

# 2021 Air Quality Monitoring Report

Prepared by the Capital Area Council of Governments

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# 1 INTRODUCTION

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The Capital Area Council of Governments (CAPCOG) is a regional planning commission covering ten counties in Central Texas – Bastrop, Blanco, Burnet, Caldwell, Hays, Fayette, Lee, Llano, Travis, and Williamson Counties. Five of these counties – Bastrop, Caldwell, Hays, Travis, and Williamson Counties – constitute the Austin-Round Rock-Georgetown Metropolitan Statistical Area (MSA). This report documents the ground-level ozone (O<sub>3</sub>) and meteorological monitoring activities conducted by CAPCOG in 2021.

During 2021, CAPCOG contracted with Weston Solutions, Inc. (WESTON) to operate and maintain eight Continuous Air Monitoring Stations (CAMS) in the MSA. A map of these monitoring stations is provided below. Data collected at CAPCOG CAMS was electronically transmitted to the Texas Commission on Environmental Quality's (TCEQ) Leading Environmental Assessment Display System (LEADS) and the U.S. Environmental Protection Agency's (EPA's) AirNow. This report is based on monthly reports provided to CAPCOG by WESTON. This report provides details of the activity conducted throughout the 2021 O<sub>3</sub> season (March – November 2021) and key performance metrics. The following table provides some key identifying information about the eight CAMS that CAPCOG operated in 2021.

*Table 1-1. CAPCOG Air Quality Monitors Operated in 2021*

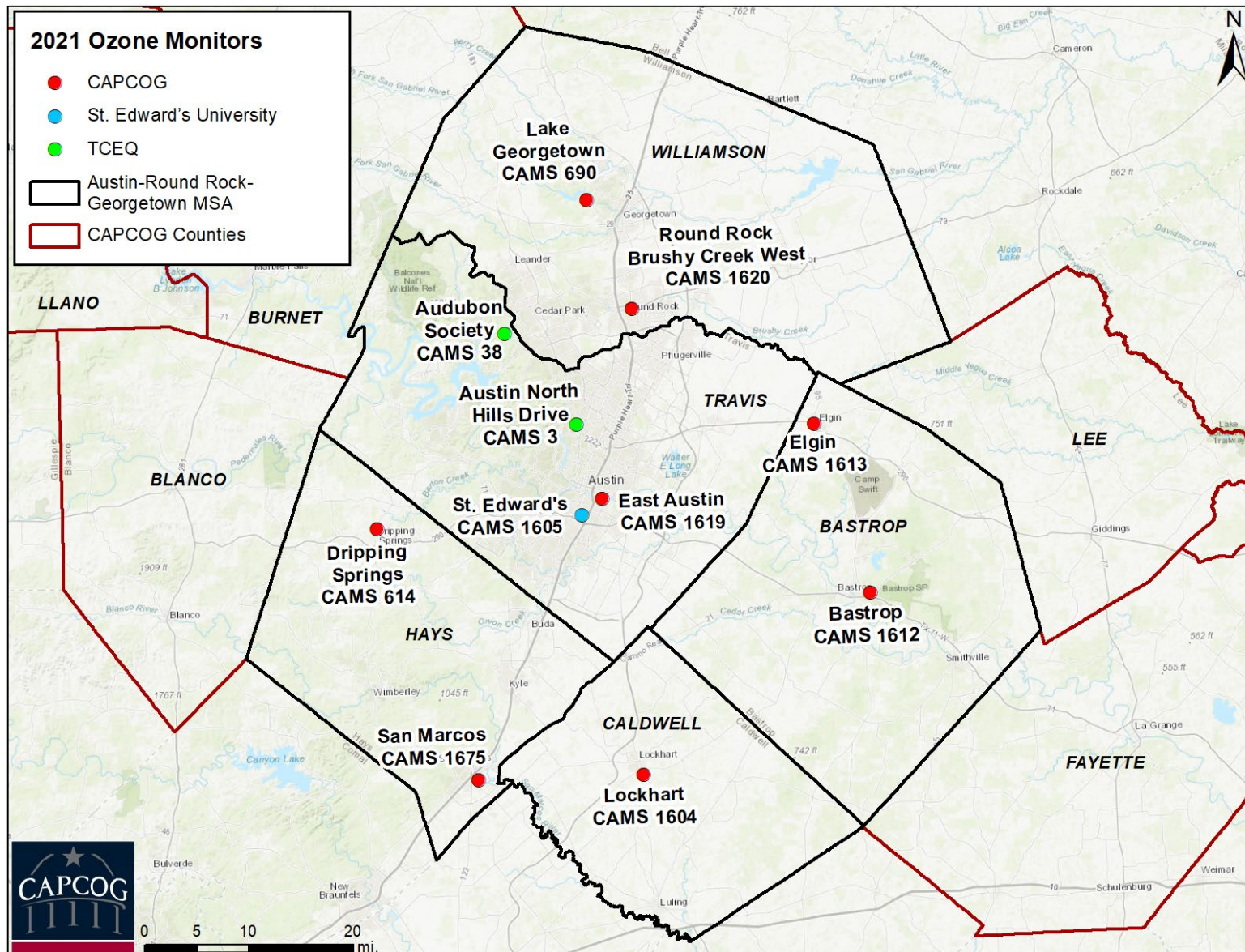
Station Name	CAMS #	EPA #	County	Start	End
<b>Dripping Springs School</b>	614	482090614	Hays	2/23/2021	11/20/2021
<b>Lake Georgetown</b>	690	484910690	Williamson	2/26/2021	11/17/2021
<b>Lockhart</b>	1604	480551604	Caldwell	2/22/2021	11/18/2021
<b>Bastrop</b>	1612	480211612	Bastrop	2/23/2021	11/19/2021
<b>Elgin</b>	1613	480211613	Bastrop	2/22/2021	11/23/2021
<b>East Austin</b>	1619	484531619	Travis	2/28/2021	11/23/2021
<b>Round Rock Brushy Creek West</b>	1620	484911620	Williamson	3/11/2021*	11/16/2021
<b>San Marcos Staples Road</b>	1675	482091675	Hays	2/23/2021	11/18/2021

\*CAMS 1620 was a new site for CAPCOG in 2021. The CAMS 1620 site set-up and start-up was delayed due to logistics at the site and the 2021 February Winter Storm Uri.

