

Additional Monitoring in the AACOG Region Based on Network Design Analysis

**QUALITY ASSURANCE PROJECT PLAN (QAPP)
Category III: Secondary Data Project**

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Revision 2**

Prepared by:



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The content, findings, opinions and conclusions are the work of the author(s) and do not necessarily represent findings, opinions or conclusions of TCEQ.

APPROVAL SHEET

The purpose of this project is for the Alamo Area Council of Governments (AACOG) to upgrade its ambient monitoring network based on information gathered in Task 2.3 Network Design Analysis. Specific details about the project and the roles and responsibilities of participants appear in Section 2, Organization and Responsibilities.

This document is a Category III QAPP for the Additional Monitoring in the AACOG Region Based on Network Design analysis being conducted in the AACOG region of south central Texas. This QAPP is deliverable 2.4.1 for Task 2 – Ambient Monitoring Projects found in the FY 2016-2017 Proposal for Grant Activities (PGA) and Notice to Commence No.: #582-16-60849-01. This QAPP document outline follows Category III National Risk Management Research Laboratory (NRMRL) QAPP Requirements for Secondary Data Projects¹. This QAPP is in effect for the duration of this project.

This project is funded and overseen by the Texas Commission on Environmental Quality (TCEQ) and managed by the Natural Resources Department of AACOG.

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¹ National Risk Management Research Laboratory, 2008. "NRMRL QAPP Requirements for Secondary Data Projects." Available online: <https://www.tceq.texas.gov/assets/public/implementation/air/am/contracts/reports/qa/SecondarydataQAPPNRMRL.pdf>. Accessed October 24, 2016.

DISTRIBUTION LIST

Below is a list of individuals and their organizations who should receive copies of the approved QA Project Plan and any subsequent revisions, including all persons responsible for implementation (e.g., project managers), the QA managers, and representatives of all groups involved.

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During the course of the project, any revision to the QAPP will be circulated to everyone on the distribution list. Paper copies need not be provided to individuals if equivalent electronic information systems can be used.

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1 PROJECT DESCRIPTION AND OBJECTIVES

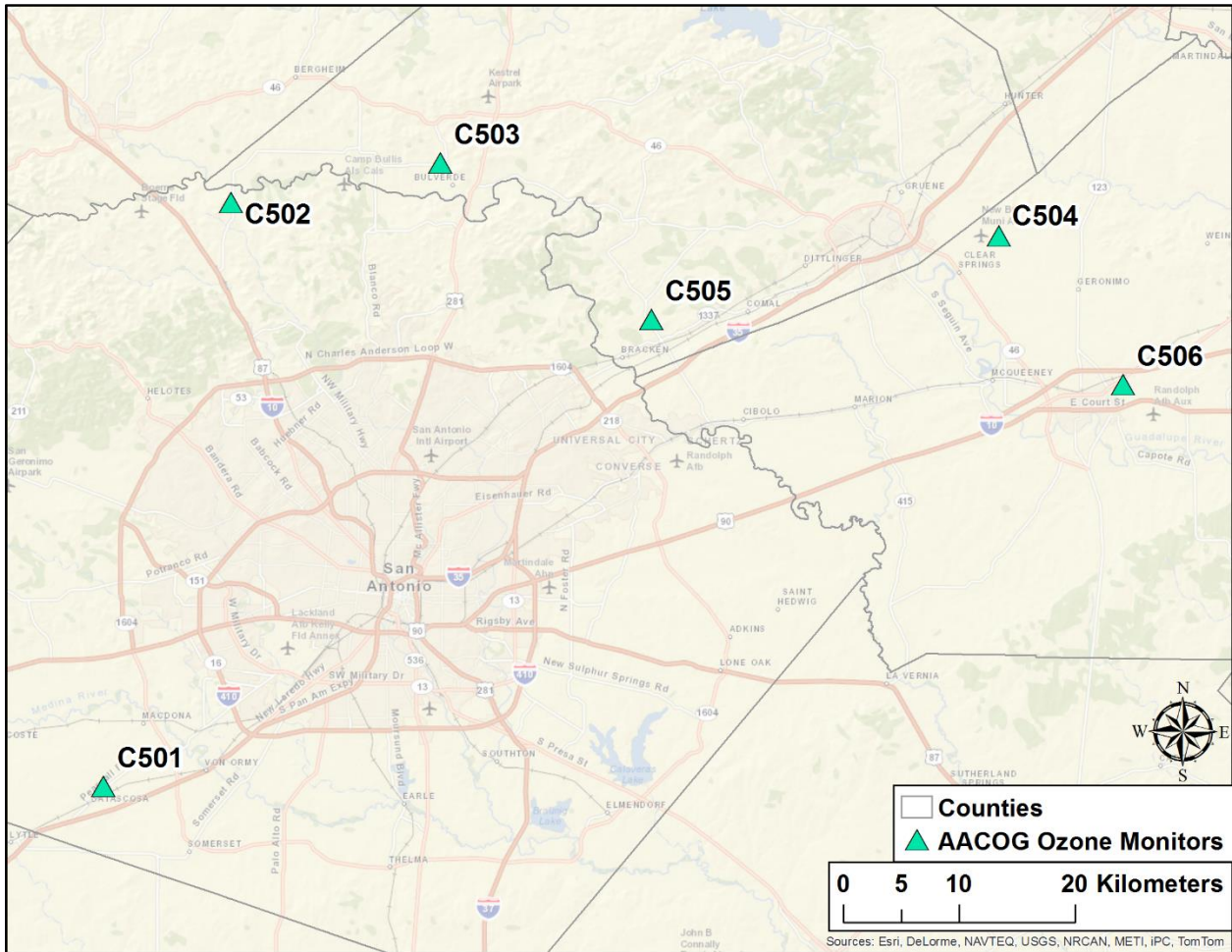
The U.S. Environmental Protection Agency (EPA) amended its ambient air monitoring regulations in October 2006 requiring states and applicable local agencies to conduct a network assessment once every five years. The EPA has provided guidance for completing a monitoring network assessment, which includes a “re-evaluation of the objectives and budget for air monitoring, an evaluation of a network’s effectiveness and efficiency relative to its objectives and costs, and the development of recommendations for network reconfigurations and improvements.”²

The ozone monitoring network for the AACOG region has remained unchanged since 2004. The San Antonio – New Braunfels Metropolitan Statistical Area (MSA) is one of the fastest-growing MSAs in the country, with much of this growth concentrated in northern Bexar County, southern Kendall County, and along the Interstate 35 corridor between Comal and Guadalupe Counties. With this population growth comes increases in ozone precursor emissions, whether from point sources like power plants that have to keep up with growing regional demand, or from onroad sources like automobiles. In addition, oil and gas exploration in the Eagle Ford Shale has gone from almost nonexistent to heavily-developed during this time period. The monitoring network for oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) has been expanded accordingly, but the ozone monitoring network has remained in the same configuration since 2004.

The current AACOG-owned monitoring network consists of six ozone monitors, mostly to the north and east of the urban core. A map showing AACOG’s zone monitoring sites is provided in Figure 1. CAMS 504 and CAMS 506 are situated such that they record upwind ozone concentrations under a northeasterly wind flow. CAMS 502 and CAMS 503 record downwind ozone concentrations under southeasterly or southerly wind flow. Ozone concentrations at CAMS 505 in Garden Ridge are often influenced by large point sources from cement processing facilities and onroad emissions from Interstate 35, particularly when winds are out of the northeast. CAMS 501 in far southwestern Bexar County records downwind ozone concentrations under northeasterly wind flow, but is occasionally an upwind monitor when winds are out of the southwest, which is a relatively less common occurrence. Only CAMS 501 and CAMS 502 have meteorological monitoring equipment that is operational. At this time, AACOG does not own any NO_x or VOC monitors that are in operation within the San Antonio Region.

CAMS 622 and CAMS 678, both southeast of San Antonio, contain ozone monitors that are currently owned by City Public Service (CPS Energy), the local electric utility company. Prior to the start of the 2016 ozone season, it was thought that ownership of those monitors would be transferred to AACOG by the start of the season. The deal ended up not materializing, and ownership of the two monitors remains with CPS Energy.

² U.S. Environmental Protection Agency, 2007. “Ambient Air Monitoring Network Assessment Guidance.” <http://www3.epa.gov/ttnamti1/files/ambient/pm25/datamang/network-assessment-guidance.pdf>. Accessed 10/1/2016.



1.1 Project Description

This additional monitoring project seeks to expand the ozone monitoring network using data and guidance from the Network Design analysis (Task 2.3). Most analysis guidance in the Network Design report is provided by the EPA and includes site-by-site, bottom-up, and network optimization techniques which help determine redundant monitoring sites, as well as areas that are underserved by monitors.³ The analysis is performed on the ozone, meteorological, NO_x, and VOC monitoring networks, although recommendations are only made for the ozone and NO_x networks. Data from all eleven regional ozone monitors is used in the aforementioned analysis techniques. This includes monitors owned by TCEQ, CPS, and ACOG.

1.2 Project Objectives

³ *Ibid.*

The objective of this project is to implement an ozone monitoring network that improves upon the one that has existed since 2004, keeping in mind the three monitoring objectives defined by the EPA:

1. Provide air pollution data to the general public in a timely manner;
2. Support compliance with ambient air quality standards and emissions strategy development (regulatory monitors only); and
3. Support for air pollution research studies.

The above objectives apply to the regulatory monitoring network, which is used for attainment demonstrations. Objectives 1 and 3 may apply to non-regulatory monitors. The AACOG-owned monitoring network, the focus of the Network Design Analysis, is non-regulatory, and cannot be used in attainment demonstrations. AACOG has established local monitoring objectives that are as follows:

1. Augment the existing regulatory monitoring network for ambient ozone data collection (improve ozone interpolation);
2. Assess population exposure,
3. Photochemical model performance verification, and
4. Improve public awareness, place monitors at schools if possible.

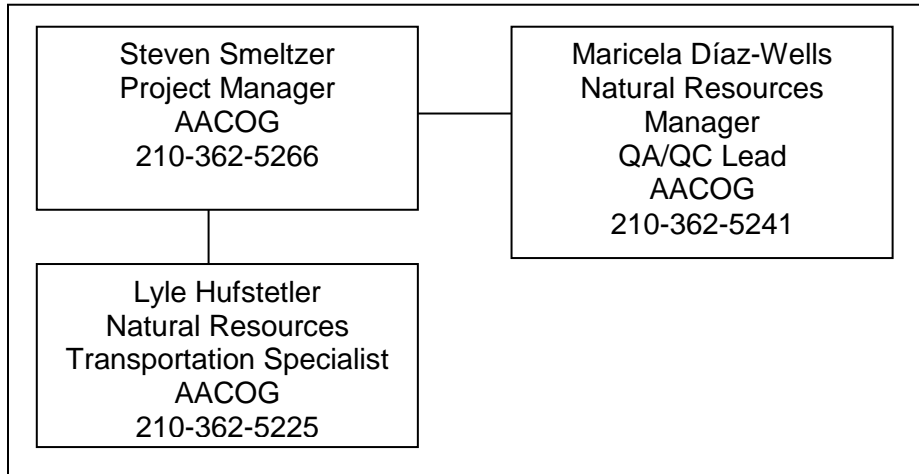
Each new and existing monitor shall meet the above objectives and exhibit one (or more) of six site types:

1. Sites located to determine the highest concentrations expected to occur in the area covered by the network;
2. Sites located to measure typical concentrations in areas of high population density;
3. Sites located to determine the impact of significant sources or source categories on air quality;
4. Sites located to determine general background concentration levels;
5. Sites located to determine the extent of regional pollutant transport among populated areas; and in support of secondary standards; and
6. Sites located to measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts.

2 ORGANIZATION AND RESPONSIBILITIES

All AACOG personnel involved in this assignment shall follow the direction of TCEQ management in all operations.

2.1 Personnel Involved



2.2 Project Schedule

The schedule of deliverables under FY 2016-2017 PGA No. 582-16-60849-16-01 is shown below:

Work Element	Deliverable Date
Deliverable 2.4.1: QAPP	
Submit draft to TCEQ for review and approval	December 16, 2016
Approval of QAPP by TCEQ	January 13, 2016
Deliverable 2.4.2: Additional Monitoring Report	
Submit draft to TCEQ for review and approval	May 15, 2017
Approval of report by TCEQ	June 15, 2017
Begin communication with owners of proposed ozone monitoring sites	March 1, 2017
Finalize plans to implement new monitors	June 15, 2017
New and existing ozone monitors fully functional	July 1, 2017

3 SCIENTIFIC APPROACH

3.1 Secondary Data

The majority of data used to locate additional monitoring sites comes from the Network Design analysis (Task 2.3).

3.1.1 Site-by-Site Analysis

This data was used primarily to assess the existing monitoring network and to pinpoint monitors that might be removed or relocated. The three-year average of yearly fourth-highest maximum 8-hour average is used to determine the three-year average ozone at each monitor. Maximum 8-hour average ozone data between 2005 and 2015 were used to perform a monitor-to-monitor

correlation. In addition to actual measured data from ozone monitors, site data is used for all monitor types, including the length of operation of each monitor, the number of parameters monitored, and the geographic locations of each monitor. Population data and Topologically Integrated Geographic Encoding and Referencing (TIGER) line files and census block population data from the 2010 Decennial Census have been used to determine the population served by each monitor.

3.1.2 Bottom-up Analysis

To help determine new locations for monitors, HYSPLIT 24-hour back and forward trajectories were used for the ozone and ozone precursor monitoring network analyses, respectively. Back trajectories show source regions of high ozone, while forward trajectories show probable paths that precursor emissions from point sources take on high ozone days. Photochemical modeling output of maximum average 8-hour ozone from the June 2006 and June 2012 Episodes were also used in the Network Design analysis to show the extent of the urban ozone plume.

3.1.3 Network Optimization Analysis

For network optimization analysis, the yearly top four of the maximum 8-hour average ozone for the years 2013-2015 were used in creating interpolated regional ozone maps.

3.1.4 Other Secondary Data

Other data used in the Additional Monitoring project are the locations of schools and other government facilities to determine specific sites for each new monitor, in fulfillment of local monitoring objectives.

3.2 **Secondary Data Sources**

Ozone measurements come from the TCEQ website and have been validated, although only the ozone data from CAMS 23, CAMS 58, and CAMS 59 meet quality assurance criteria defined by the EPA. The United States Census Bureau provides the TIGER and population data used in the Network Design analysis. Modeled HYSPLIT back trajectory data is provided by the NOAA Air Resources Laboratory.

4 **QUALITY METRICS**

4.1 **Data Quality Requirements**

The data used in the Network Design Analysis was developed under a Category III Measurement QAPP for the six AACOG-owned monitors. Monthly calibration checks at these monitors have been provided to AACOG. The Network Design Analysis itself was conducted under a Category III Secondary Data QAPP.

The data used for the Additional Monitoring Report shall meet comparability requirements. The results of the Network Design Analysis should yield similar network recommendations,

regardless of who is assessing the data. Under the Category III QAPP requirements, audits of data quality are required for 10% of data sets. A report of quality assurance findings shall be included in the final report. The Ambient Monitoring QAPP will be updated to address the changes to the AACOG monitoring network.

4.2 Data Quality Procedures

The procedures for ensuring data quality are employed by TCEQ for regulatory ozone monitors and AACOG's monitoring maintenance contractor, Dios Dado Environmental, LTD, for all non-regulatory ozone monitors in the San Antonio region. The regulatory monitors undergo routine calibrations on a schedule mandated by the EPA. For the six AACOG-owned monitors, bimonthly maintenance and monthly 3-point calibrations are performed.

5 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

5.1 Data Reporting, Reduction, and Calculations

The network analysis incorporates emissions, population, and spatial datasets. Ozone data will primarily consist of the maximum daily 8-hour average for each monitor, although there may be cases where it is appropriate to use hourly ozone data.

5.2 Data Validation Procedures

The data validation procedures used for the Network Design Analysis will apply to the Additional Monitoring project. The Ambient Monitoring QAPP will be updated to address the changes to the AACOG monitoring network.

5.3 Data Analysis and Interpretation

The data from the Network Design analysis will be interpreted both quantitatively (EPA guidance for network assessment) and qualitatively (monitor purpose) to determine ideal monitor locations. The locations of new monitors are chosen based on the results of analysis in the Network Design Report.

5.3.1 Relocation of CAMS 502

The ozone and meteorological monitor at CAMS 502 – City of Fair Oaks Ranch provides useful data on downwind ozone concentrations. Several analytical methods used in the Network Design Analysis concluded that CAMS 502 was highly essential to the overall monitoring network: monitor-to-monitor correlations, measured concentrations, and removal bias. The data presented in the Network Design Analysis indicates that CAMS 502 at Fair Oaks Ranch is critical in the AACOG monitoring network partly due to its position downwind of the urban area and on the edge of the monitoring network. Site conditions were originally reported to have

deteriorated over time due to tree overgrowth, but a recent investigation of the site showed that this problem was remedied and no longer requires relocation.

5.3.2 Installation of Wind Profiler Equipment

The Network Design Analysis discusses the possibility of purchasing and operating a radar wind profiler (RWP) and radio acoustic sounding system (RASS), similar to the study conducted at New Braunfels Regional Airport in 2005 and 2006, to assess mixing height characteristics on high ozone days. It was determined that the cost for AACOG to purchase and operate a RWP and RASS was too great to be seriously considered in the near future.

During the 2017 ozone season, two major air quality research projects will be conducted throughout the San Antonio Region: the University of Texas at Austin will record upper air wind measurements using a RWP and ceilometer located in northwestern Bexar County (near CAMS 58) and a sounder located in southeastern Bexar County (near CAMS 59); Drexel University and Aerodyne Research, Inc. will utilize a mobile monitoring unit to calculate ozone production rates and to determine when and where ozone formation is NO_x- or VOC-limited. Together, these projects will provide air quality planners and analysts with much greater knowledge of ozone formation and transport, which will inform decisions regarding the implementation of voluntary local emissions control strategies.

5.3.3 Changes to the Existing AACOG Monitoring Network

There are no plans to modify the existing monitoring network at this time.

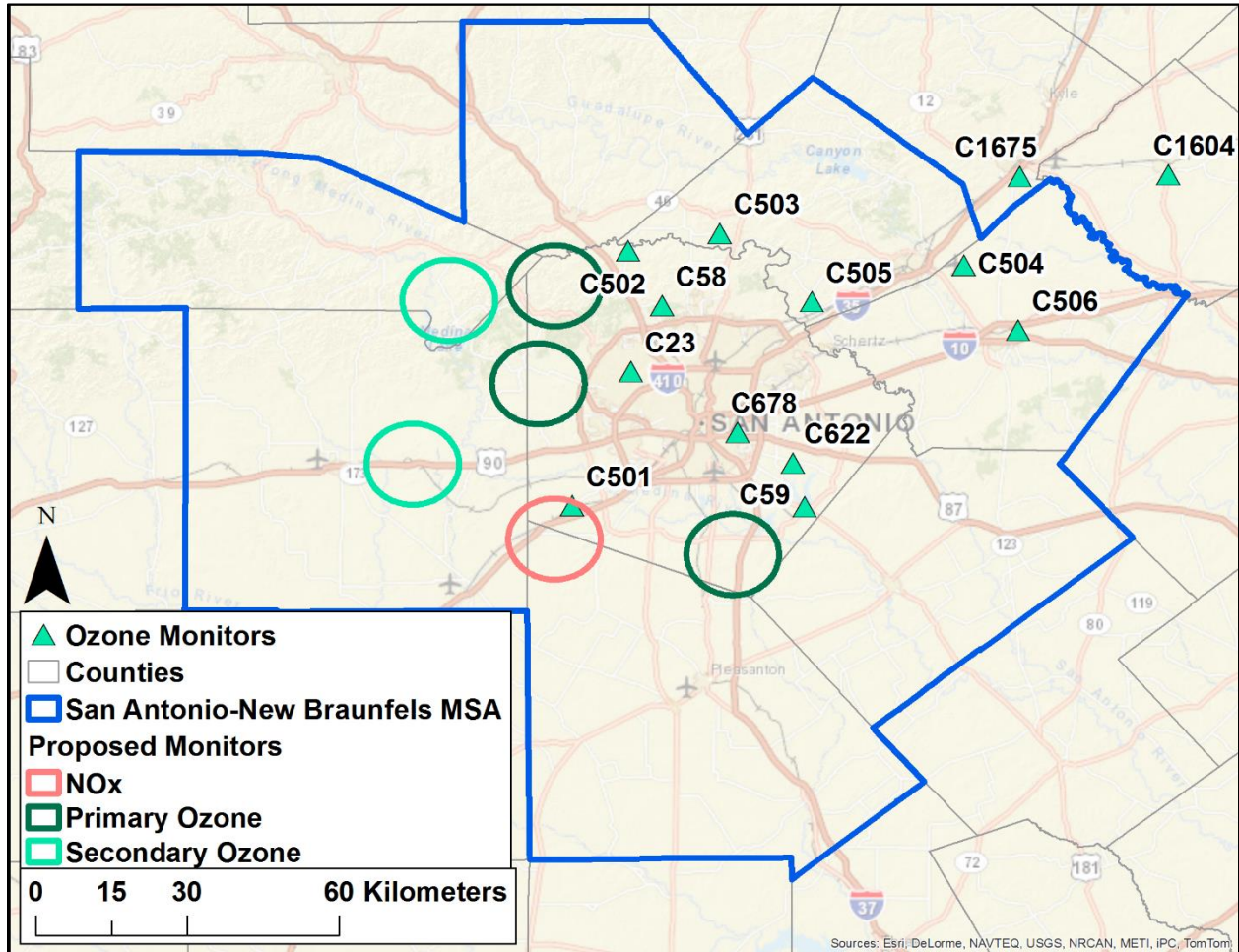
5.3.4 Additions to the AACOG Monitoring Network

Figure 5-1 shows multiple proposed monitor locations, where primary monitors reflect top-priority monitor placement with TCEQ funds, and secondary monitors would enhance the existing network, but are lower-priority due to a lack of funding available at this time. The primary proposed ozone monitoring sites are ranked in order of importance in the following table:

Monitoring Site	Rank
West	1
Northwest	2
South	3

Photochemical modeling results and back trajectory analysis largely informed the locations of the proposed monitoring sites. The west and northwest sites are most commonly downwind of the urban core and the south site is usually upwind. Photochemical modeling results often show areas northwest and west of the urban core receive the highest ozone concentrations in the region. It is useful to know how far the urban ozone plume extends from San Antonio. Having monitors in the west and northwest will help verify these modeling results.

Figure 5-1: Current and Proposed Ambient Monitoring Sites in the San Antonio Region



All existing ozone monitors were operational by the start of the 2017 ozone season.

5.4 Data Storage

The budget for this project includes funding for administrative services, which includes retention of all electronic files on back-up servers for each contract project. This document will be maintained over the course of the project using version numbers in the file name and in the footer of each page of the document.

The following documents will be developed and delivered for this project:

- QAPP
- Final Report provided by AACOG as noted in the "Data Reporting" section above.

The Monitoring Operations group at TCEQ maintains a copy of the posted and the raw measurement data received from the field instruments. These measurements are available for online retrieval from a database located at TCEQ.

6 REPORTING

AACOG is responsible for the creation of a draft Additional Monitoring report to be submitted to TCEQ by May 15, 2017. Upon receiving feedback on the draft report from TCEQ, AACOG will be responsible for producing the final report, which will be due on June 15, 2017. AACOG shall provide the report in Microsoft Office Word and Adobe Acrobat Reader (*.pdf) formats. Any supporting data or information shall be provided in like format or in a format agreed to by TCEQ and AACOG.