EPA

A. Project Management

A.1 Title of Plan and Approval

Geospatial Monitoring Of Air Pollution (GMAP) in R5

Quality Assurance Project Plan
v3.0 2016-05-13

Prepared by U.S. EPA R5 AMAS

5/11/16

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A.2 Table of Contents

A. Project Management 1
A.1 Title of Plan and Approval 1
A.2 Table of Contents 2
A.3 Distribution List 3
A.4 Project Organization 3
A.5 Project Background 3
A.6 Project Description 4
A.7 Project Quality Objectives 4
A.8 Training/Certification 4
A.9 Documents and Records 5
B. Data Generation and Acquisition 5
B.1 Project Process Design 5
B.2 Analytical Methods 7
B.3 Sample Handling and Custody 9
B.4 Sampling Methods 10
B.5 Qualtiy Control 10
B.6 System Testing, Inspection, Maintenance 10
B.7 System Calibration 11
B.8 Data Management 11
Project Documents 11
C. Assessment and Oversight 12
C.1 Assessment and Response Actions 12
C.2 Reports to Management 12
D. Data Validation and Usability 12
D.1 Data Review, Verification, and Validation 12
Reporting Requirements 12
Data Related Organizational Deliverables Error! Bookmark not defined.
D.2 Verification and Validation Methods 13
D.3 Reconciliation with User Requirements 15

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A.5 Project Background

The Geospatial Monitoring of Air Pollution (GMAP) system will be deployed to determine the nature and extent of H2S (and/or) CH4 (and/or) VOCs in Region 5. Meteorological data will also be recorded. A report

and data submission to the QA Coordinator will address details of each individual field campaign. The report will meet the minimum guidelines found in the Field Operations Group (R5 Reg-0004-r0) Standard Operating Procedure. This QAPP will be reviewed/updated annually or upon a major change to the SOP.

A.6 Project Description

The field monitoring campaign will be performed around a potential air pollution source. The goals of the project may vary depending on the type of air pollution source and expected pollutants. The project goals will be one or all of the following:

1) Continuously measure site specific methane (CH_4) and hydrogen sulfide (H_2S) concentrations. The specific area around the site surveyed will depend on the prevailing wind direction and site specific conditions with respect to access to roadways. Additional areas may be assessed based on monitoring data captured in the field, or in response to odor complaints lodged by citizens. Data could be collected on-site as well. Data may be collected while in motion or while stationary.
2) Continuously measure site specific BTEX, styrene, formaldehyde, and SO2 concentrations. The specific area around the site surveyed will depend on the prevailing wind direction and site specific conditions with respect to access to roadways. Additional areas may be assessed based on monitoring data captured in the field, or in response to odor complaints lodged by citizens. Data could be collected on-site as well. Data may be collected while in motion or while stationary.
3) Take grab samples for laboratory analysis of TO-15 VOC's.
4) Measure wind speed and wind direction. These may only be measured while the sensor is stationary.
5) Measure latitude and longitude. These may be measured while the sensor is stationary or in motion.
6) Evaluate the monitoring data to determine if levels warrant additional actions.

A.7 Project Quality Objectives

The objectives of the project are to support investigations using U.S. EPA's GMAP system by measuring H_2S, CH_4, BTEX, styrene, formaldehyde, SO2, wind speed, wind direction, latitude and longitude by:

1. Obtaining real-time measurements of H_2S, CH_4, BTEX, styrene, formaldehyde, SO2, wind speed, wind direction, latitude and longitude.
    a. The measurement system will provide accurate and precise measurements of these parameters in real time.
    b. The data will be reported in a clear and understandable format.
    c. A quality system will be followed including the strict adherence to the operations manual and SOP.
    d. The overall bias goal for the measurements for H2S and CH4 is ±15%.
    e. The overall bias goal for the measurements of BTEX, styrene, formaldehyde, and SO2 is ±30%.
    f. The meteorological measurements will meet the manufacturers stated performance specifications of ±5% for wind speed and ±5 degrees for wind direction.
2. Obtain canister samples for subsequent analysis for TO-15 compounds.
    a. The analytical laboratory will determine the quality objectives for the analysis.

