California Environmental Protection Agency

AIR RESOURCES BOARD

AIR QUALITY SURVEILLANCE BRANCH

STANDARD OPERATING PROCEDURES

FOR

DATA REVIEW AND VALIDATION

AQSB SOP 610

Second Edition

MONITORING AND LABORATORY DIVISION

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LIST OF ACRONYMS

AQS	Air Quality System
AQDA	Air Quality Data Action
AQSB	Air Quality Surveillance Branch
BAM	Beta Attenuation Monitor
CAN	Corrective Action Notice
CFRs	Code of Federal Regulations
CH4	Methane
CO	Carbon Monoxide
DMS	Data Management System
FTP	File Transfer Protocol
HC	Hydrocarbons
MDL	Minimum Detection Limit
MO	Monitoring Organization
NO	Nitric Oxide
NO2	Nitrogen Dioxide
NOx	Oxides of Nitrogen
O3	Ozone
OIS	Office of Information Services
OP	Operational
PM2.5	Particulate Matter less than 2.5 um
PM10	Particulate Matter less than 10 um.
PQAO	Primary Quality Assurance Organization
QA	Quality Assurance
QC	Quality Control
SOP	Standard Operating Procedure
STI	Sonoma Technology, Inc.
THC	Total Hydrocarbons
US EPA	United States Environmental Protection Agency

1.0 GENERAL DESCRIPTION

The ARB's air monitoring program collects real-time pollutant values and samples of ambient air throughout California. The program is designed to ensure the quality of the data collected and disseminated by the ARB and California's air quality monitoring organizations, through the United States Environmental Protection Agency's (EPA) Primary Quality Assurance Organization (PQAO) authority. The data generated are used to determine which areas of California are in attainment, or non-attainment of federal and State air quality Standards, and/or the severity of air pollution in California. The data are also used in air models and real-time air quality public alerts.

This Standard Operating Procedure (SOP) contains specific details on performing data acquisition, editing, and revision in Data Management System (DMS), and also the general elements that should be evaluated during the multi-step data review and validation process.

1.1 Purpose

The purpose of this document is to outline how Air Quality Surveillance Branch (AQSB) staff are to handle, store, edit, and review ambient air quality data before releasing the data for use by various end-users. These procedures can be adopted by other monitoring organizations (MOs) with any differences documented in an addendum. ARB's laboratory data validation procedures are included in the laboratory's quality management documents.

