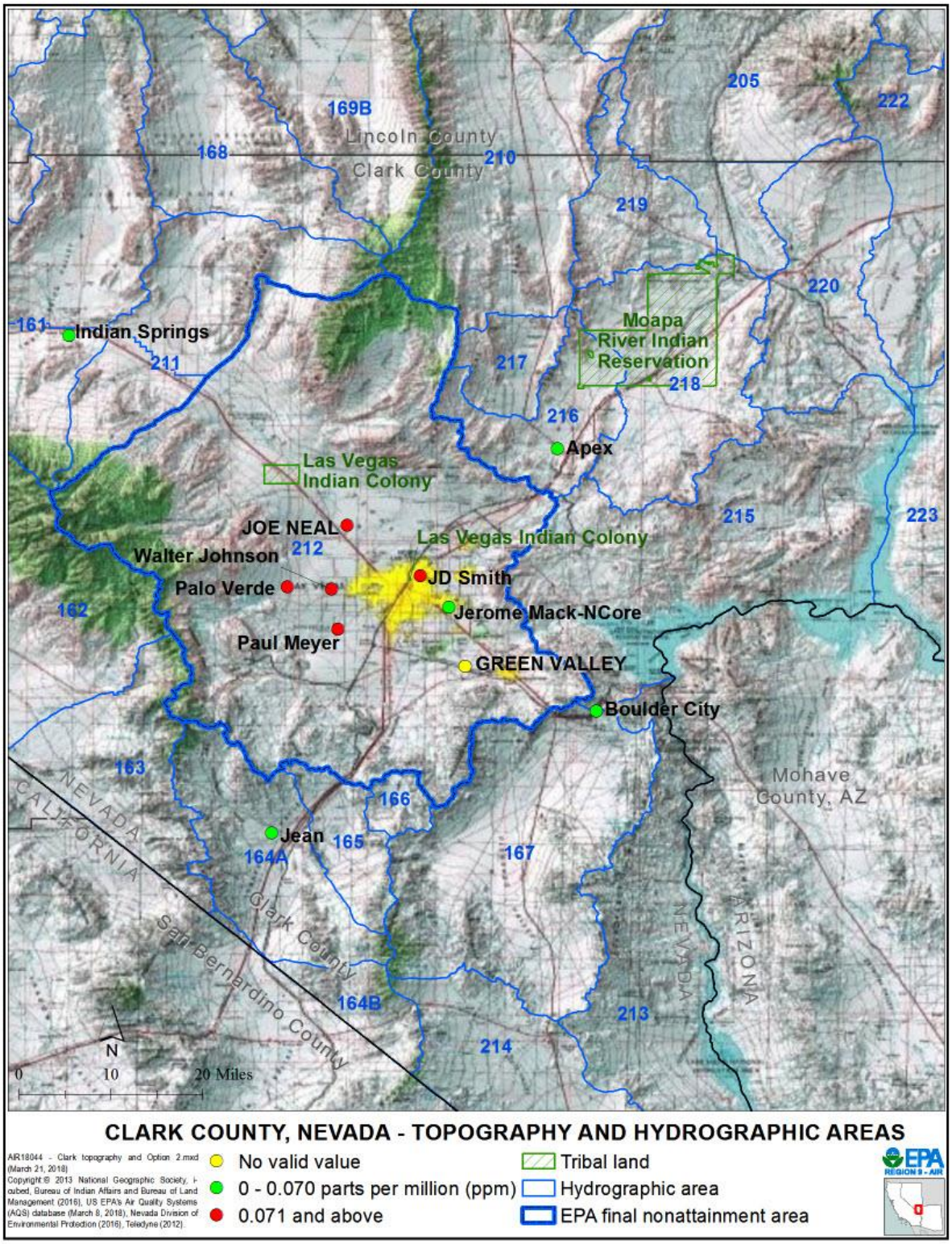


Figure 3.7 shows the topography and HA boundaries in the area of analysis for Las Vegas, NV. The EPA's nonattainment boundary for Las Vegas, NV is shown as a blue line. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2015-2017 design values. City limits for the City of Las Vegas are shown in yellow. HA boundaries are shown in blue, and land belonging to the Las Vegas Tribe of Paiute Indians (labeled as "Las Vegas Indian Colony") and Moapa Band of Paiute Indians (labeled as "Moapa River Indian Reservation") are outlined in green.