A.8 Training/Certification

All Region 5 field staff are required to maintain an annual safety training certification for field work. Region 5 AMAS staff received training to operate the Picarro system from EPA ORD during the initial deployment of the system in 2010. AMAS staff received on-site training to operate the DUVAS system from the equipment manufacturer in January 2016. On-going dialogue with ORD, the instrument manufacturers and continued field campaigns provide opportunities to ensure skills are maintained and expanded. All lead personnel operating the GMAP system must have at least three years of hands on experience in the field of air monitoring.

A.9 Documents and Records

Revisions to the QAPP will be sent to all personnel listed on the Distribution List. Revisions will be controlled numerically beginning with "Version 1.0, Year-Month-Day". The signed QAPP will be housed on ARD's QA Tracks data repository.

Records for this project include raw data generated by the GMAP system, field notes collected by staff in their field notebook (GMAP Field Book), wind roses generated with the meteorological data, and images generated that overlay concentration plots with Google Earth type maps. In addition to the data generated by the system and its operators there will be quality assurance data generated as well; the systems will be checked strictly according to the SOP. All quality control check and audit results will be included in data reports and shared with data users.

All data will be retained for at least 5 years by Region 5 EPA.

B. Data Generation and Acquisition

B.1 Project Process Design

U.S. EPA Region 5 (R5) Air and Radiation Division (ARD) will deploy a Picarro G2204 SN 2267-BFADS2013 (cavity ring-down spectrometer or CRDS), a DUVAS DV3000 SN UV3000-201502-1007 (differential UV absorption spectrometer or DUVAS), Global Positioning Systems (GPS) and meteorological instrumentation in a mobile vehicle to obtain rapid measurements around a suspected source. In some cases a backup DV3000 may be used (SN UV3000-201502-1006). The integrated measurement system will allow for the characterization and mapping of all measured pollutants in the ambient air around suspected sources. Data may also be reported without a map. Collectively this system is called the GMAP system. This sampling will be completed by following an approved SOP.

General Project Design:

1. A specific source may be identified prior to deployment.
2. The GMAP system may be simply driven around in an attempt to find sources of pollutants.
3. The predominant wind direction will be determined when a source has been identified.
4. The operator will drive around while operating the GMAP and attempt to locate the highest pollutant concentration.
5. The operator will take measurements up wind of the suspected source if possible.
6. Sampling is project and goal specific. There is no minimum or maximum sampling time.
7. Potential sources may be identified by screening techniques including but not limited to FLIR camera, handheld PID or other sensors.

As part of this field campaign VOC canister samples may be collected around the site concurrent with the stationary vertical monitoring. A limited number of canister samples may be collected and analyzed for volatile organic compounds (VOCs) using compendium TO-15. This sampling will be completed by following an approved SOP (R5-ARD-0003-r0). More information on collection and analysis of the canister samples is presented in the "VOC Canister Sample Collection" section on the next page.

The following subsections describe methods for data collection that will be used during the field deployment. Post-analysis of the data is performed using software for statistical computing and graphics.

Horizontal transect monitoring and concentration mapping

Horizontal transect monitoring is performed by driving the vehicle around the site. All pollutant data are collected with the CRDS and DUVAS along with GPS data recording the points at which samples are continuously analyzed. Pollutant analysis and GPS data may be collected while the vehicle is in motion. Meteorological data is not used while the measurement vehicle is in motion. However, the vehicle will be parked periodically during horizontal transect monitoring to collect meteorological data (stationary data collection). Stationary and mobile data sets will be separated according to the SOP. Horizontal transect data is used as a screening tool to identify sites that may be candidates for additional monitoring. The data is also used to map pollutant concentrations over the survey area using a mapping function in the data acquisition software. The data can be used to identify localized emission "hot spots" and can be provided to enforcement investigators as evidence.

The exact sampling route will be determined in the field and will be dependent on prevailing wind direction, access and the orientation of a site with respect to the roadways.