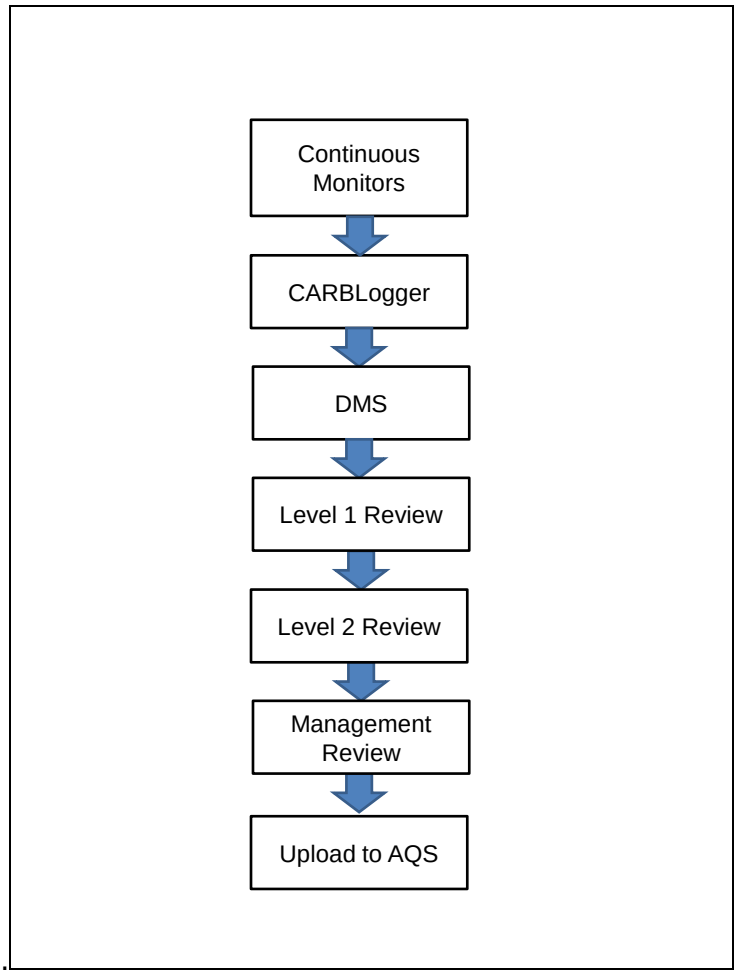
1.2 Responsibilities

The station operator has the primary responsibility for distinguishing valid measurements from indications caused by malfunctioning instruments or source interference (e.g., roofing, gasoline vapors, or structure fires). A site secondary, usually one of the section's specialists or engineers, is responsible for reviewing the work performed by the station operators and serve as the second level data reviewer to ensure that data is of sufficient quality outlined in the Code of Federal Regulations (CFRs), Title 40, Appendix A to part 58, to be deemed "data for record." Section managers provide further oversight to ensure all maintenance and repair actions are fully documented, the stations are being properly maintained, and that the instruments are operated within acceptable criteria.

2.0 DATA ACQUISITION

The task of data acquisition involves retrieving ambient air quality data from each analyzer, transmitting the data from the field stations to headquarters in Sacramento, and ingesting the data into a central database. Station operators are then able to review, edit and validate the air quality data. Figure 1 outlines the data collection, review, and validation process.

Figure1: Data Collection, Data Review, and Data Validation Process



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2.1 Collecting Data

ARB's data acquisition system is composed of two systems: a primary system utilizing a Linux based software package called CARBLogger, and a backup system utilizing each analyzer's internal data logging feature, only where the analyzer has the data logging capability. CARBLogger continuously polls each analyzer, serially via each analyzer's RS-232 port, and records these raw conversations into data files. For instruments that provide hourly data (like the MET One BAM 1020), CARBLogger processes the output as a single data value, while DMS interprets the single value as an hourly value and offsets the time stamp based upon the configuration setting within DMS. Both data acquisition systems are operated at all ARB ambient air monitoring stations for either primary data acquisition (CARBLogger) or for backup and troubleshooting, using the internal data logging feature of each analyzer. Each station's CARBLogger sends the data file to a FTP server operated by ARB's Office of Information Services (OIS). Twice an hour, ARB's DMS accesses and ingests the data files on the file server into its' database. ARB's station operators can view and edit the station's minute and hourly data using their PC workstation through a DMS user interface window.

CARBLogger also is capable of monitoring the analyzers for any alarm condition that may be present. Twice daily, CARBLogger will send the station operator, second level reviewer, and section manager an email to inform them of alarm conditions it detects.

In the event of an intermittent failure of CARBLogger, ARB staff have the ability to utilize the backup system, if available, and download the data from each analyzer directly, then incorporate the data into DMS. In this case, it should be noted that the time stamp used is that of the instrument and not of the stations CARBLogger. If the instruments clock is not frequently synchronized, the back-polled data may not have the appropriate time stamp when incorporating into DMS.