During 2021, all O<sub>3</sub> monitoring activities were funded by TCEQ, with the exception of installation of PurpleAir particulate matter (PM) sensors in spring 2021. The PurpleAir work was funded with local air quality funding. This report does not include any activities done on the PurpleAir sensors.

Figure 1-1 shows the location of CAPCOG's 2021 O<sub>3</sub> monitors, as well as the other O<sub>3</sub> monitors owned by TCEQ and St. Edward's University.

Figure 1-1. 2021 O<sub>3</sub> Monitors



## 2 MONITORING ACTIVITY BY STATION

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This section provides details of the monitoring activity for each station apart from the daily data checks by WESTON. Preventive Maintenance Instruction (PMI) 04-14 is the twice-monthly maintenance visit for the replacement of the O<sub>3</sub> analyzer sample inlet particulate filter. PMI 03-30 is the monthly replacement of the air conditioning (A/C) unit's return air filter.

### 2.1 CAMS 614

- 2/23/2021: Season start-up activities; PMIs 04-014 and 04-360 (replacement of the O<sub>3</sub> sample line); replaced MetOne relative humidity and temperature (RH/Temp) sensor with R.M. Young (RMY) Model 41382VF RH/Temp sensor; Removed Climatronics wind sensor from tower, mounted pole to side of trailer and installed an RMY model 05305 wind sensor; turned on all sensors in Envidas; turned on A/C and space heater; site inventory completed; startup 5-point calibration (cal.).
- 3/20/2021: PMI 04-014 and 03-030; Downloaded O<sub>3</sub> data from ZENO.
- 3/30/2021: Performed 5-point cal.; performed PMI 04-014; sprayed weeds; downloaded O<sub>3</sub> data from ZENO.
- 4/24/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 4/29/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 5/14/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 5/30/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 6/18/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 6/28/2021: Performed 5-point cal.; performed PMI 04-014; sprayed weeds; downloaded O<sub>3</sub> data from ZENO.
- 7/13/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 7/28/2021: Performed 5-point cal.; performed PMI 04-014; sprayed weeds; downloaded O<sub>3</sub> data from ZENO.
- 8/9/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 8/26/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 9/17/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO; sprayed weeds.
- 9/26/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 10/16/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO; sprayed weeds.
- 10/29/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 11/20/2021: Performed end of season 5-point cal.; recorded all O<sub>3</sub> parameter statuses; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO; turned off and covered ozone analyzer; turned off A/C unit; unplugged RMY interface; completed inventory; spread pre-emerge weed preventer on site grounds.

## 2.2 CAMS 690

- 2/26/2021: Season start-up activities; PMIs 04-014 and 04-360; replaced MetOne RH/Temp sensor with RMY Model 41382VF RH/Temp sensor; Removed Climatronics wind sensors from tower, mounted pole to crossarm on tower to install an RMY model 05305 wind sensor; turned on all sensors in Envidas; turned on A/C and space heater; site inventory completed; startup 5-point cal.
- 3/4/2021: Installed pole to meteorological (Met) tower crossarm for RMY wind sensor
- 3/18/2021: Mounted RMY 05305 wind sensor on the tower/crossarm, wired wind sensor to RMY interface; relocated the lightening rod on the crossarm as to not interfere with movement of wind sensor; Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from 49iQ.
- 3/30/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from 49iQ.
- 4/24/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from 49iQ.
- 4/30/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from 49iQ.
- 5/17/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from 49iQ. WESTON removed the inside cover on the A/C unit and cleaned the mold off the ceiling around the A/C and the cover with bleach cleaner. The O<sub>3</sub> unit was covered with a towel for protection until finished with the cleaning.
- 5/28/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from 49iQ.
- 6/17/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from 49iQ.
- 6/29/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from 49iQ.
- 7/15/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from 49iQ.
- 7/29/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from 49iQ.
- 8/12/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from 49iQ.
- 8/30/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from 49iQ.
- 9/16/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from 49iQ.
- 9/28/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from 49iQ; sprayed weeds.
- 10/14/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from 49iQ.
- 10/26/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from 49iQ.
- 11/17/2021: Performed end of season 5-point cal.; recorded all O<sub>3</sub> parameter statuses; performed PMI 04-014; turned off and covered ozone analyzer; turned off A/C unit; unplugged RMY interface; completed inventory.

## 2.3 CAMS 1604

- 2/22/2021: Season start-up activities; PMI 04-360; all equipment connected and turned on; A/C and heater was turned on; site inventory completed; replaced MetOne RH/Temp sensor with RMY Model 41382VF RH/Temp sensor; turned on all sensors in Envidas.
- 2/23/2021: Performed season startup 5-point cal. and PMI 04-014
- 3/9/2021: Performed PMI 04-014 and PMI 03-030, downloaded O<sub>3</sub> data from ZENO.
- 3/30/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 4/22/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 4/26/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.



- 5/14/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 5/26/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 6/15/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO; sprayed weeds.
- 6/24/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 7/13/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 7/27/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 8/11/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 8/24/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 9/17/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO; sprayed weeds.
- 9/27/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 10/13/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO; sprayed weeds.
- 10/27/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 11/18/2021: Performed end of season 5-point cal.; recorded all O<sub>3</sub> parameter statuses; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO; turned off and covered ozone analyzer; turned off A/C unit; unplugged RMY interface; completed inventory.

## 2.4 CAMS 1612

- 2/25/2021: Season start-up activities; PMI 04-360; all equipment connected and turned on; A/C and heater was turned on; site inventory completed; replaced MetOne RH/Temp sensor with RMY Model 41382VF RH/Temp sensor; turned on all sensors in Envidas.
- 2/28/2021: Performed season startup 5-point cal. and PMI 04-014.
- 3/15/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 3/28/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 4/22/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 4/26/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 5/12/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 5/29/2021: Performed 5-point cal. on switched analyzer. PMI 04-014 was not needed due to new analyzer.
- 6/15/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 6/25/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 7/19/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 7/27/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 8/12/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 8/29/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 9/17/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 9/27/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 10/13/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 10/28/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO; cut tall grass around trailer.



