Nonattainment-Transitional Designation:

Changes to the 2016 Ozone Plan Control Measure Implementation Schedule

August 2017 Report to the District Board of Directors

Santa Barbara County Air Pollution Control District
260 North San Antonio Road, Suite A, Santa Barbara, CA 93110
805-961-8800 • www.ourair.org

Aeron Arlin Genet
Air Pollution Control Officer

Santa Barbara County
Air Pollution Control District

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1 – INTRODUCTION AND REGULATORY FRAMEWORK

Addressing the Change in Designation to Nonattainment-Transitional

Santa Barbara County's designation for ozone under the California Clean Air Act recently changed from ***nonattainment*** to ***nonattainment-transitional***. As a result, the District is required to examine the stationary source control measures in the 2016 Ozone Plan and determine whether changes in the control measure implementation schedule are necessary. The following actions are recommended as an interim strategy, in order to comply with this requirement:

1. Delay implementation of the NOx control measures until 2018;
2. Shift the ROC control measures to contingency measures; and,
3. Receive and file a preliminary cost-benefit analysis of the NOx control measures; a complete cost-benefit analysis of the NOx control measures will be included with the Board action to implement the measures.

Action item 2 identified above is based on analysis and evidence presented in this report that shows there is some benefit to concentrating on NOx reductions instead of ROC reductions. This is not being proposed for adoption as the District's attainment and maintenance strategy, but rather is an interim measure that will be comprehensively assessed as part of the next triennial plan update in 2019. This report provides information and reasoning to support the actions that are recommended above.

Development and Adoption of the 2016 Ozone Plan

The 2016 Ozone Plan (2016 Plan) was developed in 2016, and was reviewed by the District Community Advisory Council (CAC) at three separate meetings prior to being recommended for Board adoption in August, 2016. It was adopted by the District's Board of Directors in October, 2016. It is the eighth triennial update to the initial state Air Quality Attainment Plan that was originally adopted by the District Board in 1991 (other updates were done in 1994, 1998, 2001, 2004, 2007, 2010, and 2013). Based on the region's nonattainment status for ozone, each of the Santa Barbara County plan updates have included an "every feasible measure" strategy to ensure continued progress toward attainment of the state ozone standards.[1]

Since 1992, the Santa Barbara County Air Pollution Control Board has adopted or amended rules implementing more than 25 control measures aimed at reducing emissions from stationary sources. These measures have substantially reduced ozone precursor pollutants (nitrogen oxides,

[1] As with many California air districts and pursuant to California Health and Safety Code Section 40914 (b), the District employs an alternative emission reduction strategy that employs "*every feasible measure*" and follows an "*expeditious adoption schedule*".

or NOx, and reactive organic compounds, or ROCs). This strategy has successfully improved the County's air quality and greatly reduced public exposure to ozone pollution. We now meet the state 1-hour ozone standard. While we have yet to attain the state 8-hour ozone standard, we are getting closer. In order to be designated attainment, air quality measurements must show that both the 1-hour and the 8-hour standards are not violated for three consecutive years.

The 2016 Plan addresses the state ozone standard only, and does not address the federal ozone standard. The District's 2001 Plan serves as the maintenance plan for the federal ozone standard. Table 1-1 provides a summary of the state and federal ambient air quality standards for ozone, their effective dates, and the attainment status for Santa Barbara County.

TABLE 1-1: STATE AND FEDERAL OZONE STANDARDS

Ambient Air Quality Standard	Concentration	Year Adopted	Status for Santa Barbara County
State 1-Hour	0.09 ppm	1988	Nonattainment - Transitional
State 8-Hour	0.070 ppm	2005	
Federal 8-Hour (old)	0.075 ppm	2008	Attainment
Federal 8-Hour (new)	0.070 ppm	2015	Undetermined[2]

Nonattainment-Transitional Designation and California Clean Air Act Requirements

When the 2016 Plan was adopted, the District was still designated as a nonattainment area for the state ozone standard. However, the District was aware that this designation might soon change to be nonattainment-transitional. The Board adoption included a commitment to review the 2016 Ozone Plan if the District's designation were to change to nonattainment-transitional, and determine whether the control measures scheduled for adoption or implementation within the next three years are needed.

The designation of nonattainment-transitional is described in The California Clean Air Act, as codified in California Health & Safety Code (HSC) Section 40925.5. The full text of HSC Section 40925.5 is included in Attachment 1 to this report. An air district is designated nonattainment-transitional if, during a single calendar year, the state standard is not exceeded more than three times at any one monitoring location within the District. After the 2016 Plan was adopted, air quality data for the 2016 ozone season was collected and transmitted to the California Air Resources Board. The data indicated that the District's attainment designation is now

[2] U.S. EPA has not finalized designations for the 2015 federal 8-hour ozone. The Air Resources Board has recommended to EPA that Santa Barbara County be designated attainment.

nonattainment-transitional. The change in designation was filed with the State in April 2017; the filing is included as Attachment 2 to this report.[3]

What does a designation of nonattainment-transitional mean, in terms of air quality planning and control measure implementation?

This change to a nonattainment-transitional designation means that, prior to implementing new control measures, the District must review the plan and determine whether the stationary source control measures scheduled for adoption or implementation within the next three years are needed to accomplish expeditious attainment of the state ozone standard. The District may modify the control measure schedule if it determines that modifications will not slow progress toward achieving or maintaining the state ozone standard.

Pursuant to HSC Section 40925.5(g), actions by the District to modify the 2016 Plan control measure implementation schedule "*shall be reviewed by the district in connection with its next review and revision of its attainment plan pursuant to Section 40925*." Hence, when the District begins development of the next triennial plan update, beginning in late 2018, any actions to delay or shift control measures to contingency will be reevaluated.

Should the District choose to implement any of the control measures in the 2016 Plan during the 3-year implementation period, Section 40930 of the HSC requires additional analysis and consideration prior to adopting new control measures. The entirety of HSC Sections 40925.5 and 40930 are included in Attachment 1, for reference.

The most critical language in HSC Section 40930 is from item (b), which requires that *the district shall not adopt any new or more stringent control measure until after preparation, and approval by the district board, of an analysis that does all of the following…*

- *Assesses the costs and benefits of all additional district, state, and federal regulatory actions that would be necessary to achieve attainment of the applicable state ambient air quality standard, taking into account only the additional costs and benefits attributable to achieving the state standard for the remaining three or fewer days each year.*

This report was prepared to evaluate the rule implementation schedule and provide a preliminary analysis of the costs and benefits of implementing the NOx control measures. When the NOx control measures are adopted by the District Board, a final cost-benefit analysis as required by HSC Section 40930 will be completed as part of the rule adoption package.

[3] California's Office of Administrative Law submitted this non-substantive regulatory change with the California Secretary of State and it was officially filed on April 17, 2017, see www.arb.ca.gov/desig/changes/2016sec100.pdf.

Section 2 of this report provides more detailed information on air quality, emission inventory, and control measures. Section 3 provides a description of, and the reasoning for, the recommended revisions to the 2016 Plan's control measure implementation schedule. Section 4 includes a summary of how the information in this document satisfies the requirements of HSC Sections 40925.5, and also discusses the preliminary analysis of the costs and benefits associated with implementing the NOx control measures.

2 – AIR QUALITY, EMISSION INVENTORY AND CONTROL MEASURE DATA

Ozone Concentrations in Santa Barbara County

The 2016 Plan includes a comprehensive review of air quality data and trends for Santa Barbara County.

Ozone pollution is not emitted directly into the atmosphere. It is formed through a series of complex chemical reactions involving the precursor pollutants ROC and NOx in the presence of sunlight. It is considered a "regional" pollutant because the locations where ozone levels are highest are not necessarily the locations where the precursor pollutants are emitted. Ozone levels tend to increase throughout the day as the amount of solar radiation increases. Meteorological conditions such as temperature inversions and stagnant air can lead to a buildup of pollutants and high ozone levels. Topography can also play a role in trapping air masses.

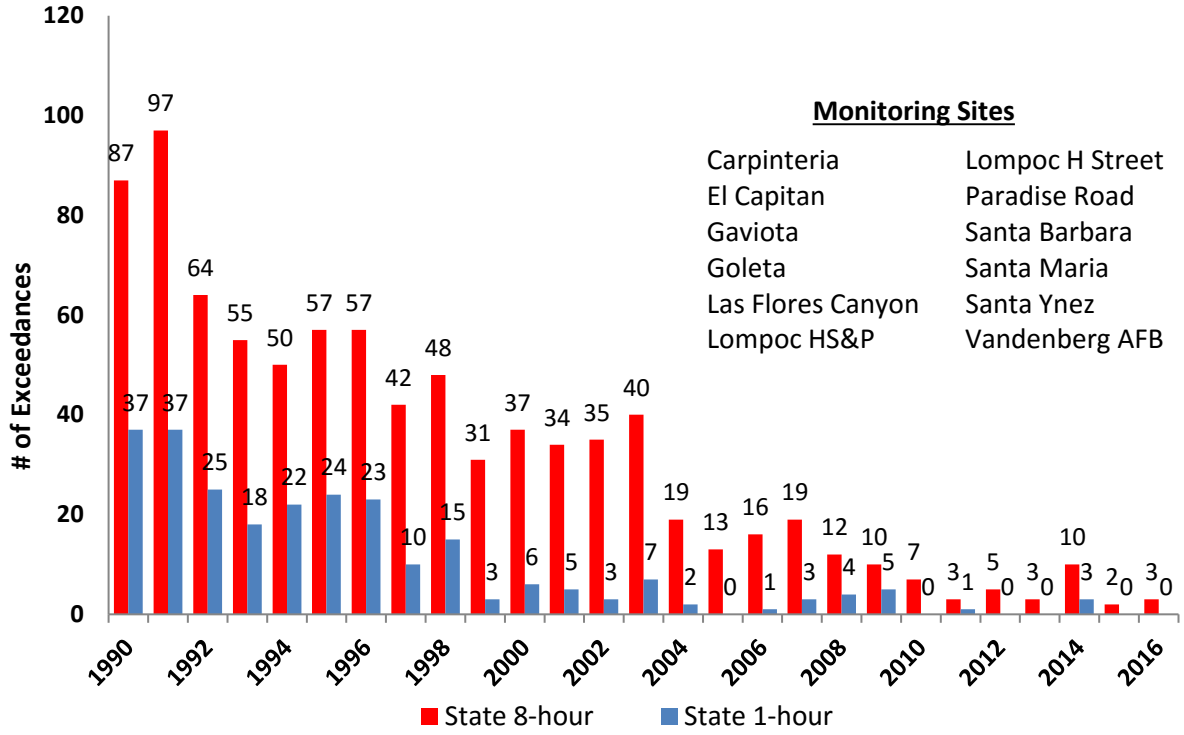
Ozone is measured at twelve locations throughout Santa Barbara County (see Figure 2-1 below). At each of the monitoring locations, a continuous air sample is pulled into an ozone analyzer and instantaneous readings from the analyzer are stored and averaged on an hourly basis. The hourly readings are displayed on the District's website and are also sent to the California Air Resources Board and the Environmental Protection Agency for display on their respective web-based data display tools. The hourly averages are used to generate 8-hour averages, for comparison to the state and federal 8-hour ambient air quality standards.