Stationary Monitoring Data Collection Methods

Stationary measurements will be conducted at select sites where elevated emissions were detected during the horizontal transect monitoring. Stationary measurements will also be conducted to measure the wind speed and wind direction. Stationary measurements are conducted by parking the vehicle allowing the GMAP system to run. Stationary and mobile data sets will be separated according to the SOP. The stationary location will be near the position of the highest detected concentrations (based on results of the previous horizontal transects). If wind speed and wind direction are being measured then the location should be free of trees, buildings or other obstructions. However, it is appropriate to measure wind speed and wind direction close to an obstruction if that is the only location available on site. This data is useable for determining the direction from where the pollutants are coming from. Pollutant concentration data are collected with the GMAP, along with meteorological data, and GPS data on vehicle location. VOC canister grab samples may be taken also.

The GMAP may also be used at a stationary location for an extended period of time.

Compound	Molecular Formula	CAS#	ATSDR Inhalation Minimum Risk Levels (MRLs)			Other
			Acute	Intermediate	Chronic	
Benzene	C_6H_6	71-43-2	0.009 ppm	0.006 ppm	0.003 ppm	
Toluene	C_7H_8	108-83-3	2 ppm	-	1 ppm	
Ethylbenzene	C_8H_{10}	100-41-4	5 ppm	2 ppm	0.06 ppm	
Xylene	C_8H_{10}	1330-20-7	2 ppm	0.6 ppm	0.05 ppm	
Sulfur Dioxide	SO_2	7446-09-5	-	-	-	75 ppb [1]; 0.5 ppm [2]
Formaldehyde	CH_2O	50-00-0	0.04 ppm	0.03 ppm	0.008 ppm	
Styrene	C_8H_8	100-42-5	5 ppm	-	0.2 ppm	
Hydrogen Sulfide	H_2S	7783-06-4	0.07 ppm	0.02 ppm	-	
Methane	CH_4	74-82-8	-	-	-	12,500 ppm [3]

[1]: Primary 1 hour NAAQS
[2]: Secondary 3 hour NAAQS
[3]: ATSDR's *de minimis* level for screening purposes of 1.25% of soil gas concentrations

Table B-1. Pollutant Benchmarks

VOC Canister Sample Collection

VOC canister samples are collected by using a canister which is manually opened and closed (i.e. grab sample). Canisters are collected typically after elevated concentrations of pollutants have been measured, during an observed odor event, or during the stationary vertical monitoring. A sample may also be taken in an "upwind" area in relation to the source and current wind direction. Sample collection will occur according to an approved SOP.

After the samples have been collected they will be transported to the U.S. EPA Region 5 Lab for analysis, using the Chain of Custody form found in Appendix C of this document. The samples will be analyzed using the compendium TO-15 based air toxics analysis for volatile organic compounds (VOCs) in air. Sample analysis and data validation will be performed by U.S. EPA Region 5 Lab.

B.2 Analytical Methods

Cavity ring down spectroscopy

This project will use a Picarro Model G2204 SN 2267-BFADS2013 (Picarro, Inc., Sunnyvale, CA) to collect hydrogen_sulfide (H2S) and methane (CH4) ambient air concentration data. The instrument is a portable, stand-alone unit that provides continuous hydrogen sulfide and methane concentration measurements. The unit is capable of measuring analyte concentrations at a rate of .5 Hz. The instrument measurement range is 0 to 500 ppm for hydrogen sulfide, and 0 to 20 ppm for methane. The MDL's will be determined by allowing the instrument to sample zero air for a set amount of time and calculating the standard deviation of the zero response. This number will be multiplied by 3. All measurements above the MDL will be reported. The instrument manual or the manufacturer may be consulted for additional information on the methodology. The inlet is a ¼ inch Teflon line connected to a mast on the outside of the vehicle.

Differential ultra violet absorption spectroscopy

This project will use a DUVAS Model DV3000 SN UV3000-201502-1007 (or a backup unit DV3000 SN UV3000 SN 201502-1006) to collect BTEX, styrene, formaldehyde, and SO2 ambient air concentration data. The instrument is a portable, stand-alone unit that provides continuous measurements for many other compounds however only compounds that have an associated gas check standard will be reported. If additional gas standards are purchased data will be reported for those respective pollutants. All other data will be used for informational purposes only. The instrument reports a response time of < 5 seconds at standard operating conditions. The instrument measurement ranges are as follows: NO2: 0-1000ppb; O3, NO, Ethylbenzene, m-Xylene, o-Xylene: 0-500ppb; Benzene, SO2, NH3, Toluene, p-Xylene: 0-250ppb. The actual MDL's will be determined by allowing the instrument to sample zero air for a set amount of time and averaging the zero response. This number will be multiplied by 3. All measurements above the MDL will be reported. The instrument manual or the manufacturer may be consulted for additional information on the methodology.