- 11/19/2021: Performed end of season 5-point cal.; recorded all O<sub>3</sub> parameter statuses; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO; turned off and covered ozone analyzer; turned off A/C unit; unplugged RMY interface; completed inventory.

## 2.5 CAMS 1613

- 2/22/2021: Season start-up activities; PMIs 04-014 and 04-360; all equipment connected and turned on; A/C and heater was turned on; site inventory completed; replaced MetOne RH/Temp sensor with RMY Model 41382VF RH/Temp sensor; turned on all sensors in Envidas; startup 5-point cal.
- 3/15/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 3/26/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 4/23/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 4/28/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 5/12/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 5/29/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 6/15/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 6/25/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 7/15/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 7/30/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 8/12/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 8/29/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 9/14/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 9/28/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 10/15/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 10/28/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 11/23/2021: Performed end of season 5-point cal.; recorded all O<sub>3</sub> parameter statuses; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO; turned off and covered ozone analyzer; turned off A/C unit; unplugged RMY interface; completed inventory.

## 2.6 CAMS 1619

- 2/28/2021: Season start-up activities; PMIs 04-014 and 04-360; all equipment connected and turned on; A/C and heater was turned on; site inventory completed; replaced MetOne RH/Temp sensor with RMY Model 41382VF RH/Temp sensor; turned on all sensors in Envidas; startup 5-point cal.
- 3/19/2021: PMI 04-014 and 03-030; Downloaded O<sub>3</sub> data from ZENO. Space heat is not working. It heats up but the fan will not come on. Unplugged the unit.
- 3/31/2021: Performed 5-point cal.; performed PMI 04-014; sprayed weeds; downloaded O<sub>3</sub> data from ZENO.
- 4/23/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 4/2/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 5/12/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 5/25/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.

- 6/18/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO; sprayed weeds.
- 6/30/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 7/19/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 7/31/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO; sprayed weeds; wiped mold from the A/C and off the ceiling with bleach wipes.
- 8/12/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 8/25/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 9/14/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 9/29/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO; sprayed weeds.
- 10/15/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 10/29/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO; sprayed weeds.
- 11/23/2021: Performed end of season 5-point cal.; recorded all O<sub>3</sub> parameter statuses; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO; turned off and covered ozone analyzer; turned off A/C unit; unplugged RMY interface; completed inventory.

## 2.7 CAMS 1620

- 3/11/2021: Set up new Round Rock Site. Erected tripod for Met, installed RMY wind and RH/Temp on tripod. Reconnected the O<sub>3</sub>, modem, and D-link switch. PMI 04-360 completed. All instrumentation was powered up. Envidas set-up is pending.
- 3/19/2021: Season startup 5-point cal.; PMI 04-014 and 03-030; Set up O<sub>3</sub> site in AirNow and set to active. Downloaded O<sub>3</sub> data from ZENO.
- 4/23/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 4/28/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 5/17/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 5/28/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 6/11/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 6/30/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 7/15/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 7/30/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 8/7/2021: Performed unscheduled 5-point cal. due to trailer move.
- 8/12/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO; changed the dust filter on the O<sub>3</sub> cooling fan.
- 8/30/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 9/16/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO; Placed traffic cones around MET tripod.
- 9/29/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 10/14/2021: Performed PMI 04-014 and PMI 03-030; downloaded O<sub>3</sub> data from ZENO.
- 10/26/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.

- 11/16/2021: Performed end of season 5-point cal.; recorded all O<sub>3</sub> parameter statuses; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO; turned off and covered ozone analyzer; turned off A/C unit; unplugged RMY interface; completed inventory.

## 2.8 CAMS 1675

- 2/25/2021: Season start-up activities; PMIs 04-014 and 04-360; all equipment connected and turned on; site inventory completed; replaced MetOne RH/Temp sensor with RMY Model 41382VF RH/Temp sensor; turned on all sensors in Envidas; adjusted RMY wind sensor declination; startup 5-point cal.
- 3/9/2021: Checked parameters on O<sub>3</sub> unit; Performed PMI 04-014.
- 3/19/2021: Performed PMI 04-014; 5-point cal. was completed due to O<sub>3</sub> pump repair.
- 4/22/2021: Downloaded O<sub>3</sub> data from ZENO.
- 4/23/2021: Performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 4/27/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO; vacuumed bugs and dirt from floor.
- 5/18/2021: Performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 5/27/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 6/15/2021: Performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 6/24/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 7/16/2021: Performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 7/28/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 8/11/2021: Performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 8/25/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 9/17/2021: Performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 9/30/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 10/13/2021: Performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 10/29/2021: Performed 5-point cal.; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO.
- 11/18/2021: Performed end of season 5-point cal.; recorded all O<sub>3</sub> parameter statuses; performed PMI 04-014; downloaded O<sub>3</sub> data from ZENO; turned off and covered ozone analyzer; removed RMY interface; completed inventory.

## 3 TECHNICAL CHALLENGES & RESOLUTIONS

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This section documents technical challenges and resolutions to those challenges during the 2021 monitoring season at each station.

### 3.1 CAMS 614

- February: None
- March: None
- April: None
- May: None
- June: None

- July: None
- August: None
- September: None
- October: None
- November: None

### 3.2 CAMS 690

- February:
  - 2/26/2021: All meteorological sensor set-up delayed due to the need to install a new meteorological pole which was delayed by Winter Storm Uri.
- March:
  - 3/18/2021: New meteorological pole installed, and all meteorological sensors were installed. All meteorological data started reporting for the season.
- April: None
- May: None
- June: None
- July:
  - 7/15/2021: Replaced 4 ft. fluorescent bulbs in the trailer.
- August: None
- September: None
- October: None
- November: None

### 3.3 CAMS 1604

- February: None
- March: None
- April: None
- May: None
- June: None
- July:
  - 7/14/2021: The cellular modem stopped working, so data will be manually sent for ozone until the modem is replaced. The meteorological data was lost from 7/14 – 7/31.
- August:
  - 8/11/2021: New modem was installed. O<sub>3</sub> data correctly reported, but the meteorological data settings in the modem need to be adjusted for proper reporting.
  - 8/12/2021: WESTON remotely logged into modem to fix meteorological data reporting issue; the issue was fixed. Meteorological data was lost from 8/1 – 8/12.
- September: None
- October: None
- November: None