2.2 Data Storage

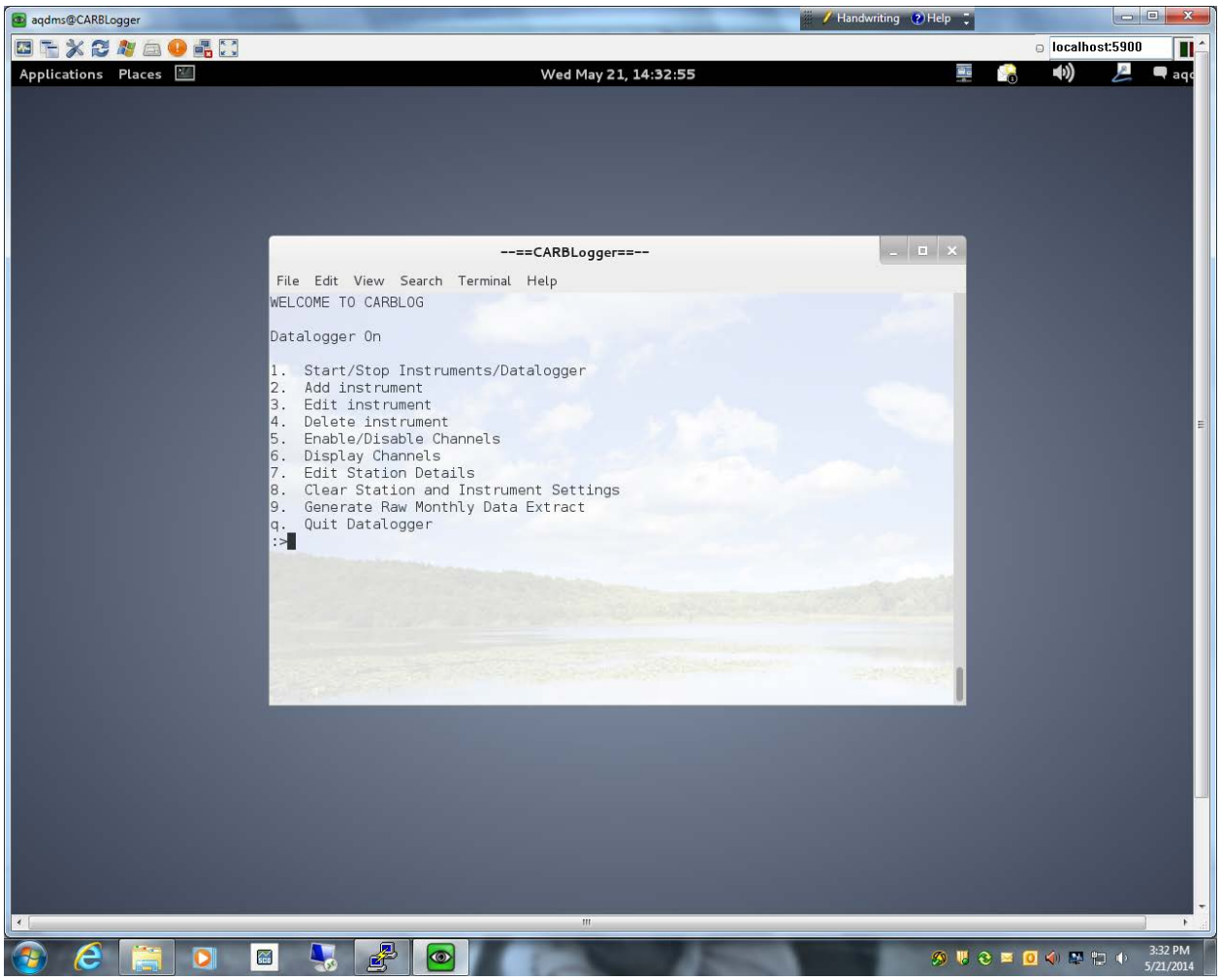
DMS was developed by Sonoma Technology, Inc. (STI) using Microsoft SQL server database. DMS resides on a virtual server maintained at California's State Tier 1 data center.

ARB staff utilizes a DMS user interface window to review, edit, and generate reports of air quality data stored by DMS.

3.0 USING CARBLOGGER TO ENABLE/DISABLE CHANNELS

This section is a means of quickly navigating through CARBLogger for the purpose of disabling or enabling a data channel. Enabling and disabling data channels are critical to alert real-time data users of the condition of instrumentation prior to releasing the data to the public. Data channels should be disabled prior to maintenance, repair, extended testing, audits, or calibrations. Refer to the forthcoming CARBLogger SOP to set up a CARBLogger system, installing/removing instrumentation from a station, or other operations.