Figure 2-1 below demonstrates the long-term downward trend in ozone levels at all of the monitoring sites in Santa Barbara County, from 1990 to 2016. In 2015, the public was exposed to ozone concentrations exceeding the 8-hour standard on two days. In 2016, three 8-hour exceedance days occurred.[4] Because no individual station had more than three exceedance days, the District's designation changed from nonattainment to nonattainment-transitional.

[4] 2016 ozone data are preliminary and subject to review and approval by the California Air Resources Board.

FIGURE 2-1: 8-HOUR AND 1-HOUR OZONE EXCEEDANCE TRENDS

SANTA BARBARA COUNTY, 1990-2016



While there has been an overall downward trend, there are still several monitoring stations that measure ozone levels close to or above the state 8-hour standard, in both the southern and the northern portions of the county. Table 2-1 shows the number of ozone exceedance days per year at each monitoring station.

TABLE 2-1: SANTA BARBARA COUNTY EXCEEDANCE DAYS AND LOCATIONS, 2007-2016

	Number of Days > State 8-Hour Standard									
Monitor Location	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Las Flores Canyon	11	3	7	4	2	4	1	4	2	1
Paradise Road	9	2	5	6	3	2	2	1	0	1
Carpinteria	2	4	7	3	1	1	1	7	0	0
El Capitan	1	0	0	1	1	0	0	1	0	2
Vandenberg AFB	3	2	0	1	0	0	1	3	0	0
Santa Barbara	1	0	1	0	1	0	0	3	0	1
Goleta	0	0	1	0	1	0	0	3	0	1
Gaviota - Nojoqui	0	0	0	0	2	0	0	2	0	0
Santa Ynez	2	3	0	1	1	0	0	0	0	0
Lompoc HS&P	0	1	0	0	2	0	1	1	0	0
Lompoc H St.	0	1	0	0	0	0	0	1	0	0
Santa Maria	0	0	0	0	0	0	0	0	0	0
*Total Exceedance Days**	**19**	**12**	**10**	**7**	**3**	**5**	**3**	**10**	**2**	**3**

* *Total Exceedance Days* indicates the number of days within a year where an exceedance was measured by at least one monitoring station in Santa Barbara County.

Emission Inventory for Ozone Precursor Pollutants

Each triennial update to our ozone plan includes an inventory of the ozone precursor pollutants NOx and ROC. Table 2-2 includes the emission inventory for the 2016 Plan base year (2012), and forecast years 2025 and 2035. This inventory includes sources that are within our air district's regulatory control (stationary sources), as well as sources that are generally outside of our local control (area-wide sources and mobile sources). Data for the 2016 Plan emission inventory was compiled by both the air district (for regulated stationary sources as well as some area-wide sources) and the California Air Resources Board (ARB, for some area-wide sources and mobile sources). In order to ascertain the "growth" in emissions over time, growth profiles were developed and were applied to the 2012 base year data to project future year emissions. Also, in order to adjust for the emission reductions that are expected to occur as existing regulations are implemented over time, control profiles were developed and were applied to the base year data to project future year emission decreases. These control profiles do not estimate emission reductions from any new regulations which may be adopted between now and 2035.

TABLE 2-2: ROC AND NOX EMISSION FORECASTS (TONS PER DAY)[5]

Source Category	2012		2025		2035	
	ROC	NOx	ROC	NOx	ROC	NOx
Stationary Sources	11.51	5.35	11.90	5.15	13.59	5.25
Area-wide Sources	12.62	0.46	11.09	0.30	11.44	0.27
On-Road Vehicles	4.88	9.44	1.81	2.65	1.61	2.11
Other Mobile [6]	3.22	6.83	2.18	4.51	1.93	3.83
Marine Shipping	2.13	49.50	4.14	39.36	6.09	36.24
Total	**34.37**	**71.58**	**32.06**	**51.96**	**35.67**	**47.69**

Upon closer examination of Table 2-2, the following generalizations can be made about the emission forecasts, and where and why the largest amount of emission reductions are anticipated to occur:

- Stationary source NOx emissions are estimated to remain fairly stable, despite anticipated growth in some industrial sectors. Stationary source ROC emissions are expected to increase slightly due to additional solvent and coating use from expanding businesses. For the Santa Barbara County oil and gas production sector, a growth factor of 1.0 was used. This growth factor is discussed further in the 2016 Plan.
- Area-wide source emissions are anticipated to remain fairly stable; the statewide consumer product regulations will reduce ROC emissions, and population growth will increase ROC emissions. NOx emissions will be reduced slightly over time by phasing in newer, cleaner combustion equipment at residential sources (per District Rule 352, amended in 2011).
- On-road vehicle measures, including better emission controls, greater fuel efficiency, and increasing use of zero emission vehicles, are expected to greatly reduce both NOx and ROC emissions. A certain amount of turnover in the vehicle fleet is assumed, and is critical to accommodate the newer, cleaner vehicles required by California's Zero Emission Vehicle (ZEV) Regulation and Truck and Bus Regulation.
- Other mobile equipment emissions of both NOx and ROC are expected to decline as a result of the Air Resources Board's in-use regulation of off-road equipment, which includes construction and other mobile equipment.
- Marine shipping emissions, although they occur offshore of Santa Barbara county, are a very large component of the NOx emission inventory and can potentially move onshore and affect local ozone concentrations. NOx emissions are anticipated to decrease as federal and international requirements for cleaner burning engines cause the vessel fleet to become cleaner. However, there is a long lag time for the fleet to turn over. ROC emissions are expected to increase due to an increase in vessel activity and fuel consumption.

[5] Includes emissions occurring both onshore and in the Outer Continental Shelf (OCS).
[6] Marine Shipping emissions have been broken-out of the Other Mobile category in this table.

By applying both the growth profiles and the control profiles described above to the inventory data to estimate future year emissions, and using the best available emission estimates for mobile sources provided by ARB in consultation with EPA, this inventory reflects all of the changes in emissions that are anticipated due to the continued implementation of ***adopted*** control measures.

However, HSC Section 40925.5 requires that, when determining whether the stationary source control measures scheduled for adoption or implementation within the next three years are needed to accomplish expeditious attainment, the following factors should be considered:

- Effect of adopted ***and proposed*** motor vehicle controls
- Effect of adopted ***and proposed*** area source controls
- Turnover of the vehicle fleet
- Impact of measures previously adopted by the district which are in the process of being implemented
- Impact of measures previously adopted by the state board which are in the process of being implemented
- Impact of measures previously adopted by the EPA which are in the process of being implemented
- Other significant factors that influence emission trends

As indicated in bold above, HSC Section 40925.5 also requires consideration of ***proposed*** motor vehicle and area source controls. There are a wide variety of State proposals (both regulatory and voluntary/incentive-based) that would further reduce mobile and area source emissions of ozone precursors. For example, they may involve providing infrastructure for zero emission vehicles, reducing "vehicle miles traveled" (VMT), reducing greenhouse gas emissions at residential, commercial, industrial, municipal and agricultural sources, improving energy efficiency, or increasing the use of renewable energy. Specific examples of such proposals or voluntary measures (subject to funding availability) are:

- The Air Resources Board has drafted a 2017 Climate Change Scoping Plan Update that lays out a number of proposals to further reduce greenhouse gases across many sectors (including area sources) statewide. In many instances, these efforts may lead to reductions in NOx and/or ROC emissions from both mobile and area sources.

- Voluntary vehicle retirement programs, such as the District's Old Car Buy Back Program, and other incentive programs such as California's Clean Vehicle Rebate Program and Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP), can help to accelerate fleet turnover so that cleaner cars, trucks and buses come into use.

These ***proposed*** measures were not specifically quantified in the 2016 Plan emission inventory and future year projections. But, if they are implemented, they can be expected to further reduce NOx and ROC emissions. However, there is no guarantee that these measures will be

implemented, and to what extent they will yield ozone precursor co-benefits. At this point they are either proposals or voluntary programs that are subject to funding availability, and are not legislative or regulatory mandates.

Stationary Source Control Measures Included in the 2016 Ozone Plan

The 2016 Plan included six different stationary source control measures that were considered feasible and cost-effective to implement during the 3-year plan period, 2017 to 2019. These stationary source control measures focus on achieving both NOx reductions and ROC reductions by promoting the use of ultra-low NOx burners and low-ROC solvents. To ensure that the District proposed every feasible measure for Santa Barbara County, staff performed the following analysis when creating the 2016 Ozone Plan Implementation schedule:

1) Compared the District's rules to rules currently adopted by other California air districts;
2) Reviewed new staff reports and guidance documents on any recent or upcoming revisions to other air district, ARB, and EPA rules; and
3) Considered the magnitude of the emissions reductions as well as the cost-effectiveness of the measures.

The implementation schedule was developed with these criteria in mind, and target adoption dates were set for each measure. All of the measures were found to have a cost-effectiveness similar to those measures previously adopted by Santa Barbara County Air Pollution Control District. They would establish emission limits and performance standards consistent with rules already adopted and implemented by other air districts. The 2016 Ozone Plan implementation schedule, the associated cost-effectiveness of each measure, estimated number of facilities/units affected by the measures, and the emission reductions estimated to be achieved are included in Section 3 of this report.

