2018 Air Quality Monitoring Report

Prepared by the Capital Area Council of Governments

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1 INTRODUCTION

The Capital Area Council of Governments (CAPCOG) is a regional planning commission covering 10 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_3) and meteorological monitoring activities conducted by CAPCOG in 2018.

During 2018, CAPCOG contracted with Dios Dado Environmental Ltd. (DDE) in order to operate and maintain eight Continuous Air Monitoring Stations (CAMS) in the region. Data collected at these stations was electronically transmitted to the Texas Commission on Environmental Quality's (TCEQ) Leading Environmental Assessment Display System (LEADS). This report is based on monthly reports provided to CAPCOG by DDE. This report provides details of the activity conducted throughout the 2018 ozone season (March – November 2018) and key performance metrics.

CAPCOG also operated and maintained a Tapered Element Oscillating Microbalance (TEOM) instrument to collect fine particulate matter ($PM_{2.5}$) data and operated and maintained the meteorological instrument at its monitoring station in Fayette County (CAMS 601) under a separate contract with TCEQ. This report does not include any information on the $PM_{2.5}$ data collection, but does provide information on the meteorological data collected at CAMS 601 for reference. A map of these monitoring stations is provided in the next section.

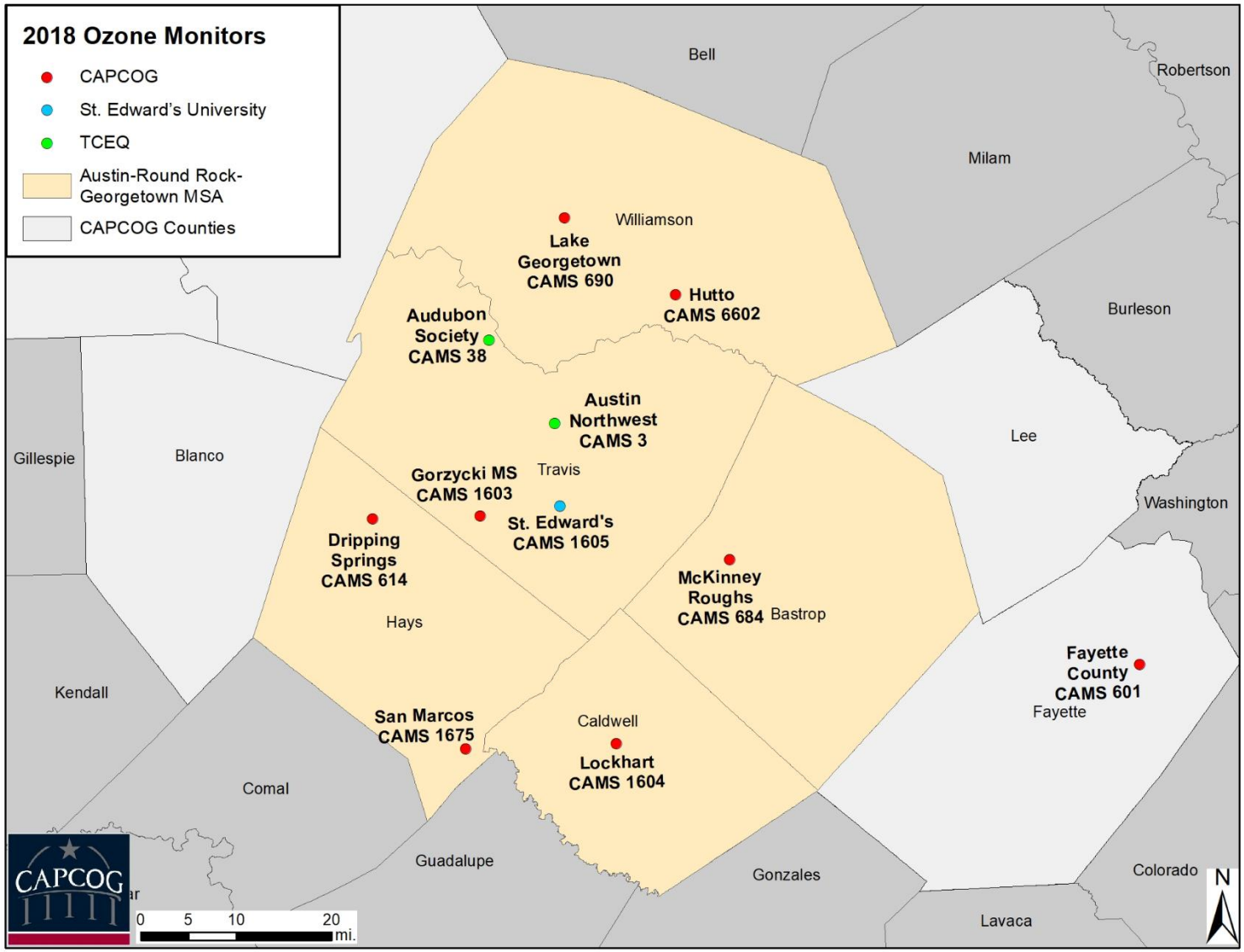
2 MONITORING STATIONS

The following table provides some key identifying information about the eight CAMS that CAPCOG operated in 2018.

Table 2-1. CAPCOG and CAPCOG Supported Air Quality Monitors Operated in 2018

Station Name	CAMS #	EPA #	County	Start	End
Fayette County	601	481490001	Fayette	2/26/2018	12/4/2018
Dripping Springs School	614	482090614	Hays	2/22/2018	11/30/2018
McKinney Roughs	684	480210684	Bastrop	2/26/2018	11/28/2018
Lake Georgetown	690	484910690	Williamson	2/23/2018	11/30/2018
Gorzycki Middle School	1603	484531603	Travis	2/27/2018	11/27/2018
Lockhart	1604	480551604	Caldwell	2/26/2018	11/29/2018
San Marcos Staples Road	1675	482091675	Hays	2/22/2018	11/28/2018
Hutto College Street	6602	484916602	Williamson	2/23/2018	11/30/2018

Figure 2-1. 2018 CAPCOG Monitoring Stations



3 MONITORING ACTIVITY BY STATION

This section provides details of the monitoring activity for each station apart from the daily data checks. Preventive Maintenance Instruction (PMI) 4-14 is the semi-monthly maintenance visits that involve the replacement of the analyzer sample inlet particulate filter.