Factor 5: Jurisdictional boundaries

Once the geographic extent of the violating area and the nearby area contributing to violations is determined, the EPA considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary to carry out the air quality planning and enforcement functions for nonattainment areas. In defining the boundaries of the Las Vegas nonattainment area, the EPA considered existing jurisdictional boundaries, which can provide easily identifiable and recognized boundaries for purposes of implementing the NAAQS. Examples of jurisdictional boundaries include, but are not limited to: counties, air districts, areas of Indian country, metropolitan planning organizations, and existing nonattainment areas. If an existing jurisdictional boundary is used to help define the nonattainment area, it must encompass all of the area that has been identified as meeting the nonattainment definition. Where existing jurisdictional boundaries are not adequate or appropriate to describe the nonattainment area, the EPA considered other clearly defined and permanent landmarks or geographic coordinates for purposes of identifying the boundaries of the designated areas.

Figure 3.8 shows the relevant jurisdictional boundaries for the Las Vegas area, including the Clark County, the Las Vegas-Henderson-Paradise CBSA (Clark County), and the Las Vegas-Henderson CSA (Clark and Nye Counties, NV and Mohave County, AZ), as well as the location of Indian country. Figure 3.8 also shows the State-recommended nonattainment area boundary and the EPA's nonattainment area boundary for the 2015 ozone NAAQS, as well as the maintenance area boundary for the 1997 ozone NAAQS.

Figure 3.8 Jurisdictional Boundaries.

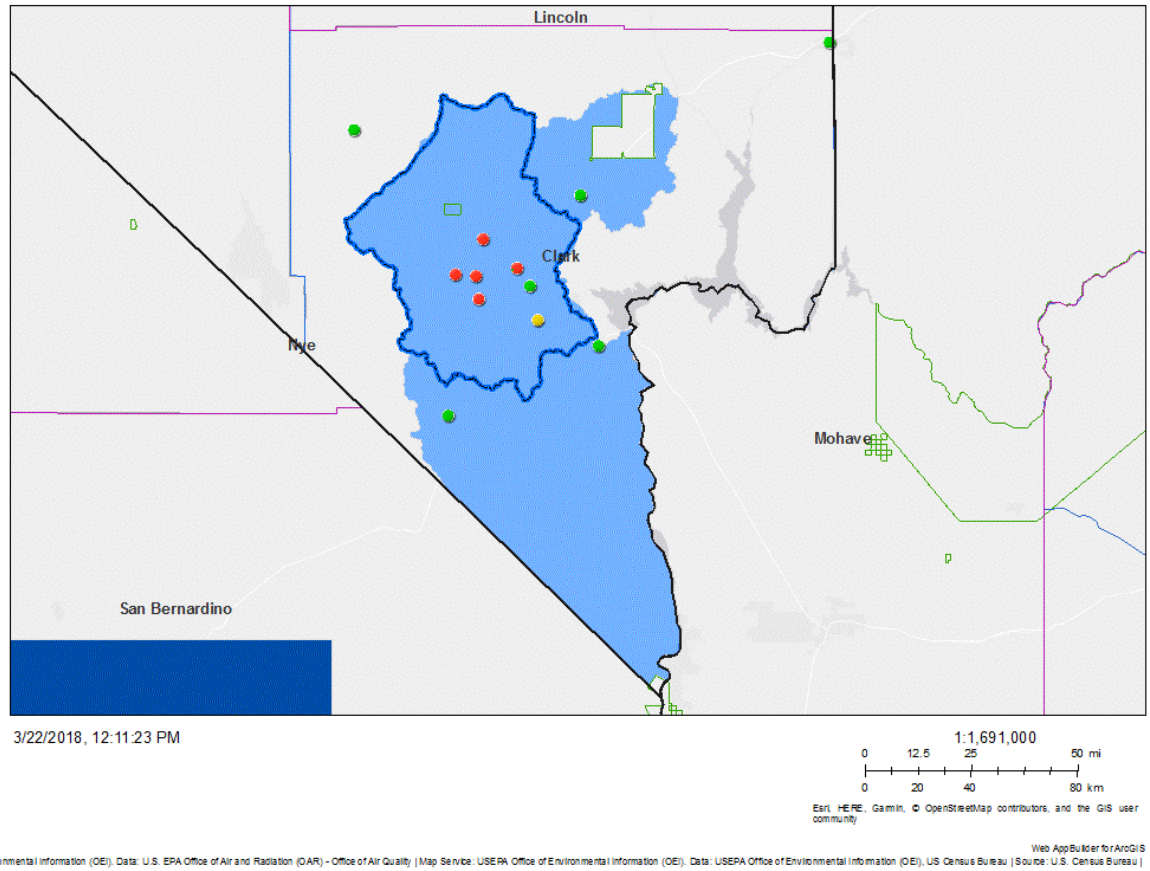


Figure 3.8 shows jurisdictional boundaries, including state boundaries (black lines), combined statistical areas (pink lines), metropolitan statistical areas (dark blue lines), and micropolitan statistical areas (light blue lines) in the area of analysis for Las Vegas, NV. The EPA's nonattainment boundary for Las Vegas, NV is shown as a blue line. The nonattainment boundaries for the 1997 and 2008 ozone NAAQS are shown in blue. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2015-2017 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The Las Vegas area has a previously established nonattainment/maintenance boundary associated with the 1997 ozone NAAQS. The State has recommended a different boundary for the 2015 ozone NAAQS. As discussed earlier, in defining the boundary for the 2015 ozone NAAQS, the State has followed its longstanding practice of using HAs as the basis for defining nonattainment area boundaries.