Implementation of the 2016 Plan control measures will be accomplished through the District's rule development/rule revision process. This process involves a public workshop, outreach to the regulated community and interested parties, Community Advisory Council (CAC) review, and final review and approval by the District Board. Because the District is now officially designated nonattainment-transitional, the District Board must "determine whether the stationary source control measures scheduled for adoption or implementation in the next 3 years are needed to accomplish expeditious attainment or to maintain the state standard following the projected attainment date." (HSC 40925.5(a)).

Following is a more in-depth discussion of the process and reasoning for the stationary source control measures that were included in the 2016 Ozone Plan.

Impact, Cost-Effectiveness, and Feasibility of Measures

NOx Measures: The NOx control measures identified as "further study" in the 2013 Clean Air Plan (updates to Rules 342 and 361) were revised as part of the 2016 Ozone Plan process so that they would not require retrofits. In the 2013 Plan, the updates to Rules 342 and 361 were found to not be cost effective and were listed as further study measures, rather than measures proposed for adoption. The 2016 reevaluation looked at regulations and air pollution control guidance from other air districts, the California Air Resources Board, and the U.S. EPA, and determined whether there was any new information or technology that would necessitate a change to the control measures. New information related to equipment or installation costs was considered. In addition, the current Santa Barbara County inventory of permitted and permit-exempt equipment, and their usage amounts, were examined. Staff compiled updated information on equipment and installation costs, and made reasonable assumptions for the operational life of the units, ongoing maintenance, testing and material costs, and the units' average operational load.

After examining this information more carefully, staff determined that the proposed amendments to Rules 342 and 361 are cost-effective if they apply to new units or replacements of existing units. Staff determined that by eliminating the retrofit requirement (i.e., not requiring operators of existing units to replace the burners by a specific date), especially for the larger, low-usage units, the control measures become cost-effective. The operators would only become subject to the lower emission limits when they are installing or replacing equipment anyway as part of their normal operations. Rule 360, the other NOx control measure, was already set up as a point-of-sale rule so the additional NOx controls proposed in the measure would only apply when a unit is installed. Thus, the cost-effectiveness values for the NOx control measures in 2016 Ozone Plan improved significantly from those in the 2013 Clean Air Plan and all three measures were proposed for adoption. All of the measures would set emission limits that are consistent with measures already adopted and implemented by other Districts, so all of the measures are feasible.

In summary, the NOx control measures that had previously required retrofit of existing combustion equipment were tailored instead to only apply to new or replacement equipment. All businesses with combustion units rated at 2 MMBtu/hr or greater and some businesses with smaller combustion units are already required to have a District permit. So, implementing the NOx control measures and tracking compliance with them will not involve unpermitted sources being required to obtain a District permit for the first time. Table 2-3 below provides the cost-effectiveness values for all six of the stationary source control measures from the 2016 Plan.[7] These values are also included in Tables 3-1 and 3-2 of this report, along with the adopted and proposed revisions to the control measure implementation schedule in the 2016 Plan.

[7] Values are from the 2016 Ozone Plan, Table 4-2.

ROC Measures: Similar to the NOx measures, the ROC control measures from the 2013 Clean Air Plan were also reevaluated as part of the 2016 Plan process to assess whether they are cost effective and feasible. The ROC control measures would require various industries to use solvents with an ROC content of 25 grams/liter (g/L), or less, and also low-ROC inks and fountain solutions in graphic arts operations. All of the measures would set emission limits that are consistent with measures already adopted and implemented by other Districts, so all of the measures are considered to be feasible.

One of the unique challenges of the ROC measures is that graphic arts businesses in Santa Barbara County that would have to comply with Rule 354, Graphic Arts, are not currently subject to District permit requirements. Implementing the Rule 354 control measure may require some portion of the graphic arts businesses in the county to obtain permits for the first time so that their material usage amounts can be tracked. Since some of these are small businesses, this may result in administrative challenges and costs for both the businesses and the District.

The District does not currently have recent emission information from these graphic arts operations, such as the amounts and types of ROC materials used, because these operations are not required to submit material usage amounts to the District. The data that was used to compile the ROC emission reduction estimates are based on studies and surveys of industry operations that were conducted by larger air districts as part of their rulemaking process. Since that time, there have been several changes to these industries and their business models that affect the emission reduction estimates, such as:

- More low-ROC products are available and in-use in the industry now, because large regions in California already require their use;
- Some businesses have voluntarily opted to use less harmful, or less polluting, products; and,
- Due to changes in technology and work practices, many businesses have moved to paperless systems for products, marketing and outreach purposes.

With these industry changes in mind, the actual ROC reductions achieved with the Rule 354, Graphic Arts measure may be much less than the estimates in the plan. During the rule development process for this control measure, the emission reductions from this business sector would need to be updated to further reaffirm the cost-effectiveness and feasibility of the control measure.

TABLE 2-3: CONTROL MEASURE COST-EFFECTIVENESS

2016 Ozone Plan Stationary Source Control Measures	Cost-Effectiveness ($/Ton)
NOx reductions Revised Rule 360 - Boilers, Water Heaters, and Process Heaters (0.075 - 2 MMBtu/hr)	$2,800 to $11,300
NOx reductions Revised Rule 361 - Boilers, Steam Generators, and Process Heaters (2 - 5 MMBtu/hr)	$13,100 to $17,300
NOx reductions Revised Rule 342 - Boilers, Steam Generators, and Process Heaters (5+ MMBtu/hr)	$8,700 to $21,000
ROC reductions Revised Rule 321 - Solvent Cleaning Machines and Solvent Cleaning	$0 to $1,000
ROC reductions Revised Rule 351 - Surface Coating of Wood Products	$1,000 to $2,000
ROC reductions Revised Rule 354 - Graphic Arts	$1,000 to $3,100

Together, the NOx control measures in the 2016 Plan are estimated to decrease NOx emissions by about 0.1 tons per day, which is about 2% of the stationary source inventory. The ROC control measures in the 2016 Plan are estimated to decrease ROC emissions by about 0.29 tons per day, which is about 2.5% of the stationary source inventory. The anticipated emission reductions for each of the control measures are included in Tables 3-1 and 3-2, in Section 3 of this report.

All of the control measures in the 2016 Plan were found to be feasible and cost-effective based on available information. The cost-effectiveness estimates in the 2016 Plan were calculated based on the incremental (additional) costs to implement the control measures, above and beyond the cost to comply with existing requirements. This is consistent with the requirements of HSC Section 40930(b)(1), which requires that the District, prior to adopting any new control measures, "*assess the costs and benefits of all additional district, state, and federal regulatory actions that would be necessary to achieve attainment of the applicable state ambient air quality standard, taking into account only the additional costs and benefits attributable to achieving the state standard for the remaining three or fewer days each year.*" Therefore, the cost-effectiveness assessment in the 2016 Plan is consistent with the cost-effectiveness methodology described in HSC Section 40930(b)(1). The cost-effectiveness of each control measure will be more precisely determined and analyzed as part of the rule adoption that implements that control measure, and the findings required by HSC 40930 will be included in the rule adoption package.

It should also be noted that the goal of implementing these control measures is to not only achieve ***attainment*** of the state ozone standard, but to also ***maintain*** the standard. If one of the District's monitoring stations measures more than three exceedances of the 8-hour standard, the designation would shift back to nonattainment, which may then require additional or stricter control measures for stationary sources.

Additional NOx Reductions Needed

As mentioned previously, ozone pollution occurs in the presence of precursor pollutants ROC and NOx, as well as heat and sunlight. Other physical conditions can also increase the likelihood of ozone formation – such as wind patterns, topography, and the presence of temperature inversions or other factors that increase stagnation or reduce atmospheric mixing. With all of these complex factors involved, every air basin in California is challenged with their own unique issues to reduce the number of high ozone exceedance days.

The air quality improvements that have been achieved in Santa Barbara County and throughout California are the direct result of many different strategies that have been implemented over the last several decades. These strategies have involved a variety of industries and technologies, to reduce both NOx and ROC emissions. Controlling emissions of both NOx and ROC will continue to be very important to improving and maintaining air quality in Santa Barbara County. Santa Barbara County's attainment plans have historically involved a strategic approach to reducing both ROC and NOx emissions by implementing all feasible and cost-effective control measures. All of the stationary source measures that have been implemented continue to remain in force, and will continue to limit ROC and NOx emissions at stationary sources to meet our clean air goals and mandates.

When developing an emission reduction strategy, the relative amount of ROC emissions compared to NOx emissions is an important consideration. The relationship between NOx and ROC emission levels and resulting ozone concentrations is driven by complex nonlinear photochemistry, and can result in regimes (air basins) that are either NOx-sensitive or ROC-sensitive.[8] In regions with relatively low NOx concentrations and higher ROC concentrations, ozone is found to decrease with decreasing NO_x, and changes little in response to decreasing ROC. This is considered a NOx-sensitive, or NOx-limited, regime. Whereas in a ROC-sensitive, or ROC-limited, regime, ozone levels decrease with decreasing ROC, and ozone may even increase by decreasing NO_x emissions.

At this point in time, some air districts have predicted through photochemical modeling studies that additional NOx emission reductions will be even more critical than additional ROC reductions at reducing ozone formation within their regions. California's recent State

[8] Silman, Dr. Sanford, *Overview: Tropospheric Ozone, Smog and Ozone-NOx-VOC Sensitivity*, www-personal.umich.edu/~sillman/Sillman-weeithbOZONE.pdf

Implementation Plan (SIP) submittal to the federal Environmental Protection Agency (EPA), for the federal 8-hour ozone standard, relies heavily on NOx reductions from mobile sources to eventually achieve compliance with that standard.[9] Some of the air districts in California with the most elevated and persistent ozone pollution, such as the South Coast Air Quality Management District and the San Joaquin Valley Air Pollution Control District, are required to prepare comprehensive studies, conduct photochemical modeling, and commit to adopting stringent control measures as part of their air quality planning efforts. In the process of preparing their air quality plans, these districts have discovered through photochemical modeling that additional NOx emission reductions are more critically needed (as opposed to additional ROC emission reductions) to reduce ozone levels and attain the ozone air quality standards. The following is a summary of some of those efforts.