Figure 2: CARBLogger's Main Menu Screen

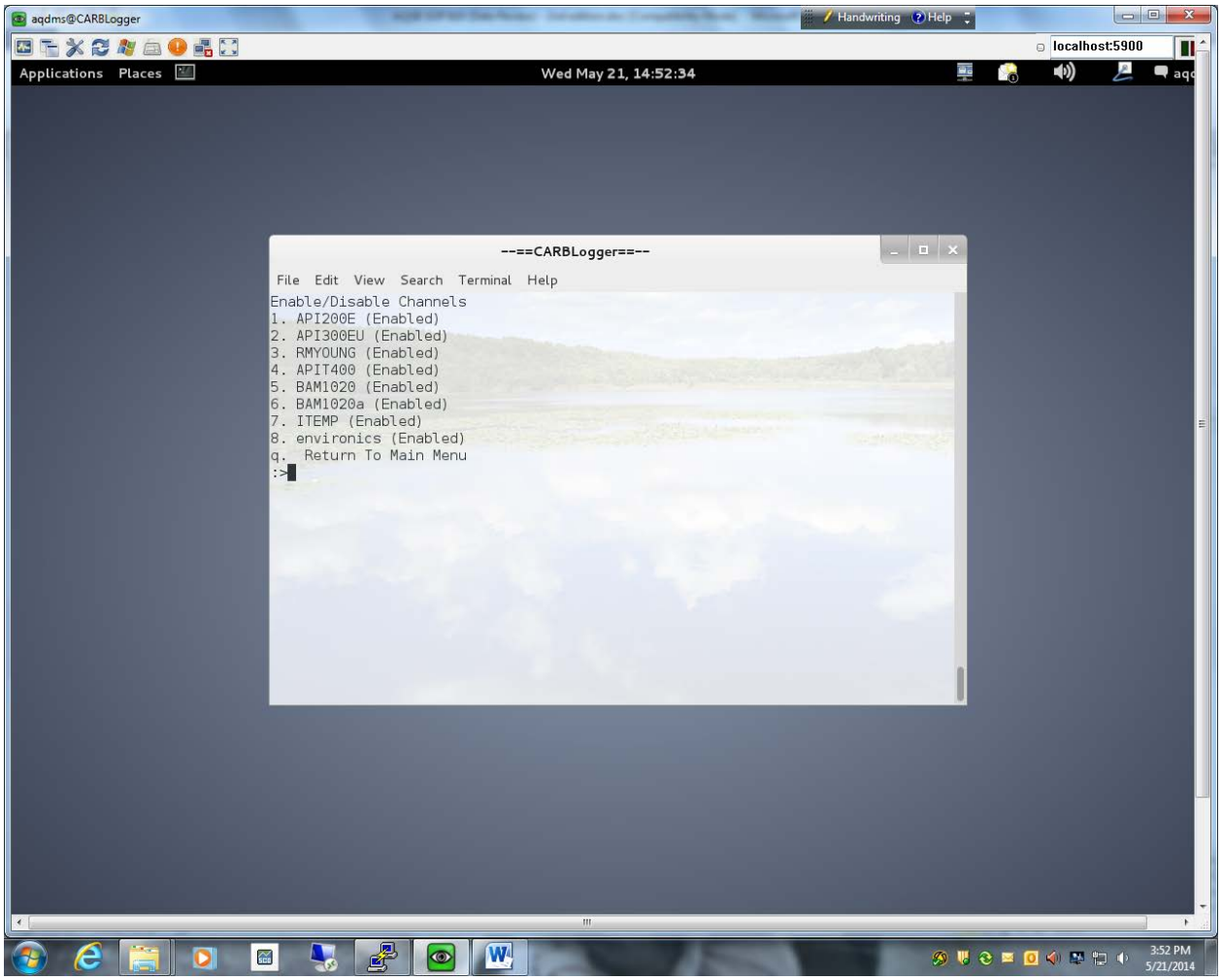


3.1 Enabling/Disabling Channels

a. To Disable logging a channel from CARBLogger's Main Menu screen:

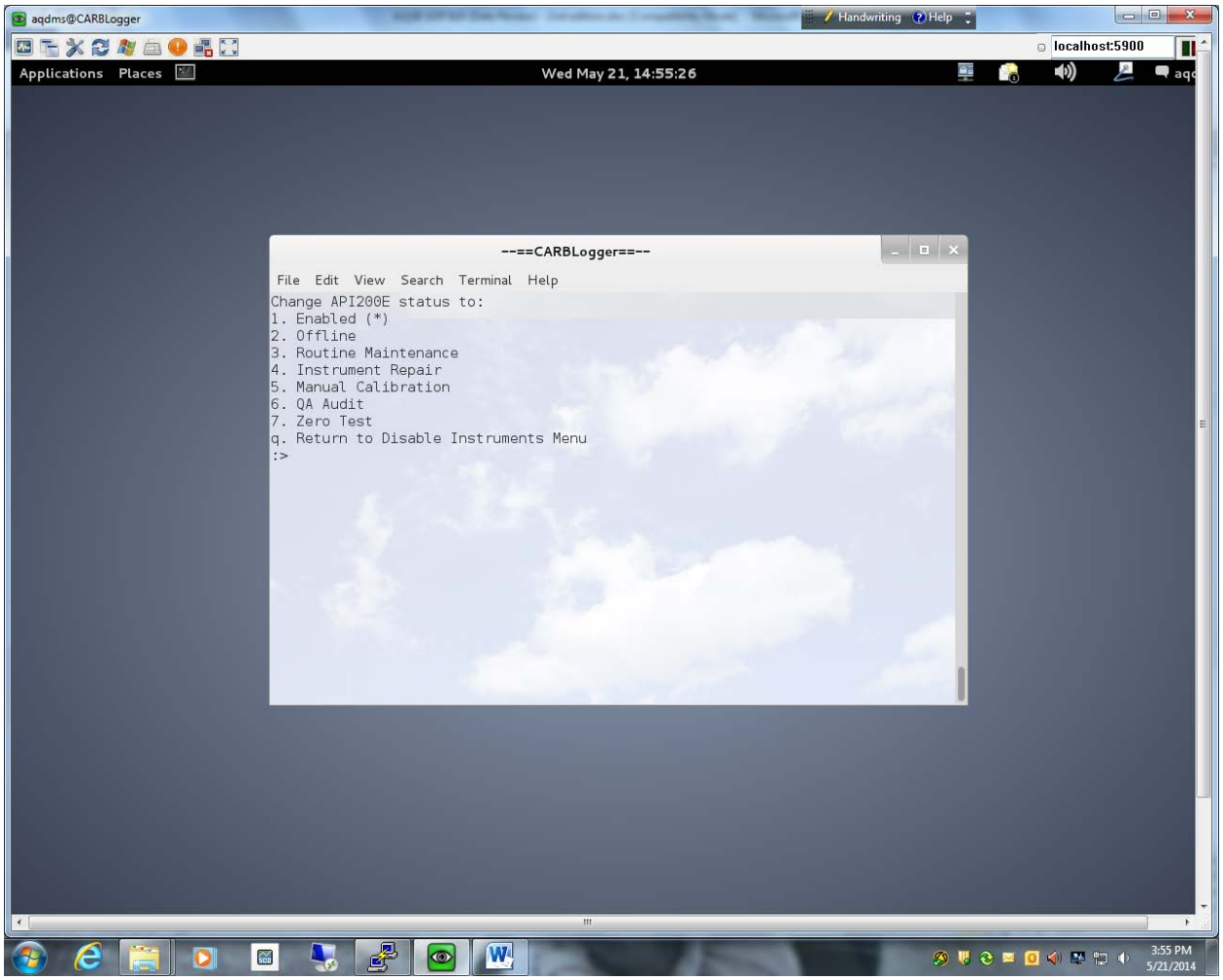
- Select "5" (Enable/Disable Channels), then press "Enter".
- Select the analyzer to disable logging, then press "Enter". See figure 3.

Figure 3. CARBLogger's Enable/Disable Selection Screen



- Select option that best describes purpose for taking data channel off-line, then press "Enter". See figure 4.

Figure 4. CARBLogger's Change Instrument Status Screen.



- View the Data Display screen to ensure CARBLogger is no longer flagging the data as disabled. Select option 6 from the CARBLogger Main Menu Screen, then press "Enter".

Note: Disabled data channels are highlighted in RED.

b. To Enable logging a channel from CARBLogger's Main Menu screen:

- Select "5" (Enable/Disable Channels), then press "Enter", see Figure 2.
- Select the analyzer to enable logging, then press "Enter", see Figure 3.
- Select option 1 (Enabled), then press "Enter", see Figure 4.
- View the Data Display screen to ensure CARBLogger is no longer flagging the data as disabled. Select option 6 from the CARBLogger Main Menu Screen, then press "Enter".

Note: Disabled data channels are highlighted in RED. It may take a couple of minutes for the data channel to display ENABLED. For some instruments such as BAMs or Met sensors, it may take until the next hour for the data channel to display ENABLED.

4.0 USING DMS TO EDIT AND REVIEW DATA

This section is a means of quickly navigating through DMS for the purposes of reviewing, and editing data. It should not be considered an in-depth manual into all the functions of DMS, refer to the forthcoming DMS SOP for a more thorough description of DMS. The viewer should take time to familiarize themselves with all menus by attending periodic DMS training provided by ARB's Operation and Data Support Section.

4.1 Logging Onto DMS

Each staff is assigned a unique user name and password to access DMS using a DMS user interface window through the Remote Desktop Connection residing on each staff's PC or laptop. Staff should initially and periodically change their password by accessing the internal DMS website at http://arbaqdms/dms/index.php.