The boundary for the 1997 ozone NAAQS, and both the State-recommended and the EPA boundaries for the 2015 ozone NAAQS, are all partial county areas but differ in their spatial extent. The boundary for the 1997 ozone NAAQS extended farther into the northeast and southeast of Clark County to include emissions sources that are no longer in operation. The sources that are no longer in operation include the Reid Gardner Generating Station, which closed in 2017, and Mohave Generating Station, which closed in 2005. The State's updated boundary recommendation for the 2015 ozone NAAQS includes all of HA 212. The EPA's final boundary is the same as the State's February 2018 updated recommendation.

The Clark County Department of Air Quality has air quality planning jurisdiction throughout Clark County and the nonattainment area. The Regional Transportation Commission of Southern Nevada is the metropolitan planning organization responsible for transportation planning in Clark County.

The Las Vegas nonattainment area also includes portions of Indian country belonging to the Las Vegas Paiute Tribe. As defined at 18 U.S.C. 1151, "Indian country" refers to: "(a) all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation, (b) all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a state, and (c) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same." The EPA recognizes the sovereignty of tribal governments, and has attempted to take the input of the tribes into account in establishing appropriate nonattainment area boundaries.

Conclusion for Las Vegas, NV

Based on the assessment of factors described above, the EPA is not modifying the State's February 2018 recommendation to designate the portion of Clark County in HA 212 as the Las Vegas nonattainment area for the 2015 ozone NAAQS. The final Las Vegas nonattainment area boundary includes land in Nevada HA 212 of the Las Vegas Tribe of Paiute Indians.

Five air quality monitors in Clark County indicate violations of the 2015 ozone NAAQS based on the 2017 design values, therefore portions of this county are included in the EPA's nonattainment area (HA 212). All five violating monitors are contained within the nonattainment area boundary. Emissions and emission-related data and meteorological data also support the nonattainment area boundary. The city of Las Vegas and surrounding areas in the final nonattainment area boundary (HA 212) comprise a densely populated urban area with large point sources and other sources of ozone precursor emissions that contribute to violations. A few areas outside of the final nonattainment area boundary have large point sources or clusters of point sources (HAs 215, 216, and 220) or isolated areas of high VMT (towns of Mesquite and Moapa Valley, to the northeast of the nonattainment area boundary) but are excluded from the nonattainment area for reasons described in this TSD and summarized below. The remaining areas of Clark County outside of the nonattainment area boundary, including HAs 164A and 165, are generally sparsely populated with only a few isolated, small population centers with populations below 20,000, have low VMT, and have either no point sources, or isolated small point sources that together represent only a few percent of point source emissions within Clark County.

Geographic and topographic features surrounding the Las Vegas Valley support restricting the boundary to HA 212. Although air flow between Las Vegas Valley and HA 211 (to the northwest) and portions of HA 215 (to the east) is not much impeded by topographic features, HA 211 has no large point sources and the portion of HA 215 containing two large point sources is separated from the Las Vegas Valley by topography. Also, wind does not generally flow from those hydrographic areas toward the Las Vegas Valley, they are sparsely populated, and neither hydrographic area has any violating monitors. As discussed in Factor 3, wind speed and direction analysis indicates that the Moapa River Indian Reservation, and more generally HA 216, HA 218, and locations to the northeast in HA 220 and beyond are not likely to contribute to ozone NAAQS violations at monitors in the Las Vegas Valley. With a few exceptions, the preponderance of HYSPLIT trajectories are from the south or southwest; this generally supports the proposed boundary. Of those trajectories that pass near point sources outside HA 212, that is, HAs 215, 216, and 220, most do so quickly and spend much more of their time moving slowly within the urbanized portion of HA 212, suggesting that stagnation and emissions within HA 212 are the dominant cause of high ozone there. Thus, meteorology, geography, and topography support the final nonattainment area boundary.

Jurisdictional considerations support this boundary, as the area is located fully within Clark County, within the jurisdiction of the Clark County Department of Air Quality, and the boundary follows HA boundaries, which have been the typical basis for designations in Nevada.

Based on consideration of all five factors, the EPA is designating a portion of Clark County, the entirety of HA 212, as the Las Vegas, NV nonattainment for the 2015 ozone NAAQS.