> ***The South Coast Air Quality Management District,*** which experienced 108 days above the state 8-hour ozone standard in 2016, has used the Community Multiscale Air Quality (CMAQ) state-of-the-science photochemical model and has found that for some areas, NOx reductions alone will achieve the necessary reductions in ozone levels. However, in other areas, a combination of both ROC and NOx reductions will achieve the necessary reductions in ozone levels. Based on their analysis, they have concluded that a NOx-reductions-only approach can lead to attainment (of the federal ozone standard) and would involve the fewest amount of tons reduced. However, such an approach may lead to elevated ozone levels in some areas during the interim years leading up to attainment. An ROC-reductions-only approach was not able to achieve attainment; furthermore, in order to reduce ROC emissions in this scenario, many of the ROC-emitting sectors would need to reformulate products and would take many years to achieve widespread use. A combined approach was found to require more tons reduced overall, but also provided co-benefits in terms of particulate matter, toxic air contaminants, and greenhouse gas emission reductions. Ultimately, the recommended approach for their most recent air quality planning effort is to focus on NOx-heavy controls, with strategic and tiered VOC reductions.[10]
>
> ***The San Joaquin Valley Air Pollution Control District,*** which experienced 91 days above the 8-hour standard in 2016, also used the CMAQ model and studies to examine whether their air basin was NOx-limited or ROC-limited. The conclusion summarized in their 2016 Ozone Plan is that most of the air basin is already or will soon be in a NOx-limited situation, mainly due to the overwhelming amount of ROC emissions from biogenic sources in the valley. A UC Berkeley study also corroborated this finding and

[9] California Air Resources Board Revised Proposed 2016 State Strategy for the State Implementation Plan, March 7, 2017, Pages 11-13; see www.arb.ca.gov/planning/sip/2016sip/2016sip.htm

[10] South Coast Air Quality Management District, *2016 AQMP White Paper (October 2015):VOC Controls*, www.aqmd.gov/docs/default-source/Agendas/aqmp/white-paper-working-groups/wp-voc-revdf.pdf?sfvrsn=2

concluded that "*NOx controls will be immediately and incrementally more effective than corresponding ROC controls in lowering the Valley's ozone levels.*"[11]

NOx-limited Regimes in Santa Barbara County

As stated previously, the Santa Barbara County Air Pollution Control District, as part of the South Central Coast Air Basin, is currently in attainment of the federal ozone air quality standard, and is not required to conduct photochemical modeling to ascertain the estimated amounts of ROC and NOx reductions required to reduce ozone concentrations to achieve attainment of the air quality standards. Photochemical modeling is a data-intensive effort that involves analysis by individuals with very specialized expertise. The process is generally time-consuming and costly, and may take numerous iterations to meet an air quality agency's planning objectives. When modeling is done, the model performance should be evaluated through comparison with measured air quality data. The largest air districts in California either have District staff, use contractors, or work with CARB staff to meet the air quality modeling requirements associated with the federal air quality standards.

Since a photochemical modeling effort for this region is neither required nor is it within the District's current staff expertise, the District looked for alternative methods to identify whether our region is NOx-limited or ROC-limited. The District contacted CARB staff in both the Air Quality Planning and the Modelling & Meteorology Sections and requested guidance on how to investigate this issue further. CARB staff provided technical guidance to help District staff analyze our ambient air quality data to determine whether a "weekend effect" occurs in Santa Barbara County. The weekend effect is a well-known phenomenon in some major urbanized areas. The occurrence of the weekend effect is an indicator of whether a region's ozone concentrations are NOx-limited or ROC-limited. The weekend effect occurs when levels of NOx are substantially lower on weekends than on weekdays, but the measured levels of ozone are higher on weekends. The prevalence of a weekend effect suggests that the region is ROC-limited; whereas a reverse weekend effect would suggest that the region is NOx-limited. Numerous studies on the weekend effect have been conducted in other areas of California (e.g., the South Coast and San Joaquin Valley Air Basins), and have correlated well with the photochemical modeling for those regions in terms of what areas of the basin are NOx-limited vs. ROC-limited.[12]

District staff evaluated what happens to NOx levels and ozone levels on weekdays versus weekends, and summarized the results in a paper titled, "The Weekend Effect: Is Santa Barbara County NOx-limited?", included as Attachment 3 to this report. As stated in the weekend effect

[11] San Joaquin Valley Air Pollution Control District, June 16, 2016*: Appendix H: Modeling Attainment Demonstration, 2016 Plan for the 2008 8-Hour Ozone Standard*, Pg. H-41, www.valleyair.org/Air_Quality_Plans/Ozone-Plan-2016/h.pdf.

[12] Heuss, J.M, Kahlbaum, D.F., and Wolff, G.T. (2003), Weekday/Weekend Ozone Differences: What Can We Learn From Them?, *Journal of Air & Waste Management Association, Vol. 53* (July 2003).

study, the ozone formation within our air basin, and especially near the air quality monitors with the highest recorded ozone concentrations, tends to be NOx-limited. This means that additional NOx reductions will be a more effective way of lowering ozone concentrations in those areas with the highest recorded ozone concentrations.

Our existing emissions control program has already substantially reduced the amounts of both NOx and ROC emitted in the County. Additional reductions from existing regulations are expected, and these reductions need to be maintained. ***Controlling ROC emissions has been and will continue to be an important factor in attaining and maintaining ozone air quality standards and protecting public health***. However, based on the extensive research on atmospheric chemistry and the conclusions of studies done by other California air districts, as well as the information compiled in the weekend effect analysis in Attachment 3, we believe that at this point in time, additional NOx reductions are needed to attain and maintain the state ozone standard.

3 – REVISING THE CONTROL MEASURE IMPLEMENTATION SCHEDULE

Because the District's ozone designation has changed to nonattainment-transitional, the District evaluated whether all of the control measures in the 2016 Ozone Plan were still necessary to ***achieve and maintain*** the state ozone standard. Pursuant to H&S Code Section 40925.5(c), if a nonattainment-transitional district determines that one or more of the stationary source control measures scheduled for adoption or implementation within the next three years are no longer necessary to accomplish expeditious attainment or to maintain the state standard, the district shall shift those measures to the contingency category. And, pursuant to Section 40925.5(d), if a nonattainment-transitional district determines that delaying one or more stationary source control measures will not retard the achievement of the state ozone standard, it may delay that measure.

District staff considered a range of options to meet these requirements and provided a report to the District's Community Advisory Council (CAC) that identified three options for consideration, along with a staff-recommended option. The CAC was provided materials for review in January 2017, and met on February 8, 2017 to review, discuss, and make recommendations. The following three options were considered:

1. Retain the control measure implementation schedule in the adopted 2016 Ozone Plan.
2. Revise the control measure implementation schedule to include only the NOx control measures, as scheduled in the Plan. Move the ROC control measures to a contingency measure status (*staff-recommended option*).
3. Revise the control measure implementation schedule to delay all measures by shifting them to a contingency status, and reconsider the need for additional control measures during the next triennial plan update.

The CAC discussed and considered the three options on February 8, 2017 at a public meeting. After deliberation, the CAC recommended to proceed with the second option. The original control measure implementation schedule, as included in the 2016 Ozone Plan, is shown in Table 3-1. The original table (Table 4-2 in the 2016 Plan) has been modified to include the number of units expected to be affected by the rule. Table 3-2 depicts a revised control measure implementation schedule, with the NOx measures remaining the same and the ROC measures moving to contingency status. Should the Board decide to change the schedule as recommended, this revised schedule would replace the schedule included in Table 4-2 of the 2016 Plan. Because this analysis is being finalized in August, District staff can continue rule development for the NOx measures throughout 2017, however Board consideration of these

rules cannot be feasibly scheduled by the end of 2017. Therefore the control measure adoption schedule for these measures has been changed from 2017 to 2018.[13]

[13] The District's typical rule development/revision process involves 30-day noticing for a public workshop, a CAC meeting, outside agency review (CARB and/or EPA), District Counsel review, and a District Board approval, which is expected to take a minimum of four months, and can take 6 months or more.

TABLE 3-1: IMPLEMENTATION SCHEDULE IN THE ADOPTED 2016 OZONE PLAN[14]

Rule	Description	2016 Plan Adoption Schedule	2016 Plan Cost-Effectiveness ($/Ton)	Estimated Number of Units Affected[15]	2016 Plan Emission Reductions, Tons/Day (Tons/Year)	
					ROC	NO_X
360	**Boilers, Water Heaters, and Process Heaters (0.075 - 2 MMBtu/hr)** Revisions to reduce the NOx limits to 20 ppmv at 3% oxygen for newly installed natural gas fired units.	2017	$2,800 to $11,300	1,770	-	0.05 (19.8)
361	**Boilers, Steam Generators, and Process Heaters (2 - 5 MMBtu/hr)** Revisions to reduce the NOx limits to 9 or 12 ppmv at 3% oxygen for newly installed natural gas fired units. Higher limits for other fuels.	2017	$13,100 to $17,300	160	-	0.03 (10.42)
342	**Boilers, Steam Generators, and Process Heaters (5+ MMBtu/hr)** Revisions to reduce the NOx limits to 9 or 15 ppmv at 3% oxygen for newly installed natural gas fired units. Higher limits for other fuels.	2017	$8,700 to $21,000	42	-	0.02 (6.36)
321	**Solvent Cleaning Machines and Solvent Cleaning** Revisions to lower the general cleaning ROC limit from 50 grams per liter to 25 g/L.	2018	$0 to $1,000	150	0.02 (6.35)	-
351	**Surface Coating of Wood Products** Revisions to include solvent cleaning provisions at 25 g/L.	2018	$1,000 to $2,000	4	0.001 (0.42)	-
354	**Graphic Arts** Revisions to include solvent cleaning provisions at 25 – 100 g/L and additional requirements for Rotogravure, Flexographic, Lithographic, Letterpress, and Screen Printing operations. Existing facilities may have to be permitted to increase the enforceability of the rule.	2019	$1,000 to $3,100	75	0.27 (98.21)	-
				Totals:	**0.29 (104.98)**	**0.10 (36.58)**

[14] Information is from Table 4-2 of the 2016 Ozone Plan; information on the estimated number of units affected has been added to this table.
[15] The boiler rules are listed in terms of "units affected." The solvent rules are listed in terms of "facilities affected."

