



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

FEB 10 2017

OFFICE OF  
AIR AND RADIATION

**MEMORANDUM**

**SUBJECT:** Response to Office of Inspector General Management Alert: "Certain State, Local and Tribal Data Processing Practices Could Impact Suitability of Data for 8-Hour Ozone Air Quality Determinations," Report No. 17-P-0106, February 6, 2017

**FROM:** Sarah Dunham   
Acting Assistant Administrator

**TO:** Arthur A. Elkins Jr.  
Inspector General  
Office of Inspector General

The EPA's Office of Air and Radiation (OAR) appreciates the opportunity to review and comment on the Office of Inspector General's (OIG) Management Alert titled "*Certain State, Local, and Tribal Data Processing Practices Could Impact Suitability of Data for 8-Hour Ozone Air Quality Determinations.*" The Office of Air and Radiation also appreciates the efforts and investigations the OIG has made to alert OAR to potential reporting issues with ozone data. The information is timely because it will allow us to evaluate the effect of these issues and take appropriate corrective actions prior to use of the data in the designations process for the 2015 ozone National Ambient Air Quality Standards (NAAQS).

Overall, we believe that the OIG findings will help us improve the integrity of our quality assurance programs and, in turn, the quality of reported ozone air monitoring data. We intend to take several corrective actions in response to the findings to date, including issuing revised quality assurance guidance and providing clearer direction on appropriate quality assurance procedures to air monitoring agencies and the EPA Regional offices. In addition, we have looked closely at the potential effect of the data differences identified by the OIG on the upcoming ozone designations and we would like to take this opportunity to share our preliminary analysis of those differences. In short, based on our analysis so far, we believe that the vast majority of the most recent available ozone air monitoring data are not impacted by these findings and, thus, the ozone designation process should not be affected.

More details on our intended corrective actions and on the results of our air quality data analysis are contained in the attachment. If you have any questions about this information, please contact Chet Wayland, Director, Air Quality Analysis Division in the EPA's Office of Air Quality Planning and Standards (OAQPS) at (919) 541-4603.

Attachment

## ATTACHMENT

### Preliminary OAR Response

#### Summary of OIG Findings to Date

The Management Alert posted on February 6, 2017, identified four key findings:

- Two states (Georgia and South Carolina) did not process ozone data according to recommended practices in EPA's 2013 Quality Assurance Handbook by zero adjusting their raw ozone data based on the results of quality control checks known as "zero checks."<sup>1</sup>
- Georgia and South Carolina were not validating data in accordance with recommended critical criteria in Appendix D of EPA's 2013 Quality Assurance Handbook.<sup>2</sup>
- There is a risk that state and local air monitoring agencies' Quality Assurance Project Plans (QAPPs) that have not been approved in the last five years have not been updated to include EPA's revised criteria. About 38 percent of the air monitoring agencies do not have ozone QAPPs that have been approved within the last five years.
- Data reported by AirNow and the Air Quality System (AQS) indicate that nationally about 26 percent of the raw data reported to AirNow were different than what was reported to AQS.

The Office of Air and Radiation received verbal notification of these findings in October 2016, and reviewed each finding carefully. The Office of Air and Radiation's Office of Air Quality Planning and Standards (OAQPS) conducted an air quality analysis to understand the significance and potential scope of the findings for the upcoming designations for the 2015 ozone NAAQS. Based on OAQPS' review and analysis, we offer the following preliminary responses.

#### Zero Adjustment of Ozone Data

According to EPA's 2013 Quality Assurance Handbook, the proper quality assurance process includes the zero air going through the sampling lines and the monitor, performing the zero test every 24-hours, and saving the original results (before the adjustment) and the adjusted results for further review.<sup>3</sup> The adjustment to the data is made to the data going forward (after the test) and not intended to correct any data prior to the test.

As part of the evaluation of this finding, OAQPS asked each Regional office to contact their states to determine the extent of zero adjustment procedures allegedly being conducted by South Carolina and Georgia. Out of the 152 Primary Quality Assurance Organizations (PQAOs) in the national network monitoring for ozone, 137 PQAOs (or 90 percent) do not zero adjust, and 15 PQAOs (or 10 percent) have performed zero adjustments within this time period (2013-2015). In summary, the majority of states are not performing the zero adjustment.

The Office of Air Quality Planning and Standards believes that some of the differences between data entered into AirNow and AQS, particularly in the 1-3 ppb range, may be due to the adjustments performed by those 10 percent of the PQAOs performing zero adjustments (see Figure 1).

In order to ensure that PQAOs are performing the zero adjustment correctly, OAQPS will:

- Revise the Quality Assurance Handbook language to provide cautionary statements about performing the zero adjustment. The revised Quality Assurance Handbook will also note that PQAOs may still perform this adjustment if done properly. In addition, OAQPS will revise the

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<sup>1</sup> Ambient monitors are "zeroed" by challenges of purified air. In the vast majority of cases, zero checks serve as verifications that confirm that instruments are operating within quality assurance tolerances. In the several cases noted above, the affected states used such data to adjust their final ozone concentrations reported to AQS. In limited situations, such practices are permitted by the Quality Assurance Handbook although they are generally discouraged as a standard practice.