### 3.4 CAMS 1612

- February: None
- March: None
- April: None
- May:
  - 5/18/2021-5/26/2021: O<sub>3</sub> analyzer malfunctioning.
  - 5/26/2021: A spare analyzer was installed while the other was repaired. WESTON encountered issues with the replacement analyzer communicating with the data collection software. Therefore, unit was left in P-code (PMI status).
  - 5/27/2021: WESTON Attempted to complete 5-point cal. but was unsuccessful. The 49iQ O<sub>3</sub> unit would not stabilize.
  - 5/29/2021: WESTON adjusted configurations on 49iQ O<sub>3</sub> unit to match the 49iQ unit at CAMS 690. WESTON completed 5-point cal. successfully. WESTON reconfigured the O<sub>3</sub> in Envidas to accommodate the 49iQ, but WESTON was unable to get analyzer to communicate in the Envidas program.
- June:
  - 6/2/2021: WESTON fixed the communication issue with the ozone 49iQ analyzer, and O<sub>3</sub> data is transmitting successfully.
- July:
  - 7/19/2021: O<sub>3</sub> unit was locked up. Alarm indicated a power supply fail. The analyzer was stuck on 26.8 parts per billion (ppb) since 7/16/2021. WESTON cycled the power on the analyzer, and O<sub>3</sub> readings were fluctuating. WESTON waited for the O<sub>3</sub> readings to stabilize then put back into data collect mode.
- August: None
- September: None
- October: None
- November: None

### 3.5 CAMS 1613

- February: None
- March: None
- April: None
- May: None
- June: None
- July: None
- August: None
- September: None
- October: None
- November: None

### 3.6 CAMS 1619

- February: None
- March:

- 3/19/2021: Space heater is not working, it heats-up but the fan will not come on. WESTON unplugged the unit until replacement.
- April: None
- May: None
- June: None
- July: None
- August: None
- September: None
- October: None
- November:
  - 11/23/2021: Modem needed to be replaced to be compatible with ATT's 5G network for next season. WESTON replaced the old Sierra Wireless LS300 modem with the new RV55 model. Also, WESTON ensured that Envidas was receiving data after the modem change.

### 3.7 CAMS 1620

- February:
  - 2/22/2021: At the request of the City of Round Rock, the trailer needed to be moved to a new location at the same site. As a result, site start-up was delayed due to the need to install a new electrical outlet at the new location. The installation of the electrical outlet was delayed due to the winter storm and the aftereffects of the storm.
- March: None
- April: None
- May:
  - 5/17/2021: Power went out briefly causing cellular modem, Wi-Fi modem, and ZENO to re-boot. WESTON unplugged the uninterruptible power supply (UPS) to test it and it failed. UPS needs replacement.
  - 5/19/2021: WESTON replaced broken UPS with new one.
  - 5/30/2021: WESTON suggested that the power outlets to the monitoring trailer need to be repaired due to only one outlet functioning, to which all of the equipment is plugged in.
- June:
  - 6/11/2021: WESTON installed new A/C unit.
  - 6/30/2021: Due to the electrical issues, the O<sub>3</sub> calibration generator would not stay on full power. Power kept going too low to keep it running normally. WESTON found an outside power source and used an extension cord to power up the O<sub>3</sub> generator and a portable light. The calibration was successful. An appointment is set with an electrician for 7/15/2021. The new A/C was frozen up and was leaking water inside the trailer. WESTON cleaned up the water and raised the front of the trailer slightly to direct the outside condensation toward the back of the trailer which stopped it from leaking inside. A/C was running fine afterward without putting more strain on the power situation.
- July:

- 7/15/2021: Electrician on site to resolve electrical issues. Electrician repaired outlets in the trailer and the breaker for the A/C unit. WESTON caulked top of back trailer door to stop leaks when it rains.
- 7/29/2021: WESTON met with Round Rock staff to discuss electrical supply issues. The electricity for the trailer is tied to the wastewater pumps at the site which is causing power loss. Round Rock suggests moving the trailer to a different location at the same site so that the trailer is on its own power supply.
- August:
  - 8/5/2021: WESTON moved trailer across the lot and remounted all meteorological sensors to tripod. Power is good, and the ozone unit needs calibration.
  - 8/7/2021: Completed, unscheduled, 5-point calibration on O<sub>3</sub> analyzer. Calibration passed and concentration readings are ambient.
  - 8/30/2021: The A/C unit had ice on the coils again. The ice was thawed, and the temperature was lowered slightly. It may be due to the previous power issues.
- September:
  - 9/16/2021: The A/C was frozen with ice covering the coils. The ice was thawed, and it was left on fan only for a while. WESTON lowered the temperature setting all the way and put it back on “Low Cool”.
  - 9/29/2021: The A/C was working properly and there was no ice on the coils. Raising the temperature settings to warmest seemed to work.
- October: None
- November:
  - 11/16/2021: Modem needed to be replaced to be compatible with ATT’s 5G network for next season. WESTON replaced the old Sierra Wireless LS300 modem with the new RV55 model. Also, WESTON ensured that Envidas was receiving data after the modem change.

### 3.8 CAMS 1675

- February: None
- March:
  - 3/9/2021: WESTON removed resistor from power source in RMY interface for Met to read correctly.
  - 3/16/2021: Site visit was made to investigate negative O<sub>3</sub> data. Found holes in the pump diaphragm.
  - 3/17/2021: Site visit was made to replace pump diaphragm. O<sub>3</sub> cooling fan not working.
  - 3/19/2021: 5-point cal. was completed due to O<sub>3</sub> pump repair. Cooling fan needs to be replaced on O<sub>3</sub> 49i unit.
- April:
  - 4/22/2021: WESTON installed broken cooling fan in O<sub>3</sub> unit.
- May:
  - 5/19/2021: WESTON removed the RMY RH/Temp sensor to test it at CAMS 1620, as readings are inaccurate. WESTON checked the wiring and jumpers, and WESTON found



moisture inside. WESTON dried the sensor and made sure the cap was tight. WESTON tested the CAMS 1675 sensor at CAMS 1620, and both sensors are working properly.