Compact weather station

The All in One (AIO) Compact Weather Station (Climatronics Corporation, Bohemia, NY) is a multi-purpose weather instrument that measures temperature, relative humidity, wind speed, wind direction, and barometric pressure in a single portable unit. The AIO Compact Weather Station consists of a low-power sonic anemometer, a multi-element temperature sensor, a relative humidity sensor, and barometric pressure sensor. The weather station contains an internal flux-gate compass for automatic alignment of wind direction to magnetic north.

The compact size and low power requirements of the AIO Compact Weather Station make it ideal for deployment in mobile monitoring applications, as the instrument can be mounted to a vehicle and powered by the vehicle battery. The instrument is capable of collecting meteorological data at a speed of 1 Hz.

GPS Instrument

During data collection, the position of the monitoring vehicle will be continuously monitored using a Hemisphere Crescent R100 Series Global Positioning System (GPS) (Hemisphere GPS, Calgary, AB Canada). The GPS receiver will be mounted to the sampling mast of the study vehicle, and will log latitude and longitude of the vehicle during measurements. Data from the GPS unit is logged at a speed of 1 Hz. The instrument manufacturer states an accuracy of less than 2.5 meters with 95% confidence.

Integration of instrumentation and deployment

The instrumentation used to collect data (i.e., CRDS analyzer, DUVAS, AIO Weather Station, and GPS) is fully-integrated so that data from all instruments are collected and logged simultaneously to either the Picarro CPU or the onboard rack mount computer. All data will be merged after it is collected. The Picarro will store H2S, CH4, WS, WD and GPS data. The DUVAS instrument itself will generate the raw spectral files for BTEX, styrene, formaldehyde, and SO2 which are then streamed to the case mount (or other) computer housing the DUVAS Solve software. The DUVAS Solve software will process the raw spectral data and generate a CSV file containing all pollutant data. All raw spectral data will stream to a computer and be immediately processed unless the monitoring occurs independent of the GMAP system (i.e. using the DUVAS stand alone on battery power). If the DUVAS is used independently raw spectral data is stored on a memory stick on the DUVAS instrument. Raw spectral data can then be processed through the DUVAS Solve software and reported to the CSV file normally.

The Picarro, DUVAS, GMAP case computer and all other ancillary components are housed in a series of heavy-duty shipping containers. The instrumentation will be driven to the monitoring area in a R5 vehicle. The main container contains a rack mount and shock absorbers to protect the instrumentation during transport. The DUVAS is also housed in a heavy duty shipping container.

The instrumentation is deployed in a vehicle with a sampling mast. Figure B-1 shows the vehicle with the sampling mast attached. The GPS, Compact Weather Station, and Picarro inlet are attached to the sampling mast. The inlet for the DUVAS (not pictured here) is a 3 inch diameter flexible sample hose with custom stainless steel fittings for making air tight connections to the instrument. The Teflon hose is run through a PVC conduit to allow for it to extend above the vehicles cap and protect it from damage. A laptop computer is used in the cab of the truck to connect to the Picarro and the case computer (running the DUVAS Solve software) in order to view the concentrations.

Figure B-1. Mobile Monitoring Vehicle (Mast in Up and Down Position)

All electronics will be powered by the vehicle via an inverter, or by a back-up, 12.8 volt lithium iron phosphate prismatic battery (BatterySpace.com/ AA Portable Power Corp., Richmond, CA). The battery is fully contained in a heavy-duty shipping container, and housed in the rear of the study vehicle.

The CRDS analyzer will sample ambient air through a ¼" Teflon line attached to a sampling inlet, which consists of 4 stainless steel sampling tubes spaced approximately 8 inches apart. An auxiliary pump will be used to draw the sample from the inlet to the Picarro unit at approximately 2.8 liters per minute. The auxiliary pump will decrease the residence time of the sample from when it enters the inlet to when it is measured in the Picarro and paired with GPS data. The Picarro unit will draw the sample from a tee near the Picarro unit at approximately 0.4 liters per minute. The Picarro sample flow rates are maintained by a diaphragm pump integrated into the CRDS system.