<sup>2</sup> <https://www3.epa.gov/ttn/amtic/qalist.html>.

<sup>3</sup> Zero air is ambient air that has been filtered or scrubbed of particulate matter and other contaminants that would bias a measurement. The zero air travels through the sample lines and monitor to mimic what the actual sample would experience in typical operating conditions.

language to make it clear that the adjustment to the data is made after the test is performed (data from the test to the next 24-hour test).

- Develop a technical memo and post on the EPA's Ambient Monitoring Technology Information Center Web site to alert monitoring organizations of the appropriate practice.
- Ask the EPA Regions to follow-up with any monitoring organization that is performing zero adjustments to ensure the appropriate practice is being performed.

### **Validation Procedures**

The Office of Air Quality Planning and Standards developed templates in order to provide consistent validation guidance to all monitoring organizations. As noted in the Management Alert, the validation template has a "critical criteria" category vital to ensuring the integrity of the data. The EPA's 2013 Quality Assurance Handbook provides acceptance criteria for each of three critical quality control checks for ozone monitoring (zero, 1-point quality control, and span checks), and notes that observations that do not meet all critical criteria should be invalidated unless there are compelling justifications for not doing so. For example, failure of a 1-point quality control check is critical and cause for data invalidation. If the ozone standard used in the quality control check was found to be faulty, and a second standard was used to retest the monitor and found that the monitor's response was acceptable, then this would be compelling evidence not to invalidate the data from the ozone monitor.

These three critical checks have been implemented for over 25 years and are a foundational aspect of validating gaseous monitoring data. However, out of these three checks, the only check that is required in the Code of Federal Regulations (CFR) is the 1-point quality control check. Although in most cases the monitoring organizations perform all three checks called for in the Handbook, the EPA recognizes that a more stringent standard applies to CFR requirements than to criteria documented in guidance.

To follow-up on this issue, the EPA will work with the EPA Regions to identify organizations that are currently not validating their data according to the critical requirements listed in the EPA's 2013 Quality Assurance Handbook. As needed, the EPA will work to ensure that QAPP's reflect acceptable practices and criteria.

### **QAPP Revisions**

We agree with the OIG statements that there is a risk that QAPPs that have not been approved in the last five years may not have been updated to include the EPA's revised 2013 criteria. In addition, it is likely that sites, monitors and other procedures have changed within the last five years. The EPA's 2013 Quality Assurance Handbook suggests that monitoring organizations update their QAPP every five years.

However, EPA has already taken steps to improve the timely development and revisions of QAPPs:

- The 2016 ambient monitoring rule requires monitoring organizations and the EPA Regions to record QAPP submittals and approvals in AQS.<sup>4</sup>
- During annual data certifications, the AQS AMP600 Certification Evaluation and Concurrence Report will flag any PQAO whose QAPP approval is more than five years ago.
- The EPA will develop a report by PQAO of air monitoring agencies whose QAPPs are more than five years old and request that they correct this situation prior to the 2017 data certification process.<sup>5</sup>

### **Difference Between AirNow and AQS Data**

We conducted an independent analysis comparing the hourly ozone concentration data in the AirNow and AQS databases for calendar years 2012 to 2015. Figure 1 below shows a summary of our findings. Overall, we found that 27 percent of the values in the AirNow and AQS databases were different (i.e., about 73 percent of the values were the same), which is close to the 26 percent difference rate cited in the Management Alert (which used 2012-2014 data). The difference rate decreased from about 29 percent in 2012 to 25 percent in 2015, indicating that the

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<sup>4</sup> <https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf>.

<sup>5</sup> States are required to certify their data in AQS by May 1 of each year; thus, any corrections should be complete before the data are needed for the current designations process.

agreement between the two databases has improved over time. A closer look at the nature of these differences led us to make the following conclusions:

- About 11 percent of the data (gray bars) show a difference of only 1 ppb between the AirNow and AQS values, with the vast majority of these values being 1 ppb higher in AirNow than in AQS. The data handling requirements for ozone in Appendix U to 40 CFR Part 50 state that hourly ozone measurements submitted to AQS should be truncated at the decimal digit in ppb. Therefore, we believe that the vast majority of the differences falling into this category are due to raw values being reported to AirNow subsequently being truncated before they were later entered into AQS, which is consistent with Appendix U. These records do not present a concern in terms of quality assurance practices or overall data quality.
- Another 10 percent of the data (blue bars) were records where a measurement value was present in the AQS database, but no measurement value was present in the AirNow database. Since reporting data to AirNow is voluntary, these records do not have any potential for concern as to the quality of the data.
- About 4 percent of the data (yellow bars) were records where a measurement value was present in the AirNow database, but no measurement value was present in the AQS database. Many of these values came from ozone monitors which were voluntarily operated outside of the required ozone monitoring season and, therefore, no data values were required to be reported to AQS. The remaining values were likely due to legitimate data invalidations which result as a part of the quality assurance process.
- About 1.5 percent of the data (red bars) show a difference of 2 or 3 ppb between the AirNow and AQS values. As noted in the EPA's 2013 Quality Assurance Handbook, zero adjustments up to 3 ppb are allowed under the current quality assurance guidance. As discussed previously, EPA surveyed the air monitoring organizations and found that only 10 percent of these organizations were performing zero adjustments. As part of our follow-up, EPA will determine the degree to which these adjustments are being performed and ensure the adjustments are being performed appropriately.
- The remaining 0.5 percent of the data (black bars) show a difference greater than 3 ppb between the AirNow and AQS values. The Office of Air Quality Planning and Standards is exploring these data further.

Based on this preliminary analysis, only 2 percent of the data show differences which may represent a legitimate concern in terms of quality assurance practices. The Office of Air Quality Planning and Standards is completing a more extensive assessment of these data, which will include 2016 data. Once complete, those results will be provided as an addendum to this response.

In addition, we calculated 2013-2015 ozone design values based on the AirNow and AQS data. Although these specific values will not be used as the basis for the current round of designations for the 2015 ozone NAAQS, we wanted to assess the potential implications of data differences on designations decisions. Although there were some sites where the design value calculated based on the AirNow data was slightly different than the design value calculated based on the AQS data, none of these differences affected potential designations determinations (i.e., the design values were not near the level of the NAAQS or would not affect a designation determination for a potential area). Since initial area designations for the 2015 ozone NAAQS may rely on 2014-2016 data, OAQPS plans to update this analysis to include 2016 data as soon as they are available in AQS to confirm that the issues raised in the Management Alert do not affect designations decisions.

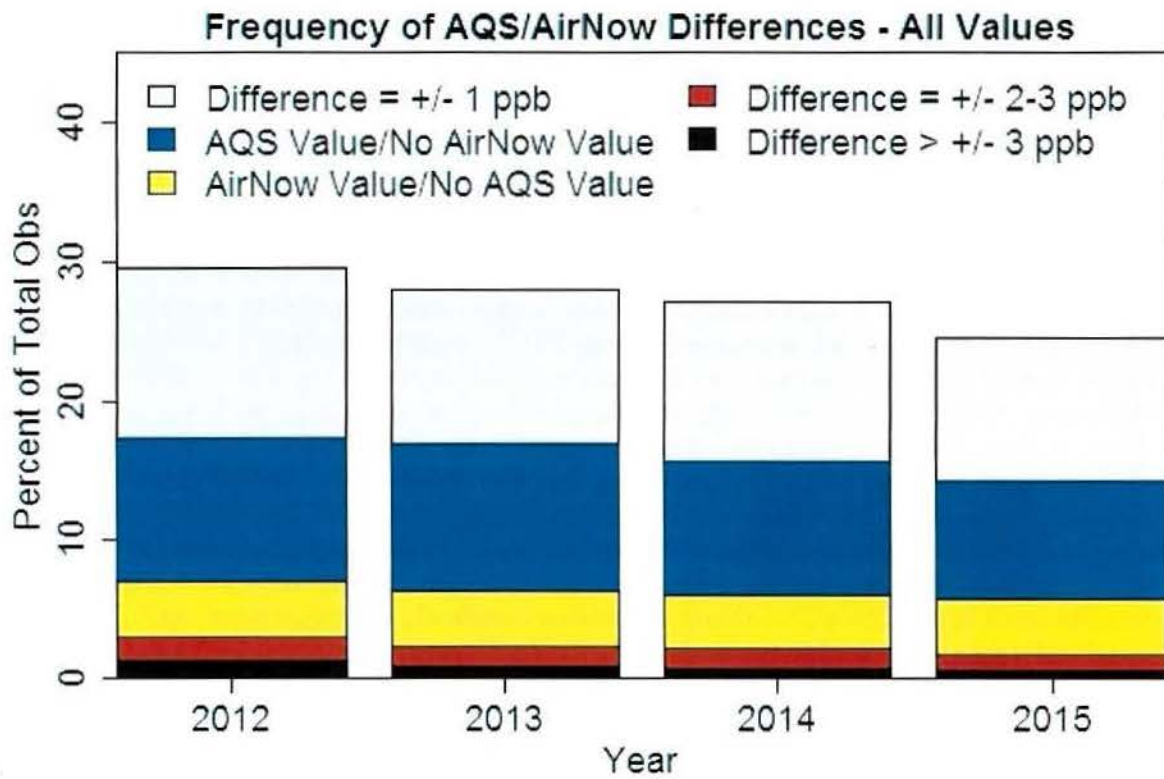


Figure 1. Rate of Differences in Hourly Ozone Concentrations between AQS and AirNow Databases