- 5/20/2021: The RMY RH/Temp sensor was shipped to RMY for repair/calibration as the sensor is still experiencing issues when installed CAMS 1675.
- June:
  - 6/18/2021: WESTON installed the repaired RH/Temp sensor. Sensor is still not reading correctly.
  - 6/24/2021: WESTON tested the RH/Temp sensor voltages on the sensor and interface. The voltages were the same. WESTON Removed RH/Temp sensor to switch with CAMS 1604 sensor. The CAMS 1675 sensor is working properly at CAMS 1604. WESTON will connect the CAMS 1604 sensor at San Marcos to see if the issue is with something else.
  - 6/29/2021: WESTON installed the RH/Temp sensor that was removed from CAMS 1604. Readings still inaccurate. WESTON called RMY for assistance, and RMY thinks that it might be the interface.
- July:
  - 7/28/2021: WESTON connected the RMY RH/Temp sensor to ZENO temporarily in order to manually download and send file to TCEQ. WESTON replaced sample line insulation with better quality to help keep condensation out of tubing. RMY interface will be sent for repair at the end of the season.
- August:
  - 8/11/2021:
    - WESTON received assistance from the ZENO manufacturer to edit the ZENO configurations for the RH/Temp sensor. The data was retrieved after 7/31/21 and uploaded to LEADS. It appears the RH is ambient compared to other sites, but the temperature readings are still not accurate.
    - WESTON moved modem antenna to outside of the building for better signal.
  - 8/12/2021: WESTON took site photos and worked on Siting Criteria form for new trailer location.
- September:
  - 9/17/2021: WESTON contacted Campbell Scientific for further assistance with outdoor temperature settings in ZENO.
- October:
  - 10/31/2021: After consulting with Campbell Scientific regarding the ZENO settings for the outdoor temperature, the sensor is still not showing correct readings. Therefore, WESTON flagged it as AQI until a solution is found. The RH readings to be ambient, but the complete data file failed to upload to LEADS. The RH data files were re-sent to TCEQ.
- November:
  - 11/18/2021: WESTON removed the RMY interface to test at another site to compare temperature readings. The outdoor temperature sensor was tested at another site and is working properly. The issue seems to be with the RMY interface as it is not working at another site either. The interface will be sent to RMY for inspection and/or repair during the winter. The outdoor temperature flagged AQI until a solution is found. Because of the issue with the temperature data, the RH data return has been affected somewhat.

## 4 COMPLETENESS STATISTICS

This section provides completeness statistics for the hourly O<sub>3</sub> and meteorological data collected between 3/1/2021 and 11/15/2021. Meteorological data includes wind speed (WS), wind direction (WD), outdoor temperature (T), and relative humidity (RH). All monitoring stations include measurements for O<sub>3</sub>, WS, WD, and T.

CAMS 1675 had issues with the relative humidity and temperature sensor throughout the season. Therefore, there are many months when the data was not valid or did not meet the data quality objective (DQO). The sensor was sent for repair mid-season, but the issue persisted. The issue may be with the port for the relative humidity and temperature sensor on the serial interface that converts the analog data to digital data. After the O<sub>3</sub> season end, the interface was sent for repair to the manufacturer, RM Young. From mid-July to mid-August, the modem at CAMS 1604 needed replacement. Until a new modem was purchased and replaced, the meteorological data was lost at CAMS 1604.

The following table provides a season-wide summary. Site-specific data by month are shown in the subsequent tables. Data that did not meet CAPCOG's DQO of 85% for each parameter at each site for each month are identified in red.<sup>1</sup>

Table 4-1. Completeness Statistics for 3/1/2021 - 11/15/2021 by Monitoring Station and Parameter

CAMS #	O <sub>3</sub>	WD	WS	T	RH
<b>CAMS 614</b>	98.9%	97.4%	97.4%	98.0%	96.5%
<b>CAMS 690</b>	98.2%	98.7%	98.7%	98.8%	97.7%
<b>CAMS 1604</b>	97.3%	88.2%	88.2%	87.3%	88.1%
<b>CAMS 1612</b>	92.4%	99.0%	99.0%	97.9%	96.1%
<b>CAMS 1613</b>	99.1%	99.0%	99.0%	97.9%	96.2%
<b>CAMS 1619</b>	98.3%	97.7%	97.7%	97.2%	98.3%
<b>CAMS 1620</b>	93.7%	97.7%	97.7%	98.0%	98.1%
<b>CAMS 1675</b>	96.2%	99.1%	98.8%	26.3%	62.6%

Table 4-2. CAMS 614 Completeness Statistics by Month & Parameter, 2021

Month	O <sub>3</sub>	WD	WS	T	RH
<b>March</b>	98.7%	84.7%	84.7%	84.7%	84.7%
<b>April</b>	99.7%	100.0%	100.0%	100.0%	100.0%
<b>May</b>	99.3%	98.9%	98.9%	99.7%	99.7%
<b>June</b>	99.6%	99.2%	99.2%	99.9%	99.9%
<b>July</b>	99.1%	99.3%	99.3%	99.3%	99.3%
<b>August</b>	99.3%	100.0%	100.0%	100.0%	100.0%
<b>September</b>	99.7%	95.7%	95.7%	100.0%	98.1%

<sup>1</sup> Statistics are based on total possible hourly values in the month. For November, this is based on total possible hourly values 11/1/2021 – 11/15/2021. Adjusted data that include all of November are available upon request. Statistics do not reflect any other data quality concerns that might have arisen during these periods.