3.1 CAMS 601

- 2/26/2018: Completed site startup activities, 5-point calibration
- 3/8/2018: PMI 4-14
- 3/13/2018: PMI 4-14
- 3/23/2018: Picked up equipment
- 3/26/2018: Attempted 5-point calibration, locked out of Zeno by TCEQ
- 3/28/2018: 5-point calibration, PMI 4-14
- 4/12/2018: PMI 4-14
- 4/26/2018: 5-point calibration, PMI 4-14
- 5/7/2018: PMI 4-14
- 5/18/2018: Dialed into site to adjusted magnetic declination and wind direction instrument offset
- 5/24/2018: 5-point calibration, PMI 4-14
- 6/4/2018: PMI 4-14
- 6/12/2018: Replaced broken wind vane and sensor
- 6/19/2018: 5-point calibration, PMI 4-14
- 7/2/2018: PMI 4-14
- 7/14/2018: PMI 4-14
- 7/24/2018: 5-point calibration, PMI 4-14
- 8/1/2018: PMI 4-14
- 8/22/2018: 5-point calibration, PMI 4-14
- 9/6/2018: PMI 4-14
- 9/11/2018: PMI 4-14, lowered and cleaned meteorological tower
- 9/17/2018: Lowered meteorological tower, replaced wind speed sensor, and still no change in limited data reading status
- 9/27/2018: 5-point calibration, PMI, replaced wind speed/wind direction meteorological tower wire which fixed the limited data reading status
- 10/4/2018: PMI 4-14
- 10/11/2018: PMI 4-14
- 10/25/2018: 5-point calibration, PMI 4-14
- 11/7/2018: PMI 4-14, instrument and site check
- 12/4/2018: Site decommissioned and equipment inventory completed

3.2 CAMS 614

- 2/22/2018: Completed site startup activities, 5-point calibration

- 3/2/2018: Communications issue
- 3/15/2018: PMI 4-14, adjusted station temperature
- 3/21/2018: Adjusted station temperature
- 3/27/2018: 5-point calibration, PMI 4-14
- 4/10/2018: PMI 4-14, adjusted station temperature
- 4/23/2018: 5-point calibration, PMI 4-14, checked wind speed sensor and changed temperature boom
- 5/8/2018: PMI 4-14, replaced wind direction boom
- 5/21/2018: 5-point calibration, PMI 4-14
- 6/5/2018: PMI 4-14, May 5-point calibration redone using a different calibrator due to a bad pump on the previous calibrator
- 6/20/2018: PMI 4-14
- 7/3/2018: PMI 4-14
- 7/18/2018: 5-point calibration, PMI 4-14
- 8/6/2018: PMI 4-14
- 8/7/2018: Resolved dead signal
- 8/21/2018: 5-point calibration, PMI 4-14
- 9/12/2018: PMI 4-14
- 9/26/2018: 5-point calibration, PMI 4-14
- 10/10/2018: PMI 4-14, mowed weeds and applied weed killer
- 10/17/2018: Adjusted station temperature
- 10/23/2018: 5-point calibration, PMI 4-14
- 11/6/2018: PMI 4-14, instrument and site check
- 11/30/2018: Site shut down and equipment inventory completed

3.3 CAMS 684

- 2/21/2018: Started site startup activities, PMI 4-14
- 2/28/2018: Completed site startup activities, 5-point calibration
- 3/15/2018: PMI 4-14
- 3/26/2018: 5-point calibration, PMI 4-14
- 4/10/2018: PMI 4-14
- 4/26/2018: 5-point calibration, PMI 4-14
- 5/8/2018: PMI 4-14
- 5/16/2018: Replaced meteorological equipment, replaced filter holder to fox the O_3 leakage
- 5/18/2018: Dialed into site to adjusted magnetic declination and wind direction instrument offset
- 5/22/2018: 5-point calibration, PMI 4-14
- 6/4/2018: PMI 4-14, May 5-point calibration redone using a different calibrator due to a bad pump on the previous calibrator
- 6/20/2018: PMI 4-14
- 7/3/2018: PMI 4-14
- 7/19/2018: 5-point calibration, PMI 4-14
- 8/7/2018: PMI 4-14

- 8/23/2018: 5-point calibration, PMI 4-14
- 9/11/2018: PMI 4-14
- 9/26/2018: 5-point calibration, PMI 4-14
- 10/9/2018: PMI 4-14
- 10/22/2018: 5-point calibration, PMI 4-14
- 11/7/2018: PMI 4-14, instrument and site check
- 11/30/2018: Site decommissioned and equipment inventory completed

3.4 CAMS 690

- 2/23/2018: Completed site startup activities, 5-point calibration, PMI 4-14
- 3/7/2018: Relocated meteorological tower, PMI 4-14
- 3/20/2018: PMI 4-14, adjusted station temperature
- 3/29/2018: 5-point calibration, PMI 4-14
- 4/11/2018: PMI 4-14
- 4/25/2018: 5-point calibration, PMI 4-14
- 5/10/2018: PMI 4-14
- 5/25/2018: 5-point calibration, PMI 4-14
- 6/13/2018: Replaced station AC unit, PMI 4-14
- 6/14/2018: Adjusted station temperature
- 6/18/2018: 5-point calibration, PMI 4-14
- 7/5/2018: PMI 4-14
- 7/17/2018: PMI 4-14, adjusted station temperature
- 7/25/2018: 5-point calibration, PMI 4-14
- 8/8/2018: PMI 4-14
- 8/20/2018: 5-point calibration, PMI 4-14
- 9/10/2018: PMI 4-14, resolved dead signal issue
- 9/25/2018: 5-point calibration, PMI 4-14
- 10/10/2018: PMI 4-14
- 10/17/2018: Adjusted station temperature
- 10/24/2018: 5-point calibration, PMI 4-14
- 11/6/2018: PMI 4-14, instrument and site check
- 11/30/2018: Site shut down and equipment inventory completed