Access to the DMS user interface window is made through the Remote Desktop Connection. From the Computer menu, select the "ARBFDCTS1" option and press the "Connect" button. Login using your workstation user id and password. From the Remote Desktop window, select the "Start" key at bottom and select the DMS user interface window. Enter your DMS User Name and Password on the menu screen, then select "OK". The main status screen will become visible after a short automated logon period. The main DMS screen should now be viewable.

4.2 Accessing Data Using DMS

Data is viewed on both a tabular and graphical representation, simultaneously.

- From the main DMS screen, select the “Data” tab on the top left side of DMS user interface window. Ensure the “Time-Series Graph” tab is selected.
- Right-click anywhere within the white or grey blank areas in the middle of the DMS interface window and select “New Graph”.
- Enter the desired name of the graph (ie. station name and parameter) and select “OK”.
- Add a data series to the graph by selecting the ”Add” tab towards the bottom of the DMS user interface window.
- Select the Duration, Site, and Parameter from the available selections. The selected data series should appear in a time series plot.

Data can be viewed in a tabular format.

- Select the named data series on the top of the graphical display. The tabular display window will populate with the selected data series on the right side of the DMS user interface window.

A specific timeframe of data can be accessed.

- Select the “Historical” button in the “Time Axis” portion of the DMS user interface window (bottom-middle portion).
- Then type or select from popup calendar the desired timeframe to display.
- Select the “Query Now” button. The tabular and graphical displays will be updated for the desired period of time.

4.3 Editing Data in DMS

Before beginning to edit data, unselect the “Show Abbreviated Data” option from the tabular data display screen. In the abbreviated data display option, null coding will not be displayed and are not allowed to be edited. Data can be edited using DMS by:

- Ensure the desired station, parameter, and time period is displayed. Scroll up or down in the tabular display and select the specific data to edit.

- Right-click the mouse over the specific data point and select “Edit Data”. The DMS Edit Data window will open.

- On this screen, the QC Code, OP Code, and/or data value can be changed. After editing the data, select “Apply” at the bottom of editing window. The edited data should then be saved by right-clicking over the tabular display area and selecting “Save Data Change” or by selecting “Save” in the Data area at the bottom of window. Type the reason for editing data and editor’s initials the select “Enter Changes” and the edits will be changed in DMS.

- On this screen, Null and/or Qualifier Codes can be applied to the data. Null codes describe the reason for invalidating data and go in place of data extracted from DMS into AQS. Qualifier Codes describe a localized event or data handling procedure that may affect the reported value. Up to ten Qualifier Codes can be applied to a value. Null and Qualifier Codes can be applied by selecting the Null Data/Qualifier Codes menu item. Note that this menu item is only available when the “Show Abbreviated Data” display option is selected.

- Once an edit is saved, DMS will create an “edit trail.” The “edit trail” saves the original and edited value, any changes to the OP/QC/Null codes, and reason for the edit. DMS then time and date stamps the entry and notes the user id of the person who performed the edit.

Note that DMS distinguishes air quality data from QC data using specific QC Codes and OP Codes.

4.4 List of QC, OP, Null, and Qualifier Codes Used in DMS

In general, OP codes are operational codes that describe the condition of the data and QC codes are quality control codes that describe the condition of the instrumentation. Qualifier codes are used to describe the condition of the data to be exported to AQS and are in two forms, either “Request for Exception” (R type) or “Informational” (I type). Both OP and QC codes remain with the data within DMS and are not included when exporting data onto EPA’s AQS. When assigned, Null codes will be exported in lieu of data when submitting data to AQS, while Qualifier codes will be exported with the data onto AQS.

Tables 1, 2, 3, and 5 describes when the QC, OP, Null, and Qualifier Codes should be used. Station operators should use good judgement when selecting the best combination of QC/OP/Null/Qualifier codes to best describe any condition that may arise. Be aware that DMS runs routines that may automatically apply various QC and OP codes to the gaseous analyzer data for conditions such as high rate of change, insufficient data, or automated QC sequences. Station operators should adhere to listed QC/OP/Null code combinations in Table 4 for the listed station operations.