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Month	O <sub>3</sub>	WD	WS	T	RH
October	97.7%	100.0%	100.0%	100.0%	100.0%
November	97.2%	98.6%	98.6%	98.6%	87.2%

Table 4-3. CAMS 690 Completeness Statistics by Month & Parameter, 2021

Month	O <sub>3</sub>	WD	WS	T	RH
March	94.8%	97.6%	97.6%	98.8%	98.8%
April	99.7%	99.9%	99.9%	99.9%	99.9%
May	99.2%	99.6%	99.6%	99.6%	99.5%
June	99.2%	99.4%	99.4%	99.4%	99.3%
July	95.6%	95.8%	95.8%	95.8%	95.8%
August	99.3%	99.6%	99.6%	99.6%	99.1%
September	99.7%	100.0%	100.0%	100.0%	98.8%
October	97.4%	97.8%	97.8%	97.8%	97.8%
November	98.6%	98.6%	98.6%	98.6%	90.6%

Table 4-4. CAMS 1604 Completeness Statistics by Month & Parameter, 2021

Month	O <sub>3</sub>	WD	WS	T	RH
March	98.0%	95.4%	95.4%	84.7%	91.9%
April	99.2%	100.0%	100.0%	100.0%	100.0%
May	98.9%	99.7%	99.7%	99.7%	99.7%
June	99.6%	99.9%	99.9%	99.9%	99.9%
July	85.3%	41.4%	41.4%	41.4%	41.4%
August	99.7%	61.2%	61.2%	61.6%	61.6%
September	99.7%	97.9%	97.9%	100.0%	100.0%
October	97.2%	100.0%	100.0%	100.0%	100.0%
November	98.3%	98.3%	98.3%	98.3%	98.3%

Table 4-5. CAMS 1612 Completeness Statistics by Month & Parameter, 2021

Month	O <sub>3</sub>	WD	WS	T	RH
March	98.1%	95.4%	95.4%	84.7%	84.7%
April	99.6%	100.0%	100.0%	100.0%	100.0%
May	61.8%	99.6%	99.6%	99.6%	99.6%
June	99.2%	99.9%	99.9%	99.9%	99.9%
July	92.6%	99.3%	99.3%	99.3%	90.3%
August	92.6%	99.3%	99.3%	99.3%	100.0%
September	95.3%	99.2%	99.2%	99.9%	95.8%

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Month	O <sub>3</sub>	WD	WS	T	RH
<b>October</b>	94.5%	99.9%	99.9%	99.9%	99.9%
<b>November</b>	98.3%	98.6%	98.6%	98.6%	95.0%

Table 4-6. CAMS 1613 Completeness Statistics by Month & Parameter, 2021

Month	O <sub>3</sub>	WD	WS	T	RH
<b>March</b>	98.5%	95.4%	95.4%	84.7%	95.4%
<b>April</b>	99.0%	100.0%	100.0%	100.0%	100.0%
<b>May</b>	99.3%	99.6%	99.6%	99.6%	99.6%
<b>June</b>	99.6%	99.9%	99.9%	99.9%	99.9%
<b>July</b>	98.9%	99.2%	99.2%	99.2%	89.9%
<b>August</b>	98.9%	99.2%	99.2%	99.2%	100.0%
<b>September</b>	99.7%	99.3%	99.3%	100.0%	94.6%
<b>October</b>	99.6%	99.7%	99.7%	99.7%	99.7%
<b>November</b>	98.6%	98.6%	98.6%	98.6%	86.9%

Table 4-7. CAMS 1619 Completeness Statistics by Month & Parameter, 2021

Month	O <sub>3</sub>	WD	WS	T	RH
<b>March</b>	97.4%	93.1%	93.1%	84.1%	94.9%
<b>April</b>	99.4%	99.2%	99.2%	99.2%	99.2%
<b>May</b>	97.3%	98.5%	98.5%	99.1%	99.1%
<b>June</b>	99.7%	98.9%	98.9%	98.9%	98.9%
<b>July</b>	96.9%	98.7%	98.7%	98.7%	96.5%
<b>August</b>	96.9%	98.7%	98.7%	98.7%	99.1%
<b>September</b>	99.6%	96.0%	96.0%	99.2%	98.6%
<b>October</b>	99.6%	98.7%	98.7%	98.7%	98.7%
<b>November</b>	98.3%	97.8%	97.8%	97.8%	100.0%

Table 4-8. CAMS 1620 Completeness Statistics by Month & Parameter, 2021

Month	O <sub>3</sub>	WD	WS	T	RH
<b>March</b>	90.6%	93.4%	93.4%	93.4%	93.4%
<b>April</b>	95.3%	95.7%	95.7%	95.7%	95.7%
<b>May</b>	95.7%	98.3%	98.3%	98.1%	98.1%
<b>June</b>	83.9%	99.2%	99.2%	99.2%	99.2%
<b>July</b>	91.0%	98.8%	98.8%	98.8%	98.5%
<b>August</b>	91.0%	98.8%	98.8%	98.8%	98.1%
<b>September</b>	97.1%	96.5%	96.5%	99.6%	99.6%

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Month	O <sub>3</sub>	WD	WS	T	RH
October	99.7%	100.0%	100.0%	100.0%	100.0%
November	98.6%	98.6%	98.6%	98.6%	100.0%

Table 4-9. CAMS 1675 Completeness Statistics by Month & Parameter, 2021

Month	O <sub>3</sub>	WD	WS	T	RH
March	82.0%	95.4%	93.2%	84.6%	84.7%
April	97.5%	100.0%	100.0%	100.0%	100.0%
May	95.7%	99.6%	99.6%	52.4%	43.8%
June	96.1%	99.7%	99.7%	0.0%	0.0%
July	99.1%	99.2%	99.2%	0.0%	0.0%
August	99.1%	99.2%	99.2%	0.0%	99.9%
September	99.4%	99.9%	99.9%	0.0%	98.9%
October	98.0%	100.0%	100.0%	0.0%	63.8%
November	98.6%	98.6%	98.6%	0.0%	72.0%

## 5 CALIBRATION STATISTICS

This section provides details for each of the O<sub>3</sub> calibration checks performed by WESTON’s staff at CAPCOG’s eight O<sub>3</sub> monitoring stations during the 2021 O<sub>3</sub> monitoring season. All checks met CAPCOG’s Quality Assurance Project Plan data quality objectives for ≤5 parts per billion (ppb) deviation for the 0 ppb check and ≤7% deviation for the 70 ppb, 200 ppb, 300 ppb, and 400 ppb checks. CAMS 1620 was not set-up until March due to logistics at the site and the Winter Storm Uri; therefore, there was no calibration in February.