3.5 CAMS 1603

- 2/22/2018: Started site startup activities, PMI 4-14
- 2/27/2018: Completed site startup activities, 5-point calibration
- 3/9/2018: Replaced outside sample line and meteorological equipment, PMI 4-14
- 3/27/2018: 5-point calibration, PMI 4-14
- 4/10/2018: PMI 4-14 attempted, no access due to STAAR testing
- 4/13/2018: PMI 4-14
- 4/24/2018: 5-point calibration, PMI 4-14
- 4/30/2018: Checked low O_3 readings, tightened loose fitting on sample line

- 5/10/2018: PMI 4-14
- 5/22/2018: 5-point calibration, PMI 4-14
- 6/5/2018: PMI 4-14, May 5-point calibration redone using a different calibrator due to a bad pump on the previous calibrator
- 6/21/2018: PMI 4-14
- 7/5/2018: PMI 4-14
- 7/19/2018: 5-point calibration, PMI 4-14
- 8/2/2018: PMI 4-14
- 8/21/2018: 5-point calibration, PMI 4-14
- 9/12/2018: PMI 4-14
- 9/26/2018: 5-point calibration, PMI 4-14
- 10/10/2018: PMI 4-14
- 10/23/2018: 5-point calibration, PMI 4-14
- 11/6/2018: PMI 4-14, instrument and site check
- 11/27/2018: Site shut down and equipment inventory completed

3.6 CAMS 1604

- 2/21/2018: Started site startup activities, installed new ozone instrument, PMI 4-14
- 2/23/2018: Completed site startup activities, 5-point calibration
- 3/9/2018: Replaced outside sample line and meteorological equipment, PMI 4-14
- 3/15/2018: PMI 4-14, adjusted station temperature
- 3/21/2018: Adjusted station temperature
- 3/28/2018: 5-point calibration, PMI 4-14
- 4/10/2018: PMI 4-14, adjusted station temperature
- 4/12/2018: Adjusted station temperature
- 4/24/2018: 5-point calibration, PMI 4-14
- 5/10/2018: PMI 4-14
- 5/24/2018: 5-point calibration, PMI 4-14
- 6/6/2018: PMI 4-14
- 6/19/2018: 5-point calibration, PMI 4-14
- 7/2/2018: PMI 4-14
- 7/16/2018: PMI 4-14, AC work
- 7/25/2018: 5-point calibration, PMI 4-14
- 8/1/2018: PMI 4-14
- 8/9/2018: Restarted AC unit
- 8/22/2018: 5-point calibration, PMI 4-14
- 9/11/2018: PMI 4-14, replaced nose cone bearings
- 9/27/2018: 5-point calibration, PMI 4-14, installed condensate line
- 10/3/2018: Power cycled modem
- 10/9/2018: PMI 4-14, retrieved modem for replacement
- 10/11/2018: Retrieved log data from 10/1/2018, 00:00 to 10/11/2018, 15:00
- 10/22/2018: 5-point calibration, PMI 4-14

- 11/7/2018: PMI 4-14, instrument and site check
- 11/29/2018: Site shut down and equipment inventory completed

3.7 CAMS 1675

- 2/22/2018: Started site startup activities, 5-point calibration
- 2/27/2018: Completed site startup activities
- 3/8/2018: Replaced outside sample line and meteorological equipment, PMI 4-14
- 3/30/2018: 5-point calibration, PMI 4-14
- 4/12/2018: PMI 4-14
- 4/23/2018: 5-point calibration, PMI 4-14
- 5/7/2018: PMI 4-14
- 5/23/2018: 5-point calibration, PMI 4-14
- 6/5/2018: PMI 4-14, May 5-point calibration redone using a different calibrator due to a bad pump on the previous calibrator
- 6/20/2018: PMI 4-14
- 7/2/2018: PMI 4-14
- 7/18/2018: 5-point calibration, PMI 4-14
- 8/6/2018: PMI 4-14
- 8/23/2018: 5-point calibration, PMI 4-14
- 9/12/2018: PMI 4-14
- 9/24/2018: 5-point calibration, PMI 4-14
- 10/9/2018: PMI 4-14
- 10/25/2018: 5-point calibration, PMI 4-14
- 11/8/2018: PMI 4-14, instrument and site check
- 11/28/2018: Site shut down and equipment inventory completed

3.8 CAMS 6602

- 2/23/2018: Completed site startup activities, 5-point calibration, PMI 4-14
- 3/7/2018: PMI 4-14
- 3/20/2018: PMI 4-14, adjusted station temperature
- 3/29/2018: 5-point calibration, PMI 4-14
- 4/11/2018: PMI 4-14
- 4/13/2018: Communications issue
- 4/25/2018: 5-point calibration, PMI 4-14
- 5/10/2018: PMI 4-14
- 5/25/2018: 5-point calibration, PMI 4-14
- 6/18/2018: 5-point calibration, PMI 4-14, troubleshoot the modem – reset the sim card and relocated the antenna to a higher position
- 7/5/2018: PMI 4-14
- 7/17/2018: PMI 4-14, adjusted station temperature
- 7/23/2018: Moved trailer 5 ft. from property edge
- 7/24/2018: 5-point calibration, PMI 4-14

- 8/8/2018: PMI 4-14, fixed titled meteorological tower
- 8/20/2018: Recorded sample flow warning fault
- 8/21/2018: 5-point calibration, PMI 4-14, replaced diaphragm and resolved flow warning fault
- 9/6/2018: Resolved dead signal issue, restarted uninterruptible power supply (UPS), reset modem
- 9/12/2018: PMI 4-14
- 9/25/2018: 5-point calibration, PMI 4-14
- 10/3/2018: Re-plugged in trailer, checked operations
- 10/10/2018: PMI 4-14
- 10/17/2018: Re-plugged in trailer, power cycled modem, adjusted station temperature
- 10/24/2018: 5-point calibration, PMI 4-14
- 11/6/2018: PMI 4-14, instrument and site check
- 11/30/2018: Site shut down and equipment inventory completed

4 TECHNICAL CHALLENGES & RESOLUTIONS

This section documents technical challenges and resolutions to those challenges during the 2018 monitoring season at each station.