TABLE 3-2: REVISED IMPLEMENTATION SCHEDULE, NOX CONTROL MEASURES ONLY

Rule	Description	2016 Plan Adoption Schedule	2016 Plan Cost-Effectiveness ($/Ton)	Estimated Number of Units Affected	2016 Plan Emission Reductions, Tons/Day (Tons/Year)	
					ROC	NO_X
360	**Boilers, Water Heaters, and Process Heaters (0.075 - 2 MMBtu/hr)** Revisions to reduce the NOx limits to 20 ppmv at 3% oxygen for newly installed natural gas fired units.	2018	$2,800 to $11,300	1,770	-	0.05 (19.8)
361	**Boilers, Steam Generators, and Process Heaters (2 - 5 MMBtu/hr)** Revisions to reduce the NOx limits to 9 or 12 ppmv at 3% oxygen for newly installed natural gas fired units. Higher limits for other fuels.	2018	$13,100 to $17,300	160	-	0.03 (10.42)
342	**Boilers, Steam Generators, and Process Heaters (5+ MMBtu/hr)** Revisions to reduce the NOx limits to 9 or 15 ppmv at 3% oxygen for newly installed natural gas fired units. Higher limits for other fuels.	2018	$8,700 to $21,000	42	-	0.02 (6.36)
321	**Solvent Cleaning Machines and Solvent Cleaning** Revisions to lower the general cleaning ROC limit from 50 grams per liter to 25 g/L.	Contingency Measure	$0 to $1,000	-	-	-
351	**Surface Coating of Wood Products** Revisions to include solvent cleaning provisions at 25 g/L.	Contingency Measure	$1,000 to $2,000	-	-	-
354	**Graphic Arts** Revisions to include solvent cleaning provisions at 25 – 100 g/L and additional requirements for Rotogravure, Flexographic, Lithographic, Letterpress, and Screen Printing operations. Existing facilities may have to be permitted to increase the enforceability of the rule.	Contingency Measure	$1,000 to $3,100	-	-	-
				Totals:	**-**	**0.10 (36.58)**

Reasons for Revising the Implementation Schedule to Proceed with NOx Measures Only

The District's strategy to attain and maintain the state ozone standard has included the implementation of over 25 control measures to reduce emissions of both NOx and ROC, and recently measured ozone levels demonstrate that this strategy has been successful. Our current rules, compliance, and permit programs are in place to ensure that these measures continue to be effective. The revisions to the control measure implementation schedule included herein are recommended as an interim measure to address the District's change in designation from nonattainment to nonattainment-transitional. The District's overall attainment strategy will be reassessed as part of the 2019 Ozone Plan update.

The 2016 Ozone Plan includes both NOx and ROC control measures. As discussed in Section 2 of this report, we believe that the scheduled NOx reductions are needed to reduce ozone levels and achieve attainment and maintenance of the ozone standard. We are edging closer to achieving attainment with continued implementation of a wide variety of ROC and NOx measures developed through prior planning efforts. Requiring new and modified combustion units to achieve the low-emission standards that are already being met in neighboring air districts and that produce long-term clean air benefits will help provide a margin of safety for the future. And, the NOx control measures in particular were revised from the prior plan (the 2013 Clean Air Plan) so that they would be more cost-effective, and would not require businesses to retrofit older devices that may be used infrequently. The cleaner combustion technology associated with these measures will yield reductions over the life of the equipment, which could be 15 to 20 years or more.

The revised implementation schedule still includes the three NOx control measures that were proposed for implementation during the 2016 Plan cycle (2017-2019) and holds off on implementing the three ROC control measures. The ROC control measures are shifted to contingency measures. Measures that are placed in a contingency status can be implemented if, at some point in the future, they are deemed necessary to meet the mandates of the California Clean Air Act and to achieve the agency's clean air goals.

During the next triennial plan update, as required by HSC 40925.5 (g), the District will need to review this decision and action, and determine whether the measures should remain as contingency measures, or whether they should be implemented to further reduce ozone precursor emissions. The 2016 Ozone Plan also includes a list of measures that the District has identified for further study. During the next triennial plan update, the District will also consider whether any of the further study measures should be implemented during the next 3-year plan period. As required by HSC Section 40925.5(f), district actions may be disapproved by the Air Resources Board within 90 days if it finds that the actions will delay expeditious attainment of the state ozone standard.

As discussed in Section 2 of this report, additional proposals at the state and federal levels may also help to reduce ozone precursor emissions (mostly NOx) from mobile and area sources. These measures, along with the many voluntary measures and incentive programs that the district and other local agencies are doing, will also help to reach our clean air goals.

In the future, if any of the ozone monitors in Santa Barbara County record more than 3 days above the state ozone standard in one calendar year, the District's attainment status will shift from nonattainment-transitional back to nonattainment. In that case, pursuant to HSC 40925.5(e), the schedule would revert back to the original control measure implementation schedule in the 2016 Ozone Plan (or the most current plan update).

Following is a list of the main points that support the recommended revised schedule:

- Air quality modeling studies in other regions in California have shown that additional NOx reductions are critical to lowering ozone concentrations and meeting the applicable air quality standard (described further in Section 2).
- Although we are not able to determine the precise amount of emission reductions needed to achieve attainment, additional reductions of NOx emissions will help to ensure that we eventually achieve attainment of the state ozone standards, and will add a margin of safety towards achieving that goal.
- Continuing to pursue cost-effective control measures is aligned with our mission to protect public health. Implementing control measures over time has improved the air quality in our community, and we should continue that trend.
- The NOx control measures were revised as part of the 2016 Ozone Plan process so that they no longer require retrofits and, as a result, they are more cost-effective.
- The NOx control measures, by design, involve long-term investments in cleaner combustion technology, and ensure that the anticipated emission reductions will continue to occur for long periods of time (in most cases, for decades).
- Although we are aware of state and federal proposals to implement measures that would reduce mobile and area-wide ozone precursors, many of these proposals are not directed at ozone precursor benefits and there are no assurances that the proposals will be implemented. It's possible that some of these proposals will not be implemented, and the emission benefits may not be realized.
- The federal ozone standard, although it differs from the state standard in how designations are determined, is now set at the same level as the state standard. Moving forward with feasible, cost-effective NOx control measures would help avoid a situation where both the state and the federal ozone standard are exceeded in the future. Exceeding the federal ozone standard would introduce additional and more stringent planning and control requirements.

In summary, Santa Barbara County has come a long way in reducing emissions of ozone precursor pollutants and achieving progressively lower ozone concentrations and many fewer

high ozone days. We expect that with our existing programs, which include continued implementation of all of the adopted control measures from prior plans and our permitting and compliance programs, Santa Barbara County will continue to be very successful in reducing ozone precursor emissions (both NOx and ROC) and measured ozone concentrations. In recommending the proposed revisions to the stationary source control measure implementation schedule, we considered whether additional measures were necessary beyond those that have already been adopted and implemented. The conclusion was that the three identified NOx measures are necessary to further reduce ozone levels, and that they would provide a margin of safety to ensure that we continue our progress and eventually attain and maintain the state ozone standard.

4 – SUMMARY OF REQUIRED ANALYSES

Revising the Schedule pursuant to HSC Section 40925.5

Because the state ozone designation has changed from *nonattainment* to *nonattainment-transitional*, this section of the Health & Safety Code (HSC) requires the District to review its plan (the 2016 Ozone Plan), determine whether any of the measures in the plan are no longer necessary, and if some measures are no longer necessary, to shift them to contingency status. Alternatively, the District can delay implementation of a control measure if the District finds that delay "will not retard achievement of the state ozone standard." In making the determination, this section requires the District to consider air quality trends, the effect of the state mobile and area source control programs, turnover of the vehicle fleet, the impact of measures previously adopted by the District, ARB, and EPA, and other significant factors influencing emission trends.

Sections 2 and 3 of this report include all of the above required information for the District Board to consider when it decides whether to revise the control measure implementation schedule as required by this section of the Health & Safety Code. The District will review these actions in connection with its next triennial state plan update, pursuant to HSC Section 40925.5(g).

Conducting a Cost-Benefit Analysis pursuant to HSC Section 40930

As required by HSC Section 40930 and as discussed in Section 1 of this report, the District must do a cost-benefit analysis and provide a justification before any new control measures are adopted. The analysis must include an assessment of the costs and benefits of all additional district, state, and federal regulatory actions necessary to achieve attainment of the state ozone standard, taking into account only the additional costs and benefits attributable to achieving the state standard for the remaining three or fewer days each year.

Section 2 of this report provides preliminary information on the costs and benefits of the 2016 Plan control measures, and also provides reasoning for continuing to seek NOx reductions. Section 3 of this report discusses the proposed revisions to the 2016 Ozone Plan control measure implementation schedule.

Should the Board decide to adopt the revised schedule as recommended in this report, District staff plans to commence the rule development process for the NOx control measures in the fall of 2017. The District's typical rule development/revision process involves 30-day noticing for a public workshop, a CAC meeting, outside agency review (CARB and/or EPA), District Counsel review, and a District Board approval, which is expected to take a minimum of four months, and can take 6 months or more. The cost-effectiveness of each control measure will be more precisely determined and analyzed as part of the rule adoption that implements that control

measure, and the findings required by HSC 40930 will be included in the rule adoption package.

ATTACHMENT 1 – APPLICABLE CALIFORNIA HEALTH & SAFETY CODE SECTIONS

The following language is provided verbatim from the *California Health & Safety Code, Division 26, Air Resources; Part 3, Air Pollution Control Districts; Chapter 10, District Plans to Attain State Ambient Air Quality Standards*. Explanatory footnotes have been added to clarify requirements in the context of this report.

HSC Section 40925.5. Nonattainment-transitional District

(a) A district which is nonattainment for the state ozone standard shall be designated "nonattainment-transitional" by operation of law if, during a single calendar year, the state standard is not exceeded more than three times at any monitoring location within the district.

(b) Any district which is designated nonattainment-transitional under subdivision (a) shall review its plan for attaining the state ozone standard and shall determine whether the stationary source control measures scheduled for adoption or implementation within the next three years by the district are needed to accomplish expeditious attainment or to maintain the state standard following the projected attainment date. In making that determination, the district shall consider air quality trends, the effect of the state's adopted and proposed motor vehicle and area source control programs, turnover of the vehicle fleet, the impact of measures previously adopted by the district, the state board, and the Environmental Protection Agency which are in the process of being implemented, and other significant factors influencing emissions trends.