Table 5-1. CAMS 614 O<sub>3</sub> Calibration Checks Compared to Reference Concentrations, 0 ppb Deviation and Percent Deviation for 70 ppb, 200 ppb, 300 ppb, and 400 ppb

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/23/2021	0.1	0.3%	-0.3%	-0.2%	0.0%
3/30/2021	0.4	0.6%	0.1%	-0.1%	-1.3%
4/29/2021	0.3	1.0%	0.1%	-0.2%	-0.1%
5/30/2021	0.0	0.0%	0.0%	-0.1%	-0.1%
6/28/2021	0.2	-0.1%	-0.1%	0.0%	-0.1%
7/28/2021	0.1	0.3%	0.1%	0.0%	-0.1%
8/26/2021	-0.3	0.6%	0.1%	-0.1%	-0.1%
9/26/2021	0.4	1.1%	0.1%	-0.1%	-0.1%
10/29/2021	0.0	0.6%	0.0%	-0.1%	-0.1%
11/20/2021	0.3	0.8%	0.1%	-0.1%	0.1%

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Table 5-2. CAMS 690 O<sub>3</sub> Calibration Checks Compared to Reference Concentrations, 0 ppb Deviation and Percent Deviation for 70 ppb, 200 ppb, 300 ppb, and 400 ppb

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/26/2021	0.0	0.1%	-0.1%	0.1%	0.1%
3/31/2021	-0.2	0.8%	0.0%	0.0%	0.1%
4/30/2021	0.0	0.6%	-0.1%	0.0%	0.1%
5/28/2021	0.1	0.4%	0.0%	-0.1%	0.0%
6/29/2021	0.1	0.4%	0.0%	0.0%	0.0%
7/30/2021	-0.3	0.0%	0.0%	-0.1%	0.0%
8/30/2021	0.1	0.7%	0.1%	0.0%	0.1%
9/28/2021	0.3	0.3%	-0.1%	0.0%	-0.1%
10/26/2021	0.4	0.7%	-0.1%	0.0%	0.1%
11/17/2021	0.3	0.3%	-0.1%	0.0%	-0.1%

Table 5-3. CAMS 1604 O<sub>3</sub> Calibration Checks Compared to Reference Concentrations, 0 ppb Deviation and Percent Deviation for 70 ppb, 200 ppb, 300 ppb, and 400 ppb

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/23/2021	0.3	0.6%	0.0%	0.0%	0.0%
3/30/2021	0.3	0.4%	0.1%	-0.2%	-0.1%
4/26/2021	0.4	0.8%	0.0%	-0.1%	0.0%
5/26/2021	0.1	0.3%	0.0%	-0.1%	-0.1%
6/24/2021	0.0	0.6%	0.0%	0.0%	0.0%
7/27/2021	0.3	0.8%	0.1%	-0.2%	-0.2%
8/24/2021	0.2	0.4%	0.0%	0.0%	0.1%
9/27/2021	0.2	0.3%	0.0%	-0.1%	0.1%
10/27/2021	0.3	0.7%	0.1%	0.0%	0.0%
11/18/2021	0.8	0.0%	-0.2%	0.0%	-0.1%

Table 5-4. CAMS 1612 O<sub>3</sub> Calibration Checks Compared to Reference Concentrations, 0 ppb Deviation and Percent Deviation for 70 ppb, 200 ppb, 300 ppb, and 400 ppb

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/28/2021	0.0	0.3%	0.0%	-0.1%	-0.1%
3/28/2021	0.2	0.7%	0.5%	0.0%	-0.1%
4/26/2021	0.2	0.6%	0.1%	-0.1%	-0.2%
5/29/2021	4.1	0.6%	-0.6%	-0.4%	-0.2%
6/25/2021	0.5	-0.3%	0.0%	-0.2%	0.0%
7/27/2021	0.3	-0.4%	-0.1%	-0.2%	0.1%
8/29/2021	-0.3	0.3%	0.0%	-0.3%	-0.1%

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Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
9/27/2021	0.0	0.3%	-0.1%	-0.1%	-0.1%
10/28/2021	-0.4	0.3%	-0.1%	0.1%	0.0%
11/19/2021	0.7	0.0%	0.2%	0.1%	0.0%

Table 5-5. CAMS 1613 O<sub>3</sub> Calibration Checks Compared to Reference Concentrations, 0 ppb Deviation and Percent Deviation for 70 ppb, 200 ppb, 300 ppb, and 400 ppb

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/22/2021	0.4	0.8%	0.3%	-0.2%	0.2%
3/26/2021	0.7	0.4%	0.0%	0.0%	-2.2%
4/28/2021	0.2	0.6%	0.1%	0.0%	-0.2%
5/29/2021	0.3	1.1%	0.1%	-0.2%	-0.1%
6/25/2021	-0.1	0.1%	-0.1%	-0.1%	-0.1%
7/30/2021	0.1	0.0%	0.1%	-0.1%	-0.1%
8/29/2021	0.2	0.8%	-0.1%	-0.2%	-0.1%
9/28/2021	0.5	0.7%	0.1%	-0.1%	-0.1%
10/28/2021	-0.2	0.8%	-0.1%	-0.1%	0.0%
11/23/2021	0.3	-0.3%	0.0%	-0.1%	-0.1%

Table 5-6. CAMS 1619 O<sub>3</sub> Calibration Checks Compared to Reference Concentrations, 0 ppb Deviation and Percent Deviation for 70 ppb, 200 ppb, 300 ppb, and 400 ppb

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/28/2021	0.2	0.4%	-0.2%	-0.1%	0.1%
3/31/2021	-0.1	0.7%	0.2%	0.1%	0.8%
4/27/2021	0.0	2.0%	1.1%	0.9%	1.1%
5/25/2021	0.2	0.7%	0.0%	-0.1%	0.1%
6/30/2021	0.8	0.6%	0.0%	0.0%	-0.1%
7/31/2021	0.1	0.4%	0.3%	-0.1%	0.0%
8/25/2021	0.1	0.6%	0.0%	-0.1%	-0.1%
9/29/2021	0.3	-1.4%	0.0%	0.0%	0.0%
10/29/2021	0.0	0.6%	0.0%	0.0%	0.2%
11/23/2021	0.0%	1.0%	0.0%	0.0%	0.0%