4.1 CAMS 601

- February: None
- March:
  - 3/8/2018: Could not check site status online
- April: None
- May:
  - 5/18/2018: Dialed into site and adjusted magnetic declination and wind direction instrument offset
- June:
  - 6/4/2018: Tail fin on wind vane broken, so the wind data was placed in P code (maintenance)
  - 6/12/2018: Replaced broken wind vane and sensor, removed a wasp nest found in the aspirator fan, instruments placed back in K code (normal)
  - 6/19/2018: Dialed into station to place O_3 unit into K code, it was left in Q code (quality-control)
- July: None
- August: None
- September:
  - 9/11/2018: Investigated limited readings on meteorological equipment. DDE's observation of the units showed no signs of damage. The units were placed into Q code and the Zeno test menu showed that the wind direction unit is functioning but the wind speed unit is stuck on zero. DDE lowered the meteorological tower. The cabling was disconnected and reconnected and the wind speed unit was disconnected and reconnected. A splice in the wire going into the trailer was inspected and remade. There

was still no signal from the wind speed unit. DDE removed several wasp nests and found that the aspiration fan needs to be replaced. DDE will contact TCEQ for replacement parts. DDE raised the meteorological tower and placed units back in K code.
    - 9/17/2018: Entered station to replace wind speed sensor. DDE placed the wind speed and direction units in Q code. DDE lowered the tower and replaced the wind speed unit. There was still no signal from wind speed unit. Placed units back in K code.
    - 9/27/2018: Set wind speed and wind direction into Q code. DDE lowered the meteorological tower and replaced the wire on the wind speed and direction sensors. Wind speed sensor is sending data correctly. Units placed in K code and tower raised.
- October:
    - 10/16/2018: Both temperatures, DDE low will contact the Lower Colorado River Authority (LCRA) to raise the temperature
    - 10/18/18: LCRA notified to raise temperatures again on next visit.
- November: None

4.2 CAMS 614

- February:
    - 2/22/2018: UPS working but was making a weird sound off and on. DDE will check on getting a replacement UPS. DDE could not replace met sensors since they were on order and will be installed as soon as they are available.
    - 2/28/2018: Could not check site status online
- March:
    - 3/1/2018: Could not check site status online
    - 3/2/2018:
        - Could not check site status online
        - Entered station to check communications issue. Replaced UPS and changed the modem as well, replaced it with 2 different modems, still not able to dial in to site. Office is contacting someone about checking and repairing telephone lines.
    - 3/5/2018: Could not check site status online
- April:
    - 4/23/2018: Checked on LIM condition reported on wind speed sensor; DDE found no problems with sensor, and it came back online before arriving onsite. However, DDE found aspirator fan not working on temperature boom, so they replaced it with a spare that was onsite.
- May:
    - 5/8/2018: Entered the station to perform PMI 4-14 and to install temperature boom. DDE placed wind direction, wind speed and temperature in P code. The boom was changed and placed all back in K code.
- June:
    - 6/5/2018: Re-conducted monthly calibration due to bad pump on calibrator
- July: None
- August:
    - 8/7/2018: Could not check site status online

- September: None
- October:
    - 10/10/2018: Trimmed vegetation on site and applied weed killer
    - 10/17/2018: Entered station to adjust heater setting, station temperature at 58°F.
- November: None

4.3 CAMS 684

- February:
    - 2/28/2018: Could not check site status online
- March: None
- April: McKinney Roughs is showing lower than other sites on the upper ends of the day's high. DDE checked the system out thoroughly and found no leaks. DDE checked backwards in the data and found that the day's upper peaks started dropping off the same time all the trees started to bud and leaf out.
- May:
    - 5/8/2018: DDE entered station to perform PMI 04-14 and to investigate low O_3 readings. They checked all sample line connections and found no issues, instrument appears to be working normally with no alarms, and had not been adjusted during the last 5-point calibration.
    - 5/16/2018: DDE entered station and placed meteorological gear to Q code and replaced the meteorological equipment. They tested the new unit and placed back in K code. DDE placed the ozone unit to P code and checked the unit for a leak. No leak found on the unit. So, they checked the filter holder and found some leakage; they replaced the filter holder and all inlet tubing and sealed all leakage. The ozone unit was placed back to K code.
- June:
    - 6/4/2018: Re-conducted monthly calibration due to bad pump on calibrator
- July: None
- August: None
- September: None
- October: None
- November: None

4.4 CAMS 690

- February:
    - 2/28/2018: Could not check site status online
- March: None
- April: None
- May:
    - 5/10/2018: DDE entered station to perform the particulate filter change. They also placed the meteorological gear in P code, realigned the wind direction 180 degrees. Placed met gear back in K code.