The DUVAS will sample through a continuous 5 foot Teflon hose. The hose is run through 4 inch PVC conduit. At no time is the sample gas in contact with the PVC. A fan on the DUVAS will pull the sample through at approximately 150 liters per minute. The flow is directly pulled from the fan through the inlet, the hose and then into the spectrometer.

B.3 Sample Handling and Custody

Data handling and custody are briefly outlined in Appendix A and are also discussed in detail in the Standard Operating Procedure For The Operation Of The Region 5 Geospatial Monitoring Of Air Pollution System (R5-ARD-0002-r2).

If VOC canister samples are taken, each canister will be opened and closed manually by the field operator (i.e. a grab sample). The field operator will enter information about the sample onto the sample label and the Chain of Custody form. The specific procedure will be discribed in an SOP.

B.4 Sampling Methods

If VOC canisters are taken, Region 5's Lab will perform the analysis using the TO-15 analytical method.

B.5 Quality Control

The Data Quality Indicator goals for accuracy, precision, and completeness for this project are summarized in Table B-2.

Table B-2. Data Quality Indicator Goals for the Project

Measurement Parameter	Analysis Method	QC Check	Precision	Completeness
CH4	CRDS Analyzer	Calibration using known concentrations of gas	± 15%	NA
H2S	CRDS Analyzer	Calibration using known concentrations of gas	± 15%	NA
BTEX, styrene, formaldehyde, and SO2	DUVAS Analyzer	Calibration using known concentrations of gas	± 30%	NA
Wind Speed	AIO Compact Weather Station	Annual Certification	±1 m/s	NA
Wind Direction	AIO Compact Weather Station	Annual Certification	±5 degrees	NA

Precision

Precision is evaluated by making replicate measurements of the same parameter and assessing the variations of the results. Precision is assessed in terms of percent difference (PD) or relative percent difference (RPD). Replicate measurements are expected to fall within the tolerances shown in Table B-2.

Completeness

Completeness will be assessed only in data sets that are being used for comparison against an average. For example, if a health standard states that 70 ppb over 30 minutes is benchmark then at least 75% of the data in each 30 minute rolling segment of the data are required. Completeness will not affect individual data points.

B.6 System Testing, Inspection, Maintenance

Acceptance testing for the GMAP system components was performed by the instrument manufacturers. Additionally, an annual calibration and other QC checks and audits are performed according to the SOP.

The GMAP operator will perform system checks in the field under sampling conditions strictly according to the SOP.

The Picarro unit will be challenged by introducing certified H_2S and CH_4 gas and zero air into the Picarro and recording the unit's response. This is a QC check. At least one check will be completed before and after each sampling campaign. If the percent difference is greater than 15% the data are to be flagged from the point of the check back to the last successful check. No change to the calibration will be made if unit response is within 10%. If the response begins to show calibration drift of more than 10% the Picarro will be calibrated.

The DUVAS unit will be challenged by introducing certified BTEX, styrene, formaldehyde, and SO2 gas and zero air into the instrument and recording the unit's response. This is a QC check. If additional gas standards are purchased the analyzer will be challenged for those respective pollutants as well. At least one check will be completed before and after each sampling campaign. If the percent difference is greater than 30% the data are to be flagged from the point of the check back to the last successful check. These data are still considered useable for informational purposes and likely still represent a positive signal for each pollutant. A zero diode response will be generated prior to each QC check and frequently during each sampling campaign. The frequency will be determined by watching the baseline data on the DUVAS and making a informal determination if zero drift has occurred. Zero drift will be watched closely. All zero diode response adjustments will be documented.

Note that it is possible that not all pollutants will be challenged during each sampling campaign. In some cases pollutants will not be challenged and therefore data will be for informational purposes only.

To the extent possible, meteorological values collected during field measurements will be checked against other local meteorological sources (airport meteorological sources or local weather stations). All meteoroloigal measurements are considered usable if the sensor is within the one year certification period and the readings appear normal. If the sensor is a solid state sonic anemometer (i.e. not a cup and vane or propeller sensor), it is acceptable to use outside the one year certification period if all data appear normal, no damage has occurred to the sensor head and the sensor data corresponds to local visual wind indicators such as a wind sock.