Table 1. List of QC Codes

QC	Reason
0	Valid Data
1	Adjusted
2	Averaged
3	Interpolated
4	Suspect (Flow Rate)
5	Suspect
6	Suspect (Audit)
7	Insufficient Data
8	Missing
9	Invalid
10	Auto Calibration
11	Manual Calibration
12	Precision Check
13	Zero/Span Check
14	QA Audit
15	Poor QA Results
20	Voided by Operator
21	Misc. Void
22	Maintenance/Routine Repairs
23	Unable to Reach Site
24	Operator Error
25	Missing O3 not likely to exceed
30	Construction/Repair in Area
31	Vandalism
32	Shelter Temp Out of Limits
33	Building/Site Repair
40	Sample Flow Out of Limits
41	Machine Malfunction
42	Site Computer/Logger Down
43	Value Below MDL
44	Power Failure
99	Test data

Table 2. List of OP Codes

OP Code	Reason
0	Valid data
1	Zero
2	Gas Precision
3	Gas Midpoint
4	Gas Span
5	Recovery
7	Insufficient Data
8	N/A
9	Invalid data
11	Gas Zero (2)
12	Gas Precision (2)
13	GPT Midpoint
14	Gas Span (2)
15	Span GPT
21	Gas Zero (3)
22	Gas Precision (3)
23	Ozone Midpoint
24	Gas Span (3)
31	Gas Zero (4)
32	Gas Precision (4)
34	Gas Span (4)
40	Instrument Malfunction
41	Instrument Flow Error
42	Instrument Pressure Error
43	Instrument Temperature Error
50	Power Failure
51	Maintenance
52	Instrument Repair
53	Off-line
54	Bad Condition – Valid
55	Bad Condition – Invalid
56	Positive Over Range – Valid
57	Positive Over Range – Invalid
58	Negative Under Range – Valid

Table 2 (cont'd). List of OP Codes.

OP Code	Reason
59	Negative Under Range – Invalid
60	QA Audit
61	Rate of Change
62	QC Check
63	MDL Check
64	BAM Zero Test
65	Autocal – off phase
66	O3 Gen Cal (IZS)
67	TCO Auto Zero
68	Calibration
69	Autocal
99	Test Data
255	Any OP Code

Table 3. List of Null Codes.

Null Code	Reason
AA	Sample pressure out of limits
AB	Technician unavailable
AC	Construction/Repairs in Area
AD	Shelter Storm Damage
AE	Shelter Temp out of Limits
AF	Scheduled but not Collected
AG	Sample Time out of Limits
AH	Sample Flow Rate out of Limits
AI	Insufficient Data (cannot calculate)
AJ	Filter Damage
AK	Filter Leak
AL	Voided by Operator
AM	Miscellaneous Void
AN	Machine Malfunction
AO	Bad Weather
AP	Vandalism
AQ	Collection Error
AR	Lab Error
AS	Poor Quality Assurance Results
AT	Calibration
AU	Monitoring Waived
AV	Power Failure
AW	Wildlife Damage
AX	Precision Check
AY	QC Control Points (zero/span)
AZ	QC Audit
BA	Maintenance/Routine Repairs
BB	Unable to Reach Site
BC	Multi-point Calibration
BD	Auto Calibration
BE	Building/Site Repair
BF	Precision/Zero/Span
BG	Missing ozone data not likely to exceed level
BH	Interference/co-elution/misidentification

Table 3 (cont'd). List of Null Codes.

BI	Lost or damaged in transit
BJ	Operator Error
BK	Site Computer/Datalogger down
BL	QA Audit
BM	Accuracy Check
BR	Sample value below acceptable range
CS	Laboratory Calibration Standard
DA	Aberrant Data (corrupt files, aberrant chromo)
DL	Detection Limit Analyses
FI	Filter Inspection Flag
MB	Method Blank (Analytical)
MC	Module End Cap Missing
SA	Storm Approaching
ST	Calibration Verification Standard
TC	Component Check & Retention Time Standard
TS	Holding Time or Transport Temps out of spec
XX	Experimental Data

Note: DMS distinguishes air quality data from QC data using QC and OP codes. CARBLogger and DMS automatically apply QC and OP codes to the data to identify each step in the automated QC program. Changing the QC and OP codes for the minute data during the automated QC program run time will result in DMS not recognizing data sequence as QC data. If this occurs, DMS will be unable to upload QC (Precision) data onto EPA's AQS database.

Table 4. Common QC/OP/Null Code Combinations.