- June:
    - 6/13/2018: Replaced air conditioning (AC) unit
    - 6/14/2018: Adjusted station temperature
- July: None
- August: None
- September:
    - 9/10/2018: Could not check site status online
    - 9/10/2018: Entered station, no power to equipment, UPs off-line. Reset UPS, moved equipment to surge protected outlets. UPS needs to be replaced.
- October:
    - 10/17/2018: Entered station to adjust heater setting, station temperature at 66°F.
- November: None

4.5 CAMS 1603

- February:
    - 2/27/2018: Inclement weather prevented the metrological sensor check and the replacement of the exterior sample line.
    - 2/28/2018: Could not check site status online
- March:
    - 3/9/2018: Entered station to replace ambient sample line (PMI 4-360), perform PMI 4-14, and replaced met gear which had gone into LIM, wind speed bearings had locked up. All equipment ready and in K code.
- April:
    - 4/30/2018: Site had a low data return for the month. TCEQ stopped DDE's system use on April 13th, and then TCEQ sent an email out showing that the site was reading low at the end of the month. DDE went to the site and discovered that the unit had been moved by school staff when a spill had occurred in the storage room. That activity had loosened a fitting on the water trap, when the fittings were tightened again data returned to normal. DDE had been to the site earlier in the day, but the spill did not happen until after DDE had departed the site. DDE did not know the unit was not working correctly when the 5-point calibration was done. The data was marked as valid in the system, so DDE had to reject the data and the result was a lower than expected data return.
- May: None
- June:
    - 6/5/2018: Re-conducted monthly calibration due to bad pump on calibrator
- July:
    - 7/19/2018: UPS battery backup was malfunctioning. DDE plugged equipment into surge protector.
- August:
    - 8/2/2018: Installed new UPS battery backup and repaired ozone inlet line near filter to prevent a kink
- September: None
- October: None

- November: None

4.6 CAMS 1604

- February:
  - 2/28/2018: Could not check site status online
- March:
  - 3/21/2018: Entered station to adjust heater temperature, it is still getting too cold overnight.
- April:
  - Lake Georgetown site move has been completed, however the wind direction boom was mounted 180 degrees out, so data is good after validation and a proper intercept was used to correct the data.
- May: None
- June: None
- July:
  - AC Unit Issue
    - 7/2/18: Checked on AC at site, it's not blowing air. AC was purchased 8/31/17 and is still under warranty. Seller was contacted.
    - 7/6/18: DDE contacted manufacturer regarding warranty per seller's instruction. ASA Electronics (ASA) stated they would email a warranty claim form for AC Technician to complete upon initial inspection. ASA does not cover initial inspection. They did state they would cover parts and labor of repair.
    - 7/10/18: DDE had not yet received the form from ASA, contacted them again. DDE made an appointment with Chapman Heat and Air for 7/16/2018.
    - 7/16/18: DDE received warranty form from ASA and emailed it to AC technician prior to appointment at 1:00 P.M. DDE's field tech waited at the site until 5:00 P.M. and the AC tech did not show.
    - 7/17/18: AC technician inspected the unit, fan wheel was broken. Photos of AC were taken by request of ASA.
    - 7/20/18: DDE received the completed warranty form from AC technician and emailed it to ASA along with photos and other required documents.
    - 7/23/18: Received notice from ASA that they were shipping out a new fan blade to the AC technician on Monday 7/23/18.
    - 7/27/18: Chapman's Heat and Air received the part from ASA late in the afternoon.
    - 7/30/18: Phoned AC technician to schedule a time to meet at the site to install the part. He said he realized on Friday when he received the part that he had checked the wrong item on the warranty form and received the wrong part in error. He said he ordered the correct part (at his company's expense) on 7/27/18 and it would take about seven days to receive it. He said he would notify DDE when he receives it.
  - 7/25/2018: Entered station to check lost data status, discovered that the UPS was not working.
- August:

  - 8/1/2018: DDE installed portable fan and replaced the batteries in the UPS. Alarm on O_3 unit bench temperature is high.
  - 8/9/2018: Checked on repaired AC unit
- September:
  - 9/11/2018: Replaced the wind speed unit nose cone bearings. Turned on station AC unit and it is still not functioning properly because the is fan not working. DDE will notify the manufacturer.
- October:
  - 10/3/2018:
    - Checked site status online, communications in LST. Trailer is receiving power.
    - Entered station to reset modem. The station temperature is 72°F. DDE power cycled modem and the signal light now green. All parameters OK.
  - 10/4/2018:
    - Checked site status online, communications still in LST. Phone line is the issue.
    - Entered station to resolve dead signal and inspect modem. Found AC off and not working, the station temperature was at 96°F. Modem signal lights are green but not transmitting data. DDE reset the SIM card in modem and power-cycled. All lights returned to green. DDE will contact the AC repairman.
  - 10/5/2018: Checked site status online, the communications are still not working
  - 10/8/2018: Checked site status online, the communications are still not working
  - 10/9/2018:
    - Checked site status online, the communications are still not working
    - Reset modem again, still no data transfer although the lights are green. AC is still out of order.
    - Made contact with AT&T while on site. SIM card was reset remotely, seems to be functioning. DDE is removing the modem to send to TCEQ for reprogramming.
  - 10/11/2018:
    - Status checked online. There are no communications from the site. TCEQ needs to reprogram modem.
    - Entered station to download data from 10/1/18, 00:00 to 10/11/2018 to send to TCEQ.
  - 10/12/2018: No communications. Data sent to TCEQ to be uploaded to LEADS manually.
  - 10/15/2018: No communications from site
  - 10/16/2018: No communications from site
  - 10/17/2018: No communications from site
  - 10/18/2018: No communications from site, the modem is at TCEQ for reprogramming,
  - 10/22/2018: Modem fixed, communications back online
- November: None

4.7 CAMS 1675

- February:
  - 2/27/2018: Inclement weather prevented the metrological sensor check and the replacement of the exterior sample line.