Table 5-7. CAMS 1620 O<sub>3</sub> Calibration Checks Compared to Reference Concentrations, 0 ppb Deviation and Percent Deviation for 70 ppb, 200 ppb, 300 ppb, and 400 ppb

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
3/19/2021	1.3	1.4%	0.6%	0.4%	0.3%
4/28/2021	1.4	2.2%	0.4%	-0.1%	0.0%



Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
5/28/2021	0.4	0.4%	-0.2%	0.0%	0.1%
6/30/2021	0.4	0.3%	-0.2%	0.0%	-0.1%
7/29/2021	0.4	0.4%	-1.8%	-0.1%	0.0%
8/30/2021	0.1	0.3%	0.1%	0.0%	0.1%
9/29/2021	0.5	-1.0%	0.1%	-0.1%	0.0%
10/26/2021	0.3	0.3%	-0.1%	-0.1%	0.0%
11/16/2021	0.5	0.4%	-0.1%	-0.1%	0.0%

Table 5-8. CAMS 1675 O<sub>3</sub> Calibration Checks Compared to Reference Concentrations, 0 ppb Deviation and Percent Deviation for 70 ppb, 200 ppb, 300 ppb, and 400 ppb

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/25/2021	0.2	0.7%	0.0%	-0.2%	0.2%
3/19/2021	0.1	0.1%	0.1%	0.0%	0.0%
4/27/2021	0.0	0.8%	0.1%	-0.1%	0.0%
5/27/2021	-0.2	0.1%	-0.1%	0.0%	0.0%
6/24/2021	0.2	0.1%	-0.1%	0.0%	0.5%
7/28/2021	-0.1	0.6%	0.0%	0.1%	0.0%
8/25/2021	0.1	0.3%	0.8%	0.0%	0.0%
9/30/2021	-0.1	0.4%	0.0%	-0.1%	0.0%
10/29/2021	-0.1	0.1%	0.0%	-0.1%	0.0%
11/18/2021	0.4	0.6%	0.2%	-0.1%	0.0%

## 6 CONTRACT COSTS AND OTHER EXPENSES

The following table shows a summary of the costs for CAPCOG’s monitoring contract in 2021. This does not represent all of the costs for conducting monitoring in 2021 since it does not include the costs for CAPCOG’s time to manage this monitoring contract. This information provides a good reference point for estimating potential costs for CAPCOG’s monitoring in 2022.

The table below outlines the costs for the 2021 monitoring contract with WESTON.

Table 6-1. 2021 Monitoring Contract Cost Summary

Monitor/Object	Routine Work Authorized	Work Orders and Incidentals	Work Orders and Incidentals as % of Routine Work Authorized	TOTAL
CAMS 614	\$10,293.50	\$300.00	2.9%	\$10,593.50
CAMS 690	\$10,293.50	\$0.00	0.0%	\$10,293.50
CAMS 1604	\$10,293.50	\$0.00	0.0%	\$10,293.50
CAMS 1612	\$11,767.00	\$300.00	2.5%	\$12,067.00

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Monitor/Object	Routine Work Authorized	Work Orders and Incidentals	Work Orders and Incidentals as % of Routine Work Authorized	TOTAL
<b>CAMS 1613</b>	\$11,767.00	\$0.00	0.0%	\$11,767.00
<b>CAMS 1619</b>	\$10,293.50	\$255.00	2.5%	\$10,548.50
<b>CAMS 1612</b>	\$11,767.00	\$3,764.95	32.0%	\$15,531.95
<b>CAMS 1675</b>	\$10,293.50	\$600.00	5.8%	\$10,893.50
<b>Network Wide</b>	\$13,225.00	\$2,462.00	18.6%	\$15,687.00
<b>TOTAL</b>	<b>\$99,993.50</b>	<b>\$7,681.95</b>	<b>7.7%</b>	<b>\$107,675.45</b>

As the table above indicates, CAPCOG should continue to include a roughly 7-10% allowance for incidentals and work orders for 2022.

Additionally, the table below outlines the costs for other monitoring expenses such as utility costs and new equipment purchases. The utility bills are a yearly recurring expense.

Table 6-2. Additional Monitoring Expenses for 2021

Expense	Cost	Explanation
<b>Sierra Wireless AirLink RV55 Cell Modems</b>	\$1,767.00	Replacement modem for CAMS 1604, 1619, and 1620
<b>Thermo Environmental 49iQ Ozone Analyzer</b>	\$12,198.00	Spare ozone analyzer for emergency replacement when needed
<b>Utility: Cellular Data Service at all 8 CAMS</b>	\$3,638.79	Monthly cellular data service from AT&T
<b>Utility: Electricity Service at CAMS 614, 690, and 1619</b>	\$1,768.16	Monthly electricity service from Pedernales Electric Cooperative (CAMS 614 and 690) and City of Austin Utilities (CAMS 1619)
<b>TOTAL</b>	<b>\$19,371.95</b>	<b>N/A</b>

In summary, Table 6-3 shows the combined monitoring expenses for 2021 from Tables 6-1 and 6-2.

Table 6-3. Combined Monitoring Expenses for 2021

Expense	Cost
<b>CAPCOG-WESTON Contract for Ambient Air Quality Monitoring Costs for 2021</b>	\$107,675.45
<b>Additional Monitoring Expenses for 2021</b>	\$19,371.95
<b>TOTAL</b>	<b>\$127,047.40</b>

## 7 CONCLUSION

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This report documents CAPCOG's ground-level O<sub>3</sub> and meteorological monitoring efforts in 2021. CAPCOG operated all eight of its CAMS continuously between March 1, 2021, and November 15, 2021. All of CAPCOG's data quality objectives for O<sub>3</sub> were met for the season, except for May at CAMS 1620 when the analyzer needed repair and replacement. Although, due to issues with meteorological data sensors, the meteorological data quality objectives were not met for specific parameters in specific months at individual sites. In fall 2021, CAPCOG issued a request for proposals (RFP) for 2022 Ambient Air Monitoring Services, and CAPCOG has awarded the contract to WESTON for 2022.

## APPENDIX

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Supplemental information about CAPCOG's end-of-year equipment inventory and copies of the monthly monitoring reports submitted by WESTON are provided as supplemental deliverables.