(c) If a nonattainment-transitional district determines that one or more of the stationary source control measures scheduled for adoption or implementation within the next three years are no longer necessary to accomplish expeditious attainment or to maintain the state standard, the district shall shift those measures to the contingency category.

(d) If a nonattainment-transitional district determines that delaying one or more stationary source control measures will not retard the achievement of the state ozone standard, it may delay that measure.

(e) Subdivisions (c) and (d) shall not apply to any stationary source control measures required by Section 39610. In addition, subdivisions (c) and (d) shall be suspended at any time that the district ceases to qualify for a nonattainment-transitional designation under subdivision (a).[1]

[1] HSC Section 39610 pertains to air districts that have been identified by the Air Resources Board as being affected by transported air pollutants from upwind areas outside of the air basin, or air basins whose pollutants affect ozone concentrations in a downwind air basin. Santa Barbara County, as part of the South Central Coast Air Basin, has not been identified for either of those situations.

(f) Actions of any district pursuant to this section are effective immediately. The state board may disapprove any action of the district pursuant to this section within 90 days of the action. The state board shall not disapprove district actions pursuant to this section unless it finds that the actions will delay expeditious attainment of the state ozone standard. Actions taken by the state board pursuant to this subdivision are subject to Section 41503.4.

(g) Actions of any district pursuant to subdivisions (c) or (d) shall be reviewed by the district in connection with its next review and revision of its attainment plan pursuant to Section 40925.

HSC Section 40930. Report on number of days district violated state standards; Restrictions on adoption of more stringent control measures

(a) Each district that has adopted a plan pursuant to this chapter shall, on or before January 31 of each year, prepare and submit to the state board a report identifying the number of days during the preceding calendar year that air quality in the district violated each state ambient air quality standard for which the district's status is nonattainment.

(b) For any pollutant for which the report indicates that the applicable state ambient air quality standard was not violated during more than three days during the calendar year at any one or more monitoring locations within the district, the district shall not adopt any new or more stringent control measure until after preparation, and approval by the district board, of an analysis that does all of the following:

> (1) Assesses the costs and benefits of all additional district, state, and federal regulatory actions that would be necessary to achieve attainment of the applicable state ambient air quality standard, taking into account only the additional costs and benefits attributable to achieving the state standard for the remaining three or fewer days each year.
>
> (2) Includes consideration of all of the socioeconomic impacts specified in Section 40728.5.[2]
>
> (3) Identifies, if the district is an upwind district, the benefits of the additional regulatory actions in the district on the air quality in any downwind district, and identifies the costs attributable to those regulatory actions.

(c) The state board shall review the district analyses prepared pursuant to subdivision (b) to ensure expeditious progress towards attainment in both the district that prepared the analysis and any downwind district and to ensure that any resulting action of the district that prepared the analysis does not adversely affect any downwind district.

[2] HSC Section 40728.5 does not apply to air districts with a population of less than 500,000 persons.

ATTACHMENT 2 – OFFICE OF ADMINISTRATIVE LAW FILING OF REGULATORY CHANGE

State of California
Office of Administrative Law

In re: **Air Resources Board**	**NOTICE OF APPROVAL OF CHANGES WITHOUT REGULATORY EFFECT**
Regulatory Action: **Title 17, California Code of Regulations**	**California Code of Regulations, Title 1, Section 100**
Adopt sections: **Amend sections: 60201** **Repeal sections:**	**OAL Matter Number: 2017-0303-02**
	OAL Matter Type: Nonsubstantive (N)

This action by the California Air Resources Board makes changes without regulatory effect section 60201 in Title 17 of the California Code of Regulations. Specifically, this action lists the counties within the South Central Coast Air Basin: Santa Barbara, San Luis Obispo, and Ventura. This action further changes the designation of the Santa Barbara county area from "Nonattainment" to "Nonattainment-Transitional."

OAL approves this change without regulatory effect as meeting the requirements of California Code of Regulations, Title 1, section 100.

Date: April 17, 2017

Thanh Huynh
Senior Attorney

For: Debra M. Cornez
Director

Original: Richard W. Corey
Copy: Trini Balcazar

STATE OF CALIFORNIA--OFFICE OF ADMINISTRATIVE LAW

NOTICE PUBLICATION/REGULATIONS SUBMISSION NONSUBSTANTIVE (See instructions on reverse)

For use by Secretary of State only

STD. 400 (REV. 01-2013)

OAL FILE NUMBERS	NOTICE FILE NUMBER	REGULATORY ACTION NUMBER	EMERGENCY NUMBER
	Z-2017-	2017-0303-02N	

For use by Office of Administrative Law (OAL) only

2017 MAR -3 P 3:20

OFFICE OF ADMINISTRATIVE LAW

ENDORSED - FILED
in the office of the Secretary of State
of the State of California
APR 17 2017
2:51 PM

NOTICE | REGULATIONS

AGENCY WITH RULEMAKING AUTHORITY: AIR RESOURCES BOARD

AGENCY FILE NUMBER (if any):

A. PUBLICATION OF NOTICE (Complete for publication in Notice Register)

1. SUBJECT OF NOTICE	TITLE(S)	FIRST SECTION AFFECTED	2. REQUESTED PUBLICATION DATE

3. NOTICE TYPE	4. AGENCY CONTACT PERSON	TELEPHONE NUMBER	FAX NUMBER (Optional)
☐ Notice re Proposed Regulatory Action ☐ Other			

OAL USE ONLY	ACTION ON PROPOSED NOTICE	NOTICE REGISTER NUMBER	PUBLICATION DATE
	☐ Approved as Submitted ☐ Approved as Modified ☐ Disapproved/ Withdrawn		

B. SUBMISSION OF REGULATIONS (Complete when submitting regulations)

1a. SUBJECT OF REGULATION(S): Area Designations for Ozone

1b. ALL PREVIOUS RELATED OAL REGULATORY ACTION NUMBER(S):

2. SPECIFY CALIFORNIA CODE OF REGULATIONS TITLE(S) AND SECTION(S) (Including title 26, if toxics related)

SECTION(S) AFFECTED (List all section number(s) individually. Attach additional sheet if needed.)

ADOPT:

AMEND: 60201,

TITLE(S): 17

REPEAL:

3. TYPE OF FILING

- ☐ Regular Rulemaking (Gov. Code §11346)
- ☐ Resubmittal of disapproved or withdrawn nonemergency filing (Gov. Code §§11349.3, 11349.4)
- ☐ Emergency (Gov. Code, §11346.1(b))
- ☐ Certificate of Compliance: The agency officer named below certifies that this agency complied with the provisions of Gov. Code §§11346.2-11347.3 either before the emergency regulation was adopted or within the time period required by statute.
- ☐ Resubmittal of disapproved or withdrawn emergency filing (Gov. Code, §11346.1)
- ☐ Emergency Readopt (Gov. Code, §11346.1(h))
- ☐ File & Print
- ☐ Other (Specify)
- ☒ Changes Without Regulatory Effect (Cal. Code Regs., title 1, §100)
- ☐ Print Only

4. ALL BEGINNING AND ENDING DATES OF AVAILABILITY OF MODIFIED REGULATIONS AND/OR MATERIAL ADDED TO THE RULEMAKING FILE (Cal. Code Regs. title 1, §44 and Gov. Code §11347.1)
N/A

5. EFFECTIVE DATE OF CHANGES (Gov. Code, §§ 11343.4, 11346.1(d); Cal. Code Regs., title 1, §100)

- ☐ Effective January 1, April 1, July 1, or October 1 (Gov. Code §11343.4(a))
- ☐ Effective on filing with Secretary of State
- ☒ §100 Changes Without Regulatory Effect
- ☐ Effective other (Specify)

6. CHECK IF THESE REGULATIONS REQUIRE NOTICE TO, OR REVIEW, CONSULTATION, APPROVAL OR CONCURRENCE BY, ANOTHER AGENCY OR ENTITY

- ☐ Department of Finance (Form STD. 399) (SAM §6660)
- ☐ Fair Political Practices Commission
- ☐ State Fire Marshal
- ☐ Other (Specify)

7. CONTACT PERSON	TELEPHONE NUMBER	FAX NUMBER (Optional)	E-MAIL ADDRESS (Optional)
Trini Balcazar, Regulations Coordinator	916 445-9564	916 322-3928	trinidad.balcazar@arb.ca.gov

8. **I certify that the attached copy of the regulation(s) is a true and correct copy of the regulation(s) identified on this form, that the information specified on this form is true and correct, and that I am the head of the agency taking this action, or a designee of the head of the agency, and am authorized to make this certification.**

SIGNATURE OF AGENCY HEAD OR DESIGNEE: [signature] DATE: 2/27/2017

TYPED NAME AND TITLE OF SIGNATORY: Richard W. Corey, Executive Officer

For use by Office of Administrative Law (OAL) only

ENDORSED APPROVED

APR 17 2017

Office of Administrative Law

Final Regulation Order

AREA DESIGNATIONS FOR STATE AMBIENT AIR QUALITY STANDARDS
Chapter 1. Air Resources Board
Subchapter 1.5. Air Basins and Air Quality Standards
Article 1.5 Area Pollutant Designations

[Note: The preexisting regulation text is set forth below in normal type. The amendments are shown in *underline italics* to indicate additions and ~~strikeout~~ to indicate deletions.]

Amend sections 60201 title 17, California Code of Regulations, to read as follows:

§ 60201. Table of Area Designations for Ozone.

Area	***Designation***
North Coast Air Basin	Attainment
San Francisco Bay Area Air Basin	Nonattainment
North Central Coast Air Basin	Nonattainment-Transitional
South Central Coast Air Basin	~~Nonattainment~~
Santa Barbara County	*Nonattainment-Transitional*
San Luis Obispo and Ventura Counties	*Nonattainment*
South Coast Air Basin	Nonattainment
San Diego Air Basin	Nonattainment
Northeast Plateau Air Basin	Attainment
Sacramento Valley Air Basin	
Colusa and Glenn Counties	Attainment
Sutter and Yuba Counties	Nonattainment-Transitional
Butte, Shasta, and Tehama Counties	Nonattainment
Placer, Sacramento, Solano, and Yolo Counties	Nonattainment
San Joaquin Valley Air Basin	Nonattainment
Great Basin Valleys Air Basin	
Alpine County	Unclassified
Inyo County	Nonattainment
Mono County	Nonattainment

§ 60201. Table of Area Designations for Ozone. (continued)

Area	*Designation*
Mojave Desert Air Basin	Nonattainment
Salton Sea Air Basin	Nonattainment
Mountain Counties Air Basin	
Amador, Calaveras, El Dorado, Nevada, Placer, Mariposa, and Tuolumne Counties	Nonattainment
Plumas and Sierra Counties	Unclassified
Lake County Air Basin	Attainment
Lake Tahoe Air Basin	Nonattainment-Transitional

NOTE: Authority cited: Sections 39600, 39601 and 39608, Health and Safety Code. Reference: Sections 39608 and 40925.5, Health and Safety Code.

ATTACHMENT 3 – THE WEEKEND EFFECT: IS SANTA BARBARA COUNTY NOX-LIMITED?

Introduction

In an effort to better understand whether ozone formation in our region is typically limited by the amount of nitrogen oxides in the air (NOx-limited) or by the amount of reactive organic compounds in the air (ROC-limited), District staff consulted with California Air Resources Board (CARB) staff and came up with a methodology to analyze whether the region experiences the "weekend effect," where a reduction in NOx levels on the weekend can actually cause ozone levels to increase on the weekend. The weekend effect generally occurs in regions that are ROC-limited. Whereas, a reverse weekend effect (i.e., lower ozone during weekends) would suggest that the region is NOx-limited.

Numerous studies on the weekend effect have been conducted in other areas of California (e.g., the South Coast and San Joaquin Valley Air Basins[1,2]) because it is a useful metric for evaluating a region's response to changes in emissions. These studies have correlated well with the photochemical modeling for those regions in terms of what areas of the basin are NOx-limited vs. ROC-limited.

District staff examined previous studies and also consulted with CARB staff to come up with a methodology to study the weekend effect locally. The methodology involved gathering historical air monitoring data for NOx and ozone for the monitoring locations in the County and performing calculations to evaluate the trends at each station. The District initially looked at several monitoring stations, and decided to focus on the three monitoring stations with the most exceedances of the State 8-hour ozone standard from 2006 through 2016: the Las Flores Canyon, Paradise Road, and Carpinteria monitoring stations. Staff focused on these stations because, based on past trends, they are more likely to record a violation of the ozone standard in the future. Staff also evaluated the Santa Barbara monitoring station because it is located in an urban environment, and so it could have a different ozone trend in its vicinity. And finally, staff compiled traffic data, in consultation with Santa Barbara County Association of Governments (SBCAG) staff, in order to examine how the NOx and ozone data compared temporally to traffic activity/volumes.

This report includes a description of the analysis that was done, and data summaries to support the analysis and conclusions.

[1] Heuss, J.M, Kahlbaum, D.F., and Wolff, G.T. (2003), Weekday/Weekend Ozone Differences: What Can We Learn From Them?, *Journal of the Air & Waste Management Association, Vol. 53* (July 2003).
[2] San Joaquin Valley Air Pollution Control District (2016), *2016 Ozone Plan for the 2008 8-Hour Ozone Standard*, *Appendix H: Modeling Attainment Demonstration*, Pages H-39 to H-43.

Traffic Volume and Daily Patterns

To understand whether a weekend effect occurs, one must first understand the time-dependent nature of emission sources in the County. Whether the emission source is an industrial spray painting operation, a residential boiler, or an agricultural tractor, emission inventories are comprised of various sources that emit pollution at different times of the day, week, and year.

Emissions from on-road vehicles make up approximately 43% of the onshore NOx inventory, and these vehicles have a very clear temporal pattern. The amount of vehicle miles travelled (VMT) is typically high during weekdays due to the commuting workforce, while the VMT generally decreases on the weekends since more people are at home. The District verified this trend by looking at data from the Caltrans Performance Monitoring System (PeMS).[3] The PeMS system has monitors that are set up on certain sections of Highway 101 to observe the amount of traffic that passes by. Although the monitors do not cover all the highways within the County, the data provides a good representation of the temporal traffic patterns. The data can be seen below in Table A3-1.

TABLE A3-1: CALTRANS PEMS VMT DATA

Day	SB County All vehicles: 2013-2015 (VMT/day)	SB County All trucks: 2013-2015 (VMT/day)
Sunday	1,550,723	29,904
Monday	1,710,330	35,383
Tuesday	1,706,093	37,023
Wednesday	1,711,710	37,507
Thursday	1,747,190	38,004
Friday	1,858,099	38,969
Saturday	1,659,126	31,700

When evaluating the PeMS data, District staff saw that the total VMT for the County dropped significantly on Sundays as compared to the normal Monday through Thursday work week. It amounted to around a 10% decrease in total VMT and a 21% decrease in truck VMT, which is important because heavy duty trucks are large contributors to the on-road NOx inventory. The PeMS data also showed that the VMT was highest on Fridays, which most likely occurs from pass through traffic and people beginning their weekend activities. These substantial changes in VMT activity between the weekdays and the weekend is expected to affect measured NOx levels in the region, with higher levels being recorded on weekdays vs. weekends.

[3] http://pems.dot.ca.gov/

NOx Levels in Santa Barbara County

To perform this weekend effect analysis, the District compiled the NOx data from 2006 to 2016 for the Las Flores Canyon, Carpinteria, and Paradise Road monitoring stations. All NOx data was taken directly from EPA's Air Quality System (AQS)[4], a database that stores verified monitored data for state, local, and tribal monitoring agencies across the United States.

The analysis began with comparing the average site-specific weekday (represented by an average of Wednesday and Thursday values) and weekend (represented by Sunday values) NOx concentrations observed during our ozone season, which is April through October.[5] Based on CARB guidance, the District focused on the average daily NOx values, as opposed to the 1-hour maximum NOx values, because ozone gradually rises throughout the day when the precursor pollutants are exposed to sunlight. The monitored NOx data can be seen numerically in Table A3-2 and graphically in Figure A3-1 below.

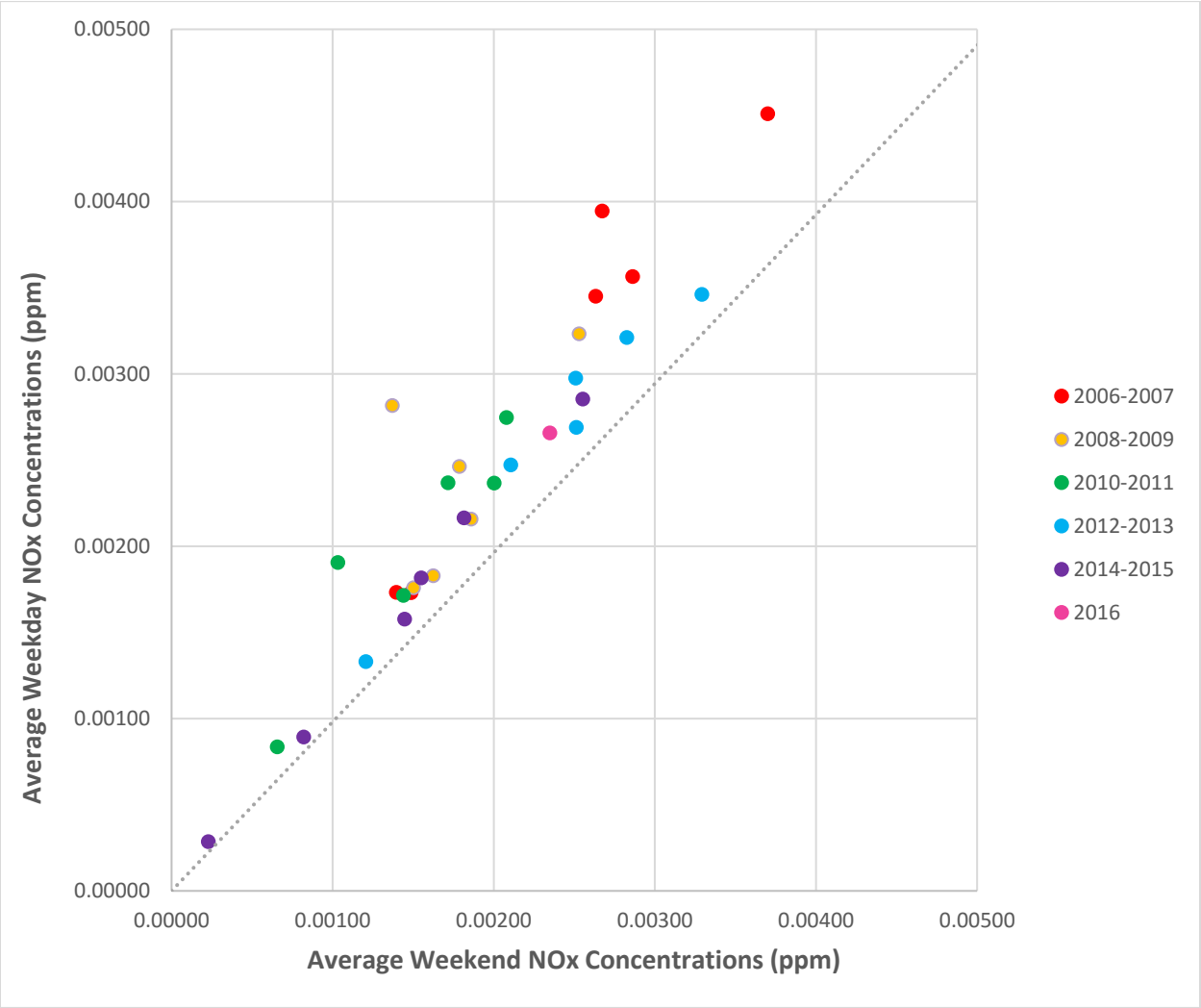
TABLE A3-2: SITE-SPECIFIC AVERAGE WEEKDAY AND WEEKEND AVERAGE NOX CONCENTRATIONS

	Las Flores Canyon Monitoring Station		Carpinteria Monitoring Station		Paradise Road Monitoring Station	
	Sunday avg NOx (ppm)	Wed-Thurs avg NOx (ppm)	Sunday avg NOx (ppm)	Wed-Thurs avg NOx (ppm)	Sunday avg NOx (ppm)	Wed-Thurs avg NOx (ppm)
2006	0.00286	0.00356	0.00370	0.00451	0.00149	0.00173
2007	0.00263	0.00345	0.00267	0.00394	0.00139	0.00173
2008	0.00253	0.00323	0.00137	0.00282	0.00162	0.00183
2009	0.00186	0.00216	0.00179	0.00246	0.00150	0.00176
2010	0.00208	0.00275	0.00103	0.00191	0.00066	0.00084
2011	0.00200	0.00237	0.00172	0.00237	0.00144	0.00171
2012	0.00210	0.00247	0.00251	0.00298	0.00121	0.00133
2013	0.00329	0.00346	0.00283	0.00321	0.00251	0.00269
2014	0.00023	0.00029	0.00255	0.00285	0.00082	0.00089
2015	0.00155	0.00182	0.00181	0.00216	0.00145	0.00158
2016	-	-	0.00235	0.00266	0.00123	0.00131
2006-2016 Average	**0.00211**	**0.00256**	**0.00221**	**0.00290**	**0.00139**	**0.00158**
Sunday / Wed-Thurs	**0.83**		**0.76**		**0.88**	

[4] https://aqsdr1.epa.gov/aqsweb/aqstmp/airdata/download_files.html

[5] Different definitions of weekday days were investigated and did not show appreciable differences from the "Wednesday-Thursday average" definition. Friday was not chosen as a weekday since it exhibits qualities of both the weekdays and the weekend. Sunday was chosen to represent the weekend as it had lower values than Saturday.

FIGURE A3-1: SITE SPECIFIC AVERAGE WEEKDAY AND WEEKEND AVERAGE NOX CONCENTRATIONS



Since all the points fall above the 1:1 dashed line, the scatterplot shows that the monitored NOx concentrations are consistently lower on the weekend year after year. The bottom row on Table A3-2 shows the quotient of the average weekend (Sunday) value divided by the average weekday (Wed-Thurs) value. Depending on the monitoring station, NOx concentrations decrease during the weekend between 12% and 24% when compared to weekday concentrations. This NOx decrease correlates well with the 10% decrease in total VMT and 21% decrease in truck VMT that was observed in PeMS. The decrease in the monitored NOx concentrations is also substantial enough to potentially affect the ozone concentrations and could create a weekender effect in Santa Barbara County.

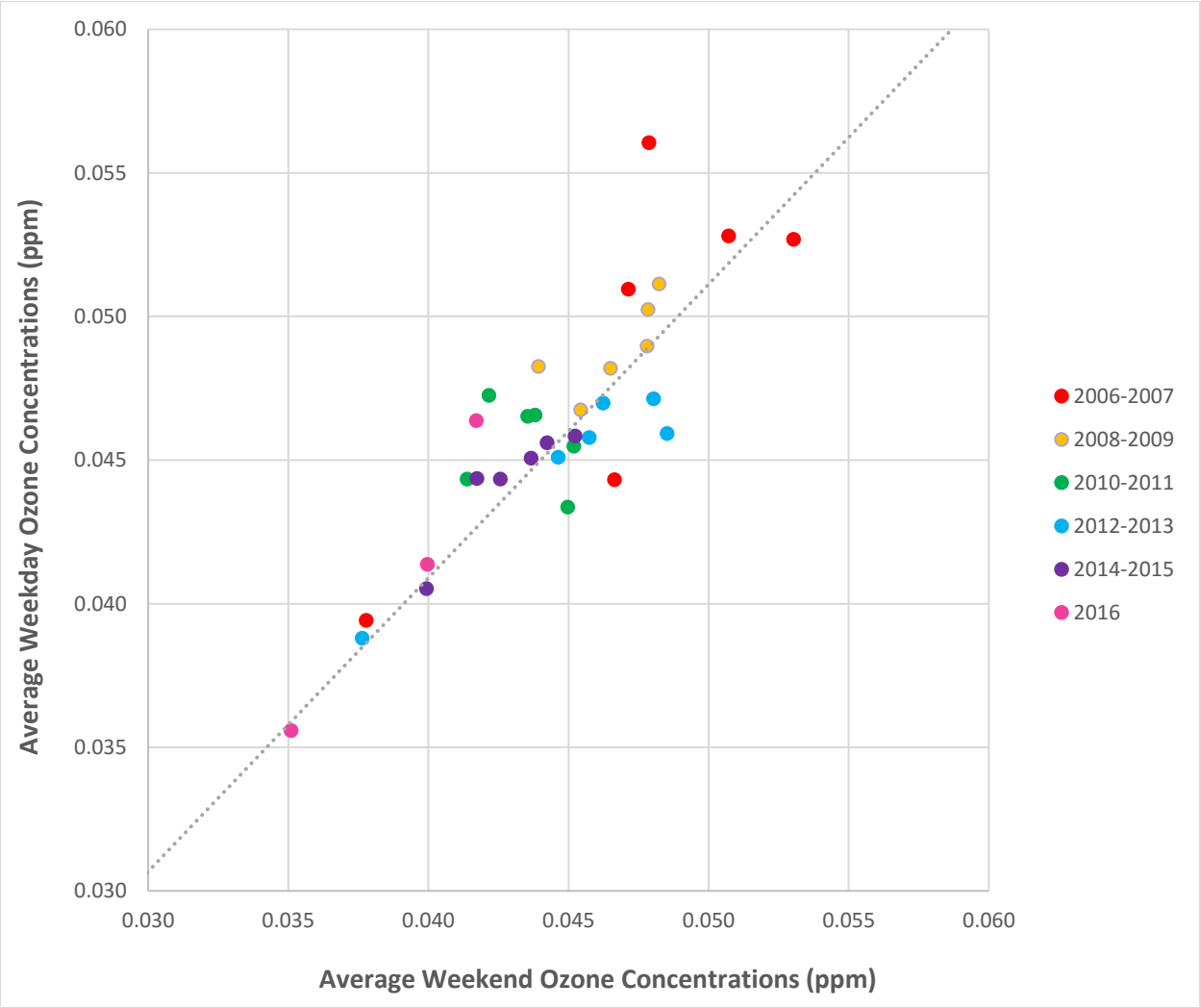
Ozone Levels in Santa Barbara County

Similar to the NOx evaluation, the District compiled the ozone data from 2006 to 2016 for the Las Flores Canyon, Carpinteria, and Paradise Road monitoring stations. All ozone data was taken directly from EPA's Air Quality System (AQS). However, instead of focusing on the daily average ozone concentrations, the data consists of the maximum daily 8-hour averages, because this criteria affects whether the monitoring station records an exceedance of the state or federal 8-hour ozone standard. As with the NOx data, District staff looked at 8-hour ozone concentrations on a weekday (represented by an average of Wednesday and Thursday values) and compared them to a weekend (represented by Sunday values) during our ozone season (April through October). The monitored ozone data can be seen numerically in Table A3-3 and graphically in Figure A3-2 below.

TABLE A3-3: SITE-SPECIFIC AVERAGE WEEKDAY AND WEEKEND MAXIMUM DAILY 8-HOUR OZONE

	Las Flores Canyon Monitoring Station		Carpinteria Monitoring Station		Paradise Road Monitoring Station	
	Sunday avg O_3 (ppm)	**Wed-Thurs avg O_3 (ppm)**	**Sunday avg O_3 (ppm)**	**Wed-Thurs avg O_3 (ppm)**	**Sunday avg O_3 (ppm)**	**Wed-Thurs avg O_3 (ppm)**
2006	0.0507	0.0528	0.0378	0.0394	0.0479	0.0561
2007	0.0530	0.0527	0.0466	0.0443	0.0471	0.0509
2008	0.0482	0.0511	0.0478	0.0502	0.0439	0.0483
2009	0.0465	0.0482	0.0478	0.0490	0.0454	0.0467
2010	0.0452	0.0455	0.0450	0.0434	0.0438	0.0466
2011	0.0414	0.0443	0.0435	0.0465	0.0422	0.0473
2012	0.0457	0.0458	0.0485	0.0459	0.0480	0.0471
2013	0.0376	0.0388	0.0462	0.0470	0.0446	0.0451
2014	0.0426	0.0443	0.0437	0.0451	0.0442	0.0456
2015	0.0452	0.0458	0.0399	0.0405	0.0417	0.0444
2016	0.0400	0.0414	0.0351	0.0356	0.0417	0.0464
2006-2016 Average	**0.0451**	**0.0464**	**0.0438**	**0.0443**	**0.0446**	**0.0477**
Sunday / Wed-Thurs	**0.972**		**0.990**		**0.936**	

FIGURE A3-2: SITE SPECIFIC AVERAGE WEEKDAY AND WEEKEND MAXIMUM DAILY 8-HOUR OZONE



Unlike the NOx scatterplot, some of the points fall both above and below the 1:1 dashed line in the ozone scatterplot. This indicates that NOx is not always the strongest contributing factor to ozone formation. However, the majority of the points still fall above the 1:1 dashed line, so the figure shows that ozone concentrations are typically lower on the weekend. When evaluating the monitoring stations individually, Carpinteria was observed to have a 1% decrease in weekend ozone concentrations, Las Flores Canyon was observed to have a 2.8% decrease, and Paradise Road was observed to have a 6.4% decrease. It is also worth noting that overall, 8-hour ozone concentrations have decreased during the last decade.

These three stations assessed above do not represent the entire county, and certain areas within the County may still be ROC-limited. The Santa Barbara monitoring station in particular showed a slight tendency of being ROC-limited, which is most likely due to having a more urban setting. Despite this tendency, the Santa Barbara station still has much lower average ozone

concentrations than the three stations evaluated in this study, and it is less likely to exceed the 8-hour ozone standard. Furthermore, the state's vehicular emission reduction program is expected to yield additional NOx reductions, which will further shift the Santa Barbara station to a more NOx-limited regime. These transitions and the disappearance of the weekend effect is being observed in many urban centers around the United States.[6]

Conclusion

The above comparisons of NOx and ozone data on weekdays vs. weekends indicate that ozone formation in the areas with the most exceedances of the State 8-hour ozone standard in Santa Barbara County is dependent on the presence of NOx. This phenomenon can be described as a "reverse weekend effect" and it demonstrates that the air around these monitoring locations is in generally a NOx-limited regime.

[6] Wolff, G.T., Kahlbaum, D.F., & Heuss, J.M, (2013), The Vanishing Ozone Weekday/Weekend Effect, *Journal of the Air & Waste Management Association Vol. 63* (February 2013).