    - 2/28/2018: Could not check site status online
- March**:** None
- April:
    - 4/12/2018: Entered station to perform PMI 4-14 and to install a new UPS. Placed O_3 unit in P code while it was powered off, and returned O_3 to K code after UPS was installed.
- May: None
- June:
    - 6/5/2018: Could not check site status online
    - 6/5/2018: Re-conducted monthly calibration due to bad pump on calibrator
- July: None
- August: None
- September:
    - 9/24/2018: Station temperature at 66°F. DDE placed the ozone unit in Q code and cleared the moisture from the sample line. DDE could not complete calibration, and they will return with new calibrator unit. Placed unit back in K code.
- October: None
- November: None

4.8 CAMS 6602

- February:
    - 2/28/2018: Could not check site status online
- March: None
- April:
    - 4/13/2018: DDE entered station to check communications issue and found the UPS powered off, but the O_3 unit plugged into it was still running. The modem and possibly Zeno had no power. DDE turned the UPS back on, everything powered back up. UPS appears to be functioning normally, shows good battery level and no alarms. All other equipment appears to be functioning correctly.
- May:
    - 5/31/2018: Could not check site status online
- June:
    - 6/1/2018: Could not check site status online
    - 6/6/2018: Could not check site status online
    - 6/14/2018: Could not check site status online
    - 6/18/2018: Checked on the modem, reset the sim card and relocated the antenna to a higher position
- July:
    - 7/23/2018: Relocated trailer 5 ft. from the fence at the request of Hutto ISD for grounds maintenance. Verified that the O_3 unit, AC, and data logger are online.
- August:
    - 8/8/2018: Fixed meteorological tower to upright position

  - 8/20/2018: Found the ozone unit in a sample flow warning alarm, checks show flow at 0.495 cc/m which is just below the set point. DDE will return with repair solution prior to proceeding. The filter wrench is missing.
  - 8/21/2018: Entered station to temperature of 88°F. DDE repaired the sample flow rate on the Teledyne 400E.
- September:
  - 9/4/2018: Could not check site status online
  - 9/5/2018:
    - Could not check site status online
    - Entered station to fix the signal issue. DDE restarted the UPS and the ozone unit and replaced the missing filter wrench.
- October:
  - 10/3/2018:
    - Site status checked online, communications lost, power to site being checked.
    - Entered station to resolve LST signal. Trailer had been unplugged. So, DDE plugged trailer back in. All units back up and running. Station temperature at 92°F. DDE purged the condensation from sample line.
  - 10/10/2018: Station temperature at 66°F. DDE moved and restarted space heater and they purged the condensation from sample line.
  - 10/17/2018:
    - Site status check online, communications down
    - Entered station to address LST signal issue. Trailer had been unplugged. Plugged trailer back in. All units back up and running, and the station temperature is 66°F. DDE power-cycled modem and turned up space heater.
- November: None

5 COMPLETENESS STATISTICS

This section provides completeness statistics for the hourly ozone and meteorological data collected between 3/1/2018 and 11/15/2018. Meteorological data includes wind speed (WS), wind direction (WD), ambient temperature (Temp.), and relative humidity (RH). All monitoring stations include measurements for O_3, WS, WD, and Temp., and all but CAMS 601 include measurements for RH.

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 data quality objective of 85% for each parameter at each site for each month are identified in red.

Table 5-1. Completeness Statistics for 3/1/2018 - 11/15/2018 by Monitoring Station and Parameter

CAMS	O_3	WD	WS	Temp.	RH
601	99.7%	90.5%	90.5%	100.0%	n/a
614	99.7%	100.0%	100.0%	100.0%	100.0%
684	99.7%	99.2%	99.2%	100.0%	100.0%
690	99.4%	99.6%	99.6%	99.7%	99.7%
1603	93.0%	97.1%	97.1%	97.1%	99.5%
1604	99.3%	96.1%	96.1%	99.4%	99.6%
1675	99.7%	100.0%	100.0%	100.0%	100.0%
6602	98.8%	98.8%	98.8%	99.1%	99.1%

Table 5-2. CAMS 601 O_3 Completeness Statistics by Month & Parameter

Month	O_3	WD	WS	Temp.
March	99.7%	100.0%	100.0%	100.0%
April	99.7%	100.0%	100.0%	100.0%
May	99.7%	100.0%	100.0%	100.0%
June	99.7%	**73.5%**	**73.5%**	99.9%
July	99.5%	99.9%	99.9%	99.9%
August	99.7%	100.0%	100.0%	100.0%
September	99.7%	**41.4%**	**41.4%**	99.9%
October	99.7%	99.3%	99.3%	100.0%
November	100.0%	100.0%	100.0%	100.0%

Table 5-3. CAMS 614 O_3 Completeness Statistics by Month & Parameter

Month	O_3	WD	WS	Temp.	RH
March	99.7%	100.0%	100.0%	100.0%	100.0%
April	99.7%	100.0%	100.0%	100.0%	100.0%
May	99.6%	99.9%	99.9%	100.0%	100.0%
June	99.7%	100.0%	100.0%	100.0%	100.0%
July	99.6%	99.9%	99.9%	99.9%	99.9%
August	99.7%	100.0%	100.0%	100.0%	100.0%
September	99.6%	100.0%	100.0%	100.0%	100.0%
October	99.7%	100.0%	100.0%	100.0%	100.0%
November	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5-4. CAMS 684 O_3 Completeness Statistics by Month & Parameter

Month	O_3	WD	WS	Temp.	RH
March	99.9%	94.6%	94.6%	100.0%	100.0%
April	99.9%	100.0%	100.0%	100.0%	100.0%
May	99.3%	99.5%	99.5%	100.0%	100.0%
June	99.7%	100.0%	100.0%	100.0%	100.0%
July	99.3%	99.7%	99.7%	99.7%	99.7%
August	99.7%	100.0%	100.0%	100.0%	99.9%
September	99.7%	99.4%	99.4%	100.0%	100.0%
October	99.7%	100.0%	100.0%	100.0%	100.0%
November	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5-5. CAMS 690 O_3 Completeness Statistics by Month & Parameter

Month	O_3	WD	WS	Temp.	RH
March	99.7%	99.6%	99.6%	100.0%	100.0%
April	99.7%	100.0%	100.0%	100.0%	100.0%
May	99.7%	100.0%	100.0%	100.0%	100.0%
June	99.7%	100.0%	100.0%	100.0%	100.0%
July	99.5%	99.9%	99.9%	99.9%	99.9%
August	99.6%	99.9%	99.9%	99.9%	99.7%
September	97.1%	97.4%	97.4%	97.4%	97.4%
October	99.6%	100.0%	100.0%	100.0%	100.0%
November	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5-6. CAMS 1603 O_3 Completeness Statistics by Month & Parameter

Month	O_3	WD	WS	Temp.	RH
March	99.7%	78.6%	78.6%	78.6%	99.9%
April	**43.2%**	100.0%	100.0%	100.0%	100.0%
May	99.7%	100.0%	100.0%	100.0%	100.0%
June	99.7%	100.0%	100.0%	100.0%	100.0%
July	95.3%	95.7%	95.7%	95.7%	95.7%
August	99.7%	100.0%	100.0%	100.0%	99.9%
September	99.7%	100.0%	100.0%	100.0%	100.0%
October	99.7%	100.0%	100.0%	100.0%	100.0%
November	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5-7. CAMS 1604 O_3 Completeness Statistics by Month & Parameter

Month	O_3	WD	WS	Temp.	RH
March	99.7%	72.2%	72.2%	99.9%	100.0%
April	99.7%	100.0%	100.0%	100.0%	100.0%
May	99.7%	100.0%	100.0%	100.0%	100.0%
June	99.7%	100.0%	100.0%	100.0%	100.0%
July	96.2%	96.5%	96.5%	96.5%	96.5%
August	99.7%	100.0%	100.0%	100.0%	100.0%
September	99.6%	96.1%	96.1%	98.2%	100.0%
October	99.6%	100.0%	100.0%	100.0%	100.0%
November	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5-8. CAMS 1675 O_3 Completeness Statistics by Month & Parameter

Month	O_3	WD	WS	Temp.	RH
March	100.0%	100.0%	100.0%	100.0%	100.0%
April	99.7%	100.0%	100.0%	100.0%	100.0%
May	99.7%	100.0%	100.0%	100.0%	100.0%
June	99.7%	100.0%	100.0%	100.0%	100.0%
July	99.5%	99.9%	99.9%	99.9%	99.9%
August	99.7%	100.0%	100.0%	100.0%	100.0%
September	99.3%	100.0%	100.0%	100.0%	100.0%
October	99.7%	100.0%	100.0%	100.0%	100.0%
November	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5-9. CAMS 6602 O_3 Completeness Statistics by Month & Parameter

Month	O_3	WD	WS	Temp.	RH
March	99.7%	99.2%	99.2%	100.0%	100.0%
April	99.7%	100.0%	100.0%	100.0%	100.0%
May	99.3%	99.6%	99.6%	99.7%	99.7%
June	99.7%	100.0%	100.0%	100.0%	100.0%
July	99.5%	99.7%	99.7%	99.7%	99.7%
August	99.7%	100.0%	100.0%	100.0%	100.0%
September	99.4%	98.9%	98.9%	99.9%	99.9%
October	92.2%	92.5%	92.5%	92.5%	92.5%
November	99.7%	99.7%	99.7%	99.7%	99.7%

6 CALIBRATION STATISTICS

This section provides details for each of the O_3 calibration checks performed by DDE staff at CAPCOG's 8 ozone monitoring stations during the 2018 ozone 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. Due to a contractor error, no calibrations were performed during the site shut-downs in November. Calibrations that did not meet these data quality objectives are noted in red.

Some of the 5-point calibrations conducted in May showed some anomalies. This was indicative of the zero air scrubbers malfunctioning in the calibration unit. Therefore, DDE recalibrated the units the following week with a different calibration unit. The sites that were calibrated with the malfunctioning calibrator were CAMS 614, CAMS 684, CAMS 1603, and CAMS 1675. The dates in May for these sites are marked with an asterisk (*). The distorted numbers did not cause the 5-point audit to fail, because the overall average of the errors still had the machines operating within the allowed parameters.

Table 6-1. CAMS 601 O_3 Calibration Checks Compared to Reference Concentrations (ppb)

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/26/2018	1.6	71.2	202.4	302.1	401.9
3/28/2018	1.9	71.2	201.3	305.1	404.3
4/26/2018	3.2	71.2	201.9	301.2	403.3
5/24/2018	0.0	70.2	200.5	300.3	400.4
6/19/2018	1.3	69.9	200.3	300.8	400.9
7/24/2018	1.6	70.1	200.3	300.2	400.6
8/22/2018	0.6	70.0	200.7	299.7	400.8
9/27/2018	0.5	69.6	197.8	297.8	399.9
10/25/2018	0.3	70.5	200.5	299.0	398.0

Table 6-2. CAMS 614 O_3 Calibration Checks Compared to Reference Concentrations (ppb)

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/22/2018	1.5	71.0	201.6	300.6	400.5
3/27/2018	1.2	70.1	200.9	300.4	400.7
4/23/2018	1.3	70.5	201.6	300.5	399.9
5/21/2018*	**8.5**	**77.9**	205.6	311.6	393.6
6/5/2018	0.9	69.9	199.2	300.4	400.8
7/18/2018	0.5	70.1	199.9	301.4	400.6
8/21/2018	0.2	69.6	199.5	299.0	401.7
9/26/2018	0.1	69.9	200.2	299.9	400.1
10/23/2018	0.1	69.5	200.1	298.8	400.7

Table 6-3. CAMS 684 O_3 Calibration Checks Compared to Reference Concentrations (ppb)

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/26/2018	0.1	70.5	201.3	300.5	400.6
3/26/2018	0.7	70.2	201.5	300.1	401.4
4/26/2018	0.3	70.8	201.4	301.0	400.7
5/22/2018*	1.0	74.9	203.6	307.4	400.8
6/4/2018	0.0	70.1	200.2	300.4	400.4
7/19/2018	0.1	69.9	200.1	300.3	399.4
8/23/2018	0.3	70.3	200.9	299.6	399.7
9/26/2018	0.1	69.9	200.2	299.6	400.1
10/22/2018	0.2	70.0	200.0	297.7	399.8

Table 6-4. CAMS 690 O_3 Calibration Checks Compared to Reference Concentrations (ppb)

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/23/2018	2.4	72.3	202.3	302.2	403.1
3/29/2018	1.6	70.4	201.4	301.4	400.5
4/25/2018	1.8	70.8	201.8	300.7	401.2
5/25/2018	1.3	70.2	200.3	300.4	400.8
6/18/2018	1.4	70.3	200.3	300.0	401.5
7/25/2018	1.3	70.4	200.1	300.6	400.5
8/20/2018	1.3	70.8	201.5	300.0	401.0
9/25/2018	1.5	71.5	201.5	299.9	400.4
10/24/2018	1.4	70.3	201.4	301.7	400.1

Table 6-5. CAMS 1603 O_3 Calibration Checks Compared to Reference Concentrations (ppb)

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/27/2018	1.0	70.8	201.6	301.9	403.1
3/27/2018	1.4	70.8	201.1	300.8	402.0
4/24/2018	0.9	70.3	202.2	301.3	401.3
5/22/2018*	1.2	**76.2**	205.8	309.0	400.7
6/5/2018	1.0	70.7	200.8	299.8	402.8
7/19/2018	1.0	70.0	200.3	299.9	401.0
8/21/2018	0.1	69.9	199.7	300.0	402.4
9/26/2018	0.1	69.8	200.0	299.5	399.7
10/23/2018	0.1	70.0	200.1	300.0	399.7

Table 6-6. CAMS 1604 O_3 Calibration Checks Compared to Reference Concentrations (ppb)

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/26/2018	0.1	70.8	200.6	300.6	401.6
3/28/2018	0.5	70.9	200.6	300.2	400.5
4/24/2018	0.1	70.9	201.1	301.2	400.7
5/24/2018	0.5	70.3	200.0	300.9	397.5
6/19/2018	0.3	70.3	200.0	300.2	398.9
7/25/2018	0.1	70.7	200.2	299.6	400.4
8/22/2018	0.1	71.0	201.0	299.8	400.1
9/27/2018	0.0	70.7	200.1	299.7	400.4
10/22/2018	0.1	70.2	200.7	299.9	401.3

Table 6-7. CAMS 1675 O_3 Calibration Checks Compared to Reference Concentrations (ppb)

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/22/2018	0.6	70.1	202.0	300.5	401.5
3/29/2018	1.2	71.4	200.6	301.2	400.9
4/23/2018	0.3	70.0	201.2	300.9	400.4
5/23/2018*	0.6	**79.0**	205.0	316.2	400.8
6/5/2018	0.1	70.6	200.3	299.9	401.6
7/18/2018	0.4	70.4	200.4	299.8	400.2
8/23/2018	0.1	69.1	200.7	299.3	399.7
9/24/2018	0.4	69.9	200.3	300.3	400.8
10/25/2018	0.1	70.0	200.5	299.1	401.9

Table 6-8. CAMS 6602 O_3 Calibration Checks Compared to Reference Concentrations (ppb)

Calibration Date	0 ppb	70 ppb	200 ppb	300 ppb	400 ppb
2/23/2018	1.1	71.2	202.0	302.0	401.3
3/28/2018	1.9	71.2	201.3	305.1	404.3
4/25/2018	0.8	70.7	200.5	300.7	401.4
5/25/2018	0.5	69.7	200.7	299.8	399.9
6/18/2018	0.7	70.0	200.5	301.7	400.4
7/24/2018	0.5	69.8	200.6	299.2	400.3
8/21/2018	0.1	71.0	200.4	299.6	399.4
9/25/2018	0.2	69.7	200.2	300.2	400.3
10/24/2018	0.2	70.1	199.6	300.3	400.7

7 COSTS & WORK ORDERS ISSUED

The following table shows a summary of the costs for CAPCOG's monitoring contract in 2018. This does not represent all of the costs for conducting monitoring in 2018 since it does not include the LEADS licenses paid in the prior year, utility costs, or the costs for CAPCOG's time to manage this monitoring contract. This information provides a good reference point for estimating potential costs for 2019 monitoring.

Table 7-1. 2018 Monitoring Cost Summary

Monitor/Object	Routine Work Authorized	Work Orders and Incidentals	TOTAL
CAMS 601	$12,676.22	$0.00	$12,676.22
CAMS 614	$11,986.60	$25.24	$12,011.84
CAMS 684	$14,304.97	$935.95	$15,240.92
CAMS 690	$11,638.99	$0.00	$11,638.99
CAMS 1603	$14,952.91	$66.59	$15,019.49
CAMS 1604	$12,032.46	$279.39	$12,311.85
CAMS 1675	$12,378.09	$25.24	$12,403.33
CAMS 6602	$11,309.48	$676.00	$11,985.48
Network Wide	$1,170.00	$432.00	$1,602.00
TOTAL	**$102,449.70**	**$2,440.40**	**$104,890.10**

8 CONCLUSION

This report documents CAPCOG's ground-level ozone and meteorological monitoring efforts in 2018. CAPCOG operated all eight of its CAMS continuously between March 1, 2018, and November 15, 2018, and all of CAPCOG's data quality objectives for this project were met for the season, although there were a few instances in which completeness objectives were not met for specific parameters in specific months at individual sites. Supplemental information about CAPCOG's equipment inventory and copies of the monthly monitoring reports submitted by Dios Dado are being provided as supplemental deliverables.