B.7 System Calibration

The Picarro unit will be calibrated annually or if the one-point checks show a difference of more than 10%. Meteorological sensors are sent to their manufacturers for calibration/certification if needed. The DUVAS will be sent back to the manufacturer for calibration if needed. All activities concerning calibrations, audits and other QC checks are described in detail in the approved SOP.

B.8 Data Management

Data will be managed strictly according to the SOP. The SOP describes all naming conventions and data transferring and storing rules. GMAP operators are responsible for all data recording activities for this project. Data are automatically stored to the Picarro CPU and to the GMAP case computer (or DUVAS memory stick). The data files will include methane, hydrogen sulfide, BTEX, styrene, formaldehyde, and SO2, GPS coordinates and meteorological data. On a daily basis (or at least at the end of a field deployment), data will be transferred to the project manager for preliminary review. In cases where high values are measured the Picarro operator will notify the Project manager as soon as possible. All data (including all raw spectral data and other data) are ultimately archived on the field computer and on the Air Toxics and Assessment Branch external hard drive.

Project Documents

After data have been analyzed and validated, a copy of this data (available electronically) along with graphs and charts (if needed) will be shared with project/team members and with the client requesting the project.

Equipment manuals will be available at all times.

C. Assessment and Oversight

C.1 Assessment and Response Actions

The GMAP system will be subject to a one-point check at the beginning and end of the sampling campaign. Meteorological sensors will be checked against other local sources when available.

C.2 Reports to Management

At the end of the deployment U.S EPA will process the data (described below) and will report the results. Minimum reporting requirements in the Field Operations Group (R5 Reg-0004-r0) Standard Operating Procedure will always be met. Raw data and analyzed data products will be provided, potentially including time series, wind roses, ribbon plots, and the results of the daily zero/one-point checks.

D. Data Validation and Usability

D.1 Data Review, Verification, and Validation

The following subsections describe post-sampling calculations as well as data management procedures.

Reporting Requirements

Reporting requirements for this project include reporting the pollutant concentration values measured, the GPS coordinates of the field vehicle for each measurement, and wind speed and wind direction for each stationary measurement. This information will be presented in the short-form final project report.

All reports will include at a minimum:

- Report title
- Name of organization preparing the report
- Name of person or organization receiving the report
- Sample measurement results (including minimum and maximum concentration)
- Name, title, and signature of the supervisor or team leader approving the report

Project Leaders are responsible for data acquisition and analysis for this project. Potential deliverables include the following:

- Methane concentration values in ppm
- Hydrogen sulfide concentration values in ppb
- Benzene concentration values in ppb
- Ethylbenzene concentration values in ppb
- m-Xylene concentration values in ppb
- o-Xylene concentration values in ppb
- p-Xylene concentration values in ppb
- SO2 concentration values in ppb
- Toluene concentration values in ppb
- coordinates of measurement vehicle
- Meteorological data:
  - Wind speed in mph
  - Wind direction in degrees (corrected for magnetic declination)
- Plots of pollutant data

D.2 Verification and Validation Methods

U.S. EPA staff are responsible for all data validation activities for this project. Collected raw data will be processed, merged, and flagged according to Table D-1. The collected data will be processed strictly according to the approved SOP.

The data generated during this project will be reviewed and validated by the U.S. EPA R5 AMAS QA Coordinator. If the QA Coordinator participates in the field sampling a different staff will be designated as the data validator by the AMAS section chief. Data will be reviewed and validated by comparison with analyzer and sensor performance parameters and quality control results.

Picarro and DUVAS analyzer performance and function will be compared to the operating parameters discussed in the manufacturer's operating manuals. Micro-processors in the analyzer's monitor internal parameters will yield a fault signal if a malfunction should take place.

Results of all quality control procedures will also be reviewed to assist with data validation. Successful one-point and zero checks are an indication the analyzer is working properly and yielding valid data.

At a minimum, successful one-point and zero checks will be used as a means to validate pollutant data and confirm proper analyzer operations. Under no circumstances will monitoring data be reported as valid without acceptable one-point and zero checks or calibrations. However, if quality control parameters are not met the data may still be used for informational purposes.

The meteorological data will be considered valid when there is no visible physical damage to the sensors and the sensor is within its one year certification period (note that in some cases sensors may be used outside the one year certification limits).

Table D-1 below details the flagging convention used for this project.

Table D-1 GMAP AQS Null Data Codes

Qualifier Code	Qualifier Description	Qualifier Type Description	Qualifier Type	EPA R5 Comments:
AM	Miscellaneous Void	Null Data Qualifier	NULL	
AN	Machine Malfunction	Null Data Qualifier	NULL	Communication error; instrument not collecting, data set to null [NA]
AT	Calibration	Null Data Qualifier	NULL	
AZ	QC Audit	Null Data Qualifier	NULL	
BA	Maintenance/Routine Repairs	Null Data Qualifier	NULL	
BN	Sample Value Exceeds Media Limit	Null Data Qualifier	NULL	Values exceed range of unit in one or more channels and are invalid; both channels invalidated
MD	Value less than MDL	Null Data Qualifier	NULL	less than MDL (MDL to be determined); invalid
ND	No value detected	Quality Assurance Qualifier	QA	zero drift; [MDL x -1]
QX	Does not meet QC criteria	Null Data Qualifier	NULL	

D.3 Reconciliation with User Requirements

Any data not meeting the data quality objectives outlined in Table B-2 of this QAPP will be flagged as invalid according to Table D-1. Invalid data may still be used for informational purposes.

Any deviations from the QAPP or SOPs will be documented by a memorandum to the QA Coordinator. The QA Coordinator will initial the memorandum to approve the deviation. The memorandum must be approved and initialed by the QA Coordinator in order for the deviation to be considered approved.

Project Documents

After data have been analyzed and validated, a copy of the data along with graphs and charts and data interpretation will be available to the data user.

Appendix A:

Data Handling Procedure

Data Handling Procedure

1) The Picarro CPU and the DUVAS data file handling is described in detail in the corresponding manuals. Both systems auto generate file names and folders. The operator must be familiar with this before proceeding.
2) The GMAP SOP describes the naming conventions for naming files and differentiating the QC checks file data from the monitoring data.
3) The operator will copy the raw data from the Picarro or DUVAS to an external storage device. The operator must leave the original raw data in the original location unaltered.
4) The operator will create a folder on the desktop of the GMAP case computer named "MM-DD-YYYY deployment name". For example "1-30-2015 XYZ Source".
5) The operator will copy all raw data from the external storage device to the field computer folder.
6) The operator will provide a copy of all raw data to the Project Manager.
7) Once the Project Manager has the data set it will be assigned a unique name according to the following naming convention: "trip name and date"
   EXAMPLE: "Facility XYZ May 13 2014"
8) These files will be defined as raw data files.
9) Raw data files will be saved to an alternate media (laptop hard drive, cd, thumb drive) and sent to the Region 5 office.
10) Region 5 will save data in the following directory:
    EXAMPLE: G:\Air Toxics And Assessment Branch\GMAP\
11) Raw data files are converted and flagged based on Table D-1 under a new column.
    a. Any value between the negative of the MDL and the MDL should be flagged appropriately. All values that are less than the negative of the MDL must be brought to the QA Coordinator's attention.
    b. Apply the appropriate flag to all values that are below the negative of the MDL.
12) Meet with instrument operator(s) to discuss and document other periods requiring special data flags (see Explanation of Data Flags).
13) When this file is ready to be presented to the QA Coordinator it must be password protected (File, Save As, Tools, General Options, in the Password to Modify field enter "**********" *(Official password has been concealed)*.
14) Send data with official memorandum to the QA Coordinator and all supporting documentation related the data collection activities.
15) QA Coordinator will review data and judge validity according to the current QAPP.
16) QA Coordinator will submit a memo to the AMAS section chief officially recommending validating of the data set.
17) AMAS section reviews and officially validates the data. All memos should be initialed by the appropriate name.
18) Upon final approval copies of the memorandums and supporting documentation will be made. All applicable data sets will be saved to the following drive:
    EXAMPLE: G:\Air Toxics And Assessment Branch\GMAP\

Appendix B

VOC Canister Chain of Custody Form