QC Code	OP Code	Null Code	Reason
0	0		Valid data.
10	69	BD	Automated QC check, invalid data
0	1	BF	Automated QC check, valid zero data
0	2	BF	Automated QC check, valid precision data
0	4	BF	Automated QC check, valid span data
10	67	BD	Trace CO auto zero check, invalid data
7	7	AI	Insufficient data
13	64	AY	BAM zero-filter check
11	68	AT	Semiannual multi-point calibration
43	59	BR	Value less than negative MDL
10	63	DL	MDL check
12	62	AZ	BAM bi-monthly flow check or normal maintenance of analyzers
14	60	BL	QA Audit

Table 5. List of Qualifier Codes.

Qualifier Code	Qualifier Description
RC	Chem. Spills & Indust. Accidents
RD	Cleanup After a Major Disaster
RE	Demolition
RH	Fireworks
RK	Infrequent Large Gatherings
RL	Other
RM	Prescribed Fire
RP	Structural Fire
RQ	Terrorist Act
RR	Unique Traffic Disruption
IA	African Dust
IB	Asian Dust
IC	Chem. Spills & Indust Accidents
ID	Cleanup After a Major Disaster
IE	Demolition
IF	Fire – Canadian
IG	Fire - Mexico/Central America
IH	Fireworks
II	High Pollen Count
IJ	High Winds
IK	Infrequent Large Gatherings
IL	Other
IM	Prescribed Fire
IN	Seismic Activity
IO	Stratospheric Ozone Intrusion
IP	Structural Fire
IQ	Terrorist Act
IR	Unique Traffic Disruption
kIS	Volcanic Eruptions
IT	Wildfire-U. S.
IU	Wildland Fire Use Fire-U.S.
RA	African Dust
RB	Asian Dust
RF	Fire - Canadian

Table 5 (cont'd). List of Qualifier Codes.

Qualifier Code	Qualifier Description
RG	Fire - Mexico/Central America
RI	High Pollen Count
RJ	High Winds
RN	Seismic Activity
RS	Volcanic Eruptions
RT	Wildfire-U. S.
RU	Wildland Fire Use Fire-U.S.
1	Deviation from a CFR/Critical Criteria
2	Operational Deviation
3	Field Issue
4	Lab Issue
5	Outlier
6	QAPP Issue
7	Below Lowest Calibration Level
9	Negative value detected - zero reported
CB	Values have been Blank Corrected
CC	Clean Canister Residue
EH	Estimated; Exceeds Upper Range
FB	Field Blank Value Above Acceptable Limit
HT	Sample pick-up hold time exceeded
LB	Lab blank value above acceptable limit
LJ	Identification Of Analyte Is Acceptable;
LK	Analyte Identified; Reported Value May Be
LL	Analyte Identified; Reported Value May Be
MD	Value less than MDL
ND	No Value Detected
RO	Stratospheric Ozone Intrusion
SQ	Values Between SQL and MDL
TB	Trip Blank Value Above Acceptable Limit
V	Validated Value
VB	Value below normal; no reason to invalidate
W	Flow Rate Average out of Spec.
X	Filter Temperature Difference out of Spec.
Y	Elapsed Sample Time out of Spec.

5.0 MONTHLY DATA SUBMITTAL PACKAGE AND FIRST LEVEL REVIEW

Data submittal packages should be submitted on a calendar month basis with the data capture report. In order to upload data onto AQS in a timely manner, AQSB staff will follow the schedule outlined in Appendix A, Data Review Schedule. It is recommended that station operators review and edit data on a weekly basis.

5.1 Monthly Data Submittal Package

The station operator (first level data reviewer) will compile a monthly data submittal package for each site. The station operator will review the monthly data submittal package to ensure that it all meets criteria outlined in this section. The monthly data submittal package will contain the following (at a minimum):

a. A completed copy of the calibration control chart for each gaseous pollutant parameter operating at the site. Use the DMS Home internal webpage to access each stations calibration control chart, http://arbaqdms/dms/index.php.

b. A copy of each instrument's "Monthly Quality Maintenance Checksheet" for that site. The station operator should refer to ARB's Webmanual (http://www.arb.ca.gov/airwebmanual/) for the most current checksheets.

c. A copy of each station logbook. Only include copies of pages covered in the month submitted. If the station operator is using DMS's e-log, print the entries for particular month.

- From the DMS Main Menu screen, select the "Administration" tab.
- Select the "Log" tab