

Network Design Analysis

QUALITY ASSURANCE PROJECT PLAN (QAPP)

QA Category III: Measurement Project

Revision 1

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Prepared by the:

**Natural Resources Department of the
Alamo Area Council of Governments**

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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.

TITLE AND APPROVAL SHEET

The purpose of this project is for the Alamo Area Council of Governments (AACOG) to assess the current network of air monitoring sites and make recommendations to improve the monitoring network for the 13-county AACOG region. 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 Quality Assurance Project Plan for the Network Design Analysis being conducted in the AACOG region of south central Texas. This QAPP is Deliverable 2.3.1 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) Quality Assurance Project Plan (QAPP) Requirements for Secondary Data Projects¹.

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

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¹ TCEQ, 2008. "NRMRL QAPP Requirements for Secondary Data Projects." Available online: <https://www.tceq.texas.gov/assets/public/implementation/air/am/contracts/reports/ga/SecondarydataQAPPNRMRL.pdf>. Accessed 10/2/15.

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1 PROJECT DESCRIPTION AND OBJECTIVES

The San Antonio – New Braunfels Metropolitan Statistical Area² (SA-NB MSA) recorded ambient ozone levels at local regulatory ozone monitors which are in excess of the 2014 federal 70 ppb 8-hour average ozone national ambient air quality standards (8-hour ozone NAAQS) both during the 2012-2014 and 2013-2015 averaging periods.

1.1 Project Description

Through this project, the Alamo Area Council of Governments (AACOG) will complete a network design analysis of AACOG's monitoring sites in the 13-county AACOG region. The U.S. Environmental Protection Agency (EPA) advises that "networks should be designed to address multiple, interrelated air quality issues and to better operate in conjunction with other types of air quality assessments (e.g., photochemical modeling, emission inventory assessments)." The analysis could include photochemical modeling results, back trajectory analysis and correlation analysis between existing ozone monitors. The analysis will include the location of existing ozone monitors, NO_x monitors, AutoGC VOC monitors, and continuous meteorological stations in the AACOG region. AACOG shall prepare a report that makes recommendations on the location of existing monitors and potential relocation of AACOG monitors.

The network design analysis shall follow the guidelines set forth in the "Ambient Air Monitoring Network Assessment Guidance" by the EPA.³

1.2 Project Objectives and Purpose

The objective of this project is to assess the current AACOG air monitoring network and to make recommendations on future network design improvements. These recommendations will be supplemented by various statistical analysis methods intended to reveal any redundancies in the current monitoring network. The network design analysis will also include a re-evaluation of the objectives and budget for air monitoring as well as an evaluation of the effectiveness and efficiency of the AACOG monitoring network relative to its objectives and costs.⁴ The network design analysis will also investigate the possibility of AACOG maintaining monitors currently operated by City Public Service (CPS) Energy. Additional monitoring network objectives can be found in Appendix D to the EPA's Network Design Criteria for Ambient Air Quality Monitoring.⁵

² The San Antonio – New Braunfels, TX Metropolitan Statistical Area is defined as Atascosa, Bandera, Bexar, Comal, Guadalupe, Kendall, Medina, and Wilson Counties. Source: pg. 51, Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas (February 28, 2013) <http://www.whitehouse.gov/sites/default/files/omb/bulletins/2013/b13-01.pdf>

³ 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 10/1/2015.

⁴ *Ibid.*

⁵ EPA, "Network Design Criteria for Ambient Air Quality Monitoring." Available online: <http://www.gpo.gov/fdsys/pkg/CFR-2014-title40-vol6/pdf/CFR-2014-title40-vol6-part58-appD.pdf>. Accessed 10/2/15.

2 ORGANIZATION AND RESPONSIBILITIES

The individuals and organizations participating in this project are

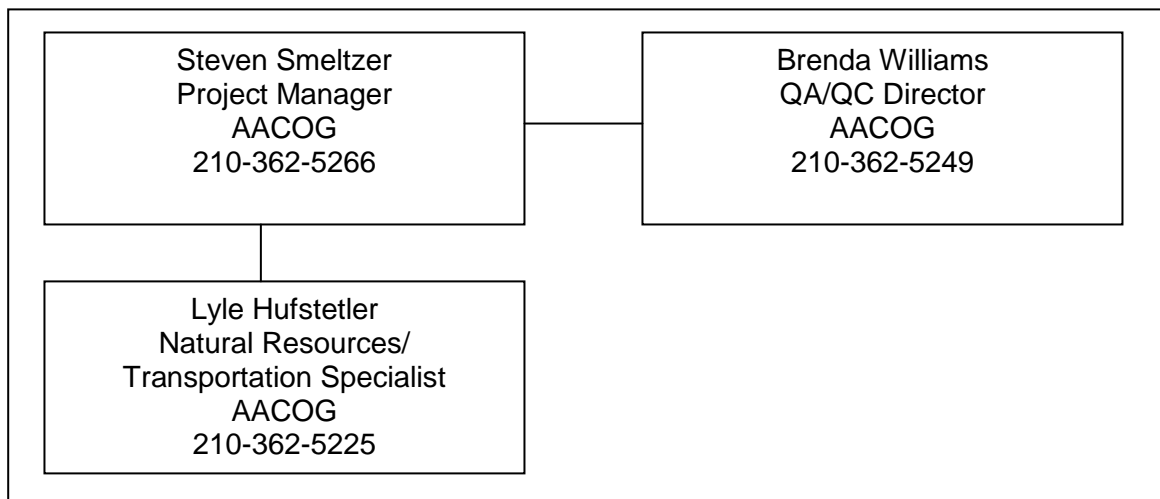
- the Texas Commission on Environmental Quality (TCEQ),
- the Alamo Area Council of Governments

2.1 Project Sponsor:

The TCEQ, through rider 7 air quality funds, is sponsoring the operations and maintenance of the AACOG Ozone and Meteorological Monitoring Network comprising six monitoring sites each of which are provided ozone measurement instruments to measure ambient ozone levels. Two of these sites are provided with meteorological equipment as well; one is co-located at a National Weather Service Station as well, supplying additional meteorological data to the network. TCEQ defined the project, approves plans and reports.

2.2 Prime Contractor:

AACOG follows the direction of the TCEQ management in all operations, and AACOG, through the subcontractor assuring maintenance and operations of the network, provides ambient ozone readings to TCEQ.



2.3 Project Deliverables under FY 2016-2017 PGA No. 582-16-60849-16-01

Deliverable: AACOG shall prepare a report documenting the AACOG network design evaluation. The report will describe the steps taken and any background AACOG feels is relevant to the project. AACOG shall provide the report in Microsoft Office Work 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.

Deliverable Dates: Draft Report March 30, 2017 and Final Report April 30, 2017.

3 SCIENTIFIC APPROACH

3.1 Secondary Data Requirements

The secondary data used for this project shall be validated by TCEQ and not older than 10 years. Data capture rates shall be greater than 90% if using an average of hourly data. The data shall be representative of the AACOG region, except when making comparisons to other regions.

3.2 Secondary Data Sources

The sources of secondary data will be each of the CAMS stations. This includes monitors that record ozone as well as meteorological conditions, nitrogen oxides (NOx) and volatile organic compounds (VOCs).

There are currently 11 monitors in the AACOG region that record ozone levels and 7 that record NOx. Two AutoGC monitors continuously record VOCs; one of them is located outside of the San Antonio – New Braunfels MSA. The data collected at these sites is processed for quality assurance by the Texas Commission on Environmental Quality (TCEQ) and is accessible via the Internet.⁶ In addition, several sites monitor meteorological conditions such as temperature, wind, speed, wind direction, precipitation, solar radiation, and relative humidity.

The CAMS network in the San Antonio region includes both regulatory and non-regulatory monitors. Regulatory monitors meet EPA's requirements for equipment type, siting criteria, and quality assurance. Regulatory monitors in the San Antonio area include three owned by TCEQ: C23, C58, and C59. Two monitors currently owned by CPS Energy, C622 and C678, are not considered regulatory monitors and will no longer be operating by CPS Energy after the 2015 ozone season. Transfer of ownership will be given to AACOG prior to the start of the 2016 ozone season. AACOG owns a series of ozone monitors, C501, C502, C503, C504, C505, and C506, which have been maintained since 2007 through the agency's subcontractor, Dios-Dado Environmental. These monitors are non-regulatory because they do not meet EPA guidelines for site selection⁷ and the data does not meet EPA criteria for determination of attainment status. CAMS 502 at Fair Oaks Ranch, which measures both ozone and meteorological parameters, will be relocated due to unsatisfactory site conditions that now exist near the monitor. Although the AACOG monitors are non-regulatory, they provide valuable information useful for the network design analysis.

⁶ TCEQ, "Select a Monitoring Site in Region 13 (San Antonio)". Available online:

http://www.tceq.state.tx.us/cgi-bin/compliance/monops/select_summary.pl?region13.gif. Accessed 05/13/10.

⁷ EPA, August 1998. "Guideline on Ozone Monitoring Site Selection". EPA-454/R-98-002. Office of Air and Radiation. Office of Air Quality Planning and Standards Research. Triangle Park, NC. Available online: <http://www.epa.gov/ttnamti1/files/ambient/criteria/reldocs/r-98-002.pdf>. Accessed 06/28/10.

Task 2.3.1, Network Design Analysis QAPP

Figure 3-1: Location of Ambient Air Monitoring Network Sites in the AACOG Region

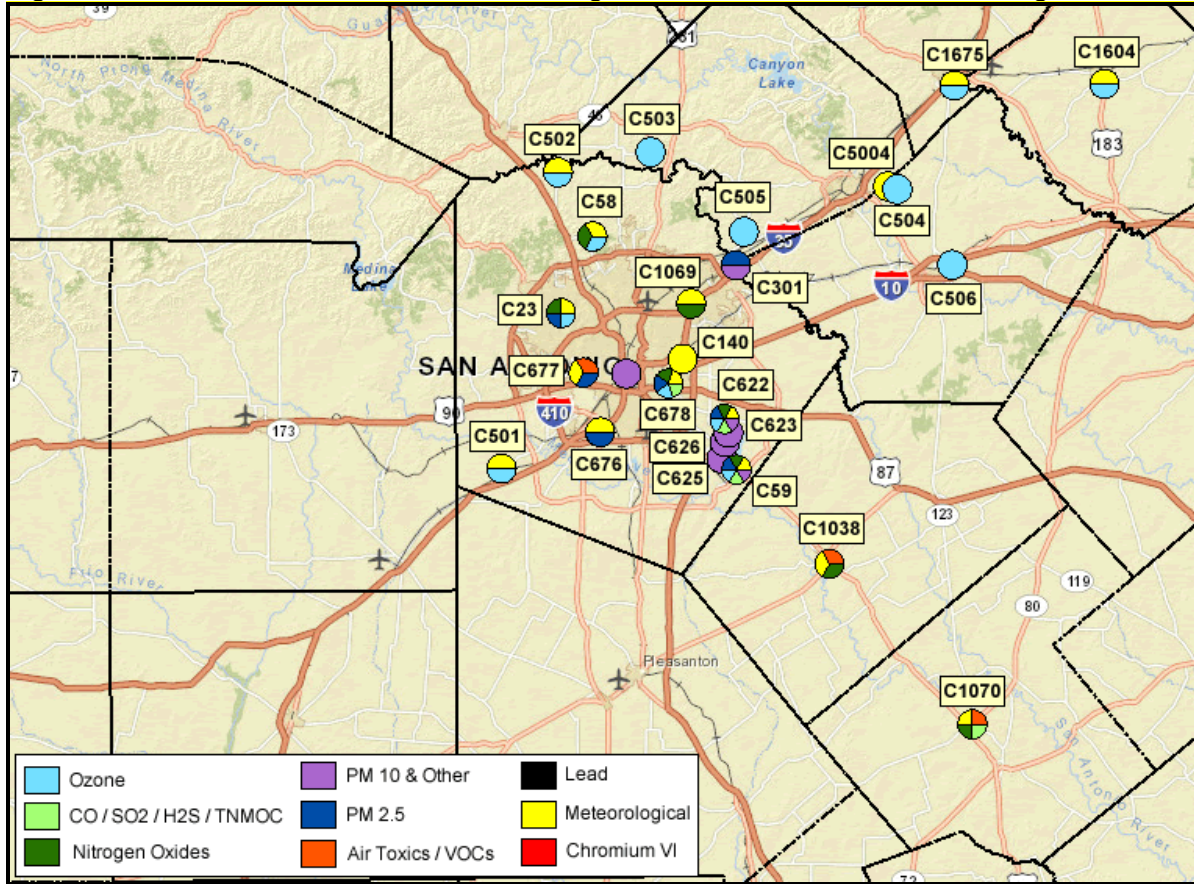


Table 3-1: AACOG-Operated Ambient Air Quality Monitor Locations, Parameters Reported

Site Name, Location (CAMS Number)	Parameters reported
Elm Creek Elementary School, 11535 Pearsall Road, Atascosa, TX 78002-5150 (C501)	Ozone & Meteorology
City of Fair Oaks Ranch, 7286 Dietz Elkhorn Road, TX 78015-4707 (C502)*	Ozone & Meteorology
Bulverde Elementary School, 1715 E. Ammann Road, Bulverde, TX 78163-2034 (C503)	Ozone
National Weather Service Station ⁸ / New Braunfels Airport, 2090 Airport Road, New Braunfels, TX 78130 (C504)	Ozone
City of Garden Ridge, 21340 FM 3009, Garden Ridge, TX 78266 (C505)	Ozone
Seguin Outdoor Learning Center, 1865 East Highway 90, Seguin, TX 78155 (C506)	Ozone

* Monitor will no longer be in operation at this location beginning with the 2016 ozone season.

⁸ Because the AACOG monitoring instrument reporting ozone data as CAMS 504 is located within the National Weather Service Station, the meteorological parameters reported for the same physical location on the CAMS 5004 dataset are provided by the NWSS instruments. Hence the CAMS 5004 meteorological reporting instruments are not the property of AACOG and are not subject to the quality assurance / quality check procedures in this document. For a complete list of meteorological parameters provided by the NWSS at this location, consult the CAMS 5004 dataset. Online: http://www.tceq.state.tx.us/cgi-bin/compliance/monops/daily_summary.pl?cams=5004

The ozone and meteorological monitors listed in **Table 3-1** operate 24 hours/day and seven days/week during the seven month ozone season in the San Antonio region, from April 1 until October 31. The data is relayed to TCEQ via modem or uplink every 15 minutes for entry into the TCEQ's Leading Environmental Analysis and Display System (LEADS) on a near-"real-time" basis during the entire ozone season.

4 QUALITY METRICS

4.1 Data Quality Requirements

As described in Section 3, the secondary data used for this project shall be validated by TCEQ and not older than 10 years. Data capture rates shall be no less than 90% if using an average of hourly data. The data shall be representative of the AACOG region, except when making comparisons to other regions.

4.2 Data Quality Procedures

The following procedures to achieve data quality are required of all contractors responsible for daily operations and maintenance of the AACOG monitoring stations:

1. Every ozone monitor will receive a monthly calibration check during each month of the seven-month ozone season (April 1 - October 31), as follows:
 - a. A five-point calibration will be performed and documented at least three times each season by the contractor: once as part of the start-up procedure; once during mid-season; and once at the end of the season. In addition, a five-point calibration will be performed before and after any ozone instrument span setting adjustment and after any instrument repair or replacement. Data logger must be set to flag ozone data "QAS" during any ozone instrument calibration.
 - b. A three-point calibration will be performed at least once a month during months that a five-point calibration is not performed. Data logger must be set to flag ozone data "QAS" during any ozone instrument calibration.
 - c. In addition to the monthly tasks in (a) and (b) above, a zero instrument check will be performed before and after any ozone instrument zero setting adjustment.
 - d. For all instrument calibration checks, the challenge concentration must be maintained for at least 10 clock minutes (two full data logger 5-minute averages) to provide verification of the checks. Data logger must be set to flag ozone data "QAS" during any ozone instrument calibration.
 - e. At least once per month, check for ozone data zero flat-line as an indicator of instrument zero offset and adjust instrument zero if offset is 5 ppb or greater.
2. Change out air sample line (1/4" Teflon sample line) once every year.
3. Site visits every fifteen days to perform cleaning (e.g., cleaning of cooling filter pad), filter replacement (e.g., replacement of particulate filter) and checks (e.g., check inline water trap) of equipment and sample inlet. (The calibration checks may be performed during these visits.)
4. A schedule of checks performed at all monitors and the results from the checks will be provided by the contractor to AACOG by November 15th following every ozone season
5. Each site will be shut down within two weeks after the end of each ozone season, by November 15th, unless another arrangement is specified.

5 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

5.1 Data Reporting, Reduction, and Calculations

The network analysis shall incorporate emissions, population, and spatial datasets. Any statistical analysis conducted shall report p-values where applicable. 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

Data validation for individual site measurements is performed by the subcontractor to AACOG. In the past, this has been Dios Dado Environmental, LTD. A Request for Proposal is currently being drafted to determine the monitoring maintenance subcontractor for the 2016-2017 ozone seasons. Validation of analysis techniques and results shall be conducted by the QA/QC manager.

5.3 Data Analysis and Interpretation

The EPA offers several analytical methods for network assessment which will be used in the network design analysis.⁹ Some of these techniques include, but are not limited to:

- Network history and changes over time
- Correlation analysis of monitoring site data
- Site analysis, including elevation, surrounding vegetation, proximity to emissions sources or other air monitoring sites, and demographic trends
- Solicit input from local agencies and leaders through AACOG's Air Improvement Resources committees.

Descriptive statistics will be selected based on the distribution of any given dataset. For normally distributed data, the mean will be used. For data that is skewed, median or percentiles will be used.

To meet TCEQ's QA/QC requirement for Category III projects, 10% of the datasets will be audited for quality by AACOG. "If problems are found, all data sets will be audited. This includes independent verification of every spreadsheet or automated calculation once and the percentage shown of manual calculations."¹⁰ A report on QA findings shall be included in the final Network Design Analysis report. A technical systems audit is not required for this project.

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, as well as paper files 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:

⁹ 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 10/1/2015.

¹⁰ Texas Commission on Environmental Quality, 2015. "Air Quality Research: Quality Assurance." <https://www.tceq.texas.gov/airquality/airmod/project/quality-assurance/>. Accessed 11/20/2015.

- QAPP
- Final Report provided by the contractor 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 Network Design Analysis report to be submitted to TCEQ by March 30, 2017. Upon receiving feedback on the draft report from TCEQ, AACOG will be responsible for producing the final report, which will be due on April 30, 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.