



South Coast
AQMD

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

APPENDIX B ENHANCED OZONE MONITORING PLAN

July 1, 2020

Deputy Executive Officer

Science and Technology Advancement

Matt Miyasato, Ph.D.

Assistant Deputy Executive Officer

Science and Technology Advancement

Jason Low, Ph.D.

Atmospheric Measurements Manager

Science and Technology Advancement

Rene M. Bermudez

Introduction

On October 1, 2015 EPA substantially revised the Photochemical Assessment Monitoring Stations (PAMS) requirements in 40 CFR part 58 Appendix D. As part of the revision, an Enhanced Ozone (O₃) Monitoring Plan (EMP) was required by Federal Regulation for States and local agencies with moderate and above eight-hour O₃ nonattainment. Agencies are required to develop and implement an EMP detailing enhanced O₃ and precursor monitoring activities important to understanding localized O₃ challenges. This report describes monitoring activities within the South Coast Air Quality Management District (South Coast AQMD) boundaries. This plan addresses the requirement for an EMP as listed in Title 40, Part 58, Appendix D 5(h) of the Code of Federal Regulations (40 CFR 58). Regulations require the report be reassessed and approved as part of the 5-year network assessments required under 40 CFR 58.10(d).

Additional O₃ and NO_x Monitors

South Coast AQMD is currently classified as extreme nonattainment for the eight-hour O₃ standard. Guidance suggests enhanced monitoring activities may include:

1. Additional O₃ monitors beyond those minimally required.
2. Additional NO_x or NO_y monitors beyond those required.
3. Additional speciated VOC measurements including data gathered during different periods other than required or locations other than those required; and
4. Enhanced upper air measurements of meteorology or pollution concentrations.

South Coast AQMD operates a robust network of O₃ and NO/NO₂/NO_x/NO_y monitors beyond the minimum monitoring requirements. Tables 1 and 2 show all O₃ and NO/NO₂/NO_x/NO_y within the South Coast AQMD monitoring network which operate continuously January 1 through December 31 collecting hourly averages.

Table 1 Minimum Monitoring Requirements for O₃.

(Note: Refer to section 4.1 and Table D-2 of Appendix D of 40 CFR Part 58.)

MSA	Counties	Population and Census Year	8-hr Design Value (ppb) DV, Years ¹	Design Value Site (name AQS ID)	Monitors Required	Monitors Active	Monitors Needed
31080	Los Angeles Orange	13,214,799 2019	103 2017-2019	Glendora 060370016	4	14	0
40140	San Bernardino Riverside	4,650,631 2019	108 2017-2019	Redlands 060714003	3	15	0

¹DV Years – The three years over which the design value was calculated.

Table 2 Minimum Monitoring Requirements for NO/NO2/NOx/NOy

(Note: Refer to section 4.3 of Appendix D of 40 CFR Part 58.)

CBSA	Population and Census Year	Max AADT Counts (2018)	Required Near Road Monitors	Active Near Road Monitors	Required Area Wide Monitors	Active Area Wide Monitors	Required NOy Monitors	Active NOy Monitors
31080	13,291,486 2018	377,600 2018	2	2	2	15	1	1
40140	4,622,361 2018	278,000 2018	2	2	2	8	1	1

Starting June 1, 2019 South Coast AQMD PAMS, O3 and precursor monitoring activities were collocated with NCore sites at Los Angeles (Main St.) and Rubidoux AMS. Measurements are described below.

Auto GC - Volatile Organic Compounds (VOCs)

A complete list of the targeted compounds for PAMS are found in Table 3. South Coast AQMD measures hourly speciated VOC measurements with an auto-gas chromatograph (GC) using an Agilent/Markes model 7890A/Unity Air Server 2 at both Los Angeles (Main St.) and Rubidoux AMS.

Carbonyls – South Coast AQMD monitors carbonyls at a frequency of three 8-hour samples on an one in-three day basis during the months of June, July, August and September (~120 samples per PAMS sampling season) using ATEC model 8000 Automated Sampler. A complete list of the target carbonyl compounds may be found in Table 3. The TO-11A test method is used consistent with the National Air Toxics Trends (NATTS) monitoring program.

Nitrogen Oxides – South Coast AQMD monitors NO and NOy (total oxides of nitrogen) in addition to true NO2. True NO2 is measured with a direct reading NO2 analyzer, cavity attenuated phase shift (CAPS) spectroscopy. South Coast AQMD utilizes Teledyne CAPS T500U for the true NO2 measurement. NO and NOy are measured using a Thermo 42i or Thermo 42i-Y.

Table 3 PAMS Target Compound List

Priority Compounds				Optional Compounds			
1	1,2,3-Trimethylbenzene	18	N-Hexane	1	1,3 Butadiene	19	Beta Pinene
2	1,2,4-Trimethylbenzene	19	N-Pentane	2	1,3,5-Trimethylbenzene	20	Cis-2-Pentene
3	1-Butene	20	O-Ethyltoluene	3	1-Pentene	21	Carbon Tetrachloride
4	2,2,4-Trimethylpentane	21	O-Xylene	4	2,2-Dimethylbutane	22	Cyclohexane
5	Acetaldehyde	22	P-Ethyltoluene	5	2,3,4-Trimethylpentane	23	Cyclopentane
6	Benzene	23	Propane	6	2,3-Dimethylbutane	24	Ethanol
7	Cis-2-Butene	24	Propylene	7	2,3-Dimethylpentane	25	Isopropylbenzene
8	Ethane ^d	25	Styrene	8	2,4-Dimethylpentane	26	M-diethylbenzene
9	Ethylbenzene	26	Toluene	9	2-Methylheptane	27	Methylcyclohexane
10	Ethylene	27	Trans-2-Butene	10	2-Methylhexane	28	Methylcyclopentane
11	Formaldehyde			11	2-Methylpentane	29	N-Decane
12	Isobutane			12	3-Methylheptane	30	N-Heptane
13	Isopentane			13	3-Methylhexane	31	N-Nonane
14	Isoprene			14	3-Methylpentane	32	n-octane
15	M/P-Xylene			15	Acetone	33	N-Propylbenzene
16	M-Ethyltoluene			16	Acetylene	34	N-Undecane
17	N-Butane			17	Alpha Pinene	35	P-Diethylbenzene
				18	Benzaldehyde	36	Tetrachloroethylene
						37	Trans-2-Pentene

Source: Revisions to the Photochemical Assessment Monitoring Stations Compound Target List. U.S. EPA, October 2, 2017

Additional or Alternative PAMS Sites.

South Coast AQMD operates an O3 and NO/NO2/NOx network beyond minimum requirements as shown in Tables 1 and 2 to evaluate localized O3 challenges.

Although enhanced PAMS measurements are not required to be implemented until June, 2021, South Coast AQMD began monitoring June 1, 2019 and has extended the intensive monitoring season from June 1 through September 30 each year. PAMS seasonal schedule includes:

Table 4 PAMS Sites and Measurements

Date Established as PAMS site	Site / AQS ID#	Non – Intensive Monitoring Schedule October 1 to April 31 ¹		Intensive Monitoring Schedule May 1 to September 30 ²	
		VOC	Carbonyl	VOC	Carbonyl
06/01/2009	Los Angeles (Main St) 060371103	Auto GC hourly averages (24) every 6 th day	24 hr. sample every 6 th day	Auto GC daily hourly averages	3 x 8 hr. sample every 3rd day
06/09/2009	Rubidoux 060658001	Auto GC hourly averages (24) every 6 th day	24 hr. sample every 6 th day	Auto GC daily hourly averages	3 x 8 hr. sample every 3rd day

¹ Non – Intensive Monitoring Schedule equals approximately 5 sample days per month.

² Intensive Monitoring Schedule equals approximately 30 sample days per month.

Measurements Made out of PAMS Season

The PAMS intensive monitoring schedule begins each May 1 and ends September 30. The non-intensive season begins each October 1 and ends April 31. During the non-intensive season,

measurements continue but at a reduced schedule. Auto GC VOC hourly measurements and integrated carbonyls are collected on a 1-in-6 sample frequency for a 24 hour period at the Los Angeles (Main St.) and Rubidoux AMS. O₃, NO/NO₂/NO_x/NO_y and direct NO₂ are collected year-round on a continuous schedule.

Advanced Upper Air and Additional Meteorological Measurements

South Coast AQMD measures wind direction, wind speed, temperature, humidity, atmospheric pressure, solar radiation, ultraviolet radiation, and mixing height. South Coast AQMD has elected to use the following sensors to measure meteorology: RM Young 5305VP anemometer, Rotronic HC2-S3 ambient temperature/humidity, Vaisala PTB 110 barometer, Kipp and Zonen CMP6 Pyranometer, Eppley TUVR Total Ultraviolet Radiometer, and Vaisala CL51 Ceilometers.

Enhanced upper air meteorological measurements provide upper air wind speed and direction. This is useful for understanding O₃ formation and transport. South Coast AQMD will continue utilizing radar wind profilers with radio acoustic sounding systems (RASS) and mini Sodar acoustic wind profilers located at Los Angeles International Airport, Moreno Valley and Irvine, as resources allow. Although these systems are expensive to maintain, continued operation is valuable as part of an enhanced monitoring plan.

Special Studies

South Coast AQMD had identified special studies that would be useful understanding specific O₃ issues within the South Coast Air Basin (Basin). South Coast AQMD is working to secure partners and EMP funding to explore the following:

- What is the upwind O₃ concentration entering the basin?
- How much of an influence does background O₃ have on maximum concentration sites vs other sites? Will this make attainment harder as we get closer to the standard?
- How well do the models represent background O₃?
- Can background O₃ aid in forecasting?
- What are key biogenic VOCs in our area and what are their temporal trends?
- Are modeled biogenic VOCs accurate?
- How much do fluctuations of biogenic VOC concentrations influence O₃ formation?
- What are the concentrations of intermediate VOCs (IVOCs) within the Basin?
- What are the seasonal and long-term trends of IVOCs?

Specific studies and data can be gathered to explore the preceding through the following:

- Addition of an O₃ LIDAR to provide time/height O₃ measurements from near surface through the troposphere to characterize the spatial-temporal distribution at a fixed location upwind of the Basin. Ideally, a location near or at Vandenberg AFB through a partnership with CARB or the Tropospheric O₃ Lidar Network (TOLNet).
- Addition of measurements for biogenic VOCs through Proton Transfer Reaction Mass Spectrometry (PTR MS). It is anticipated this can be accomplished through short term

mobile monitoring at locations throughout the Basin. If not, South Coast AQMD will consider use of thermal desorption with GC/MS.

- Addition of measurements for Intermediate and (Semi Volatile Organic Compounds IVOC/SVOC). It is anticipated this can be accomplished through short term mobile monitoring at locations throughout the Basin.
- Addition of LIDAR or radiometer instruments for improved wind and temperature profile measurements.

Summary

South Coast AQMD has enhanced the monitoring network to measure additional O₃ and NO/NO₂/NO_x/NO_y beyond the minimum monitoring requirements. South Coast AQMD was an early adopter for PAMS and has implemented the enhanced PAMS monitoring ahead of schedule for year-round monitoring. Advanced upper air and network metrological measurements exceed PAMS requirements and South Coast AQMD had identified special studies that would be useful understanding specific O₃ issues within the Basin provided funding is available to prioritize monitoring. The addition of these measurements beyond the minimum requirement and proposed monitoring will continue to provide data to understand O₃ challenges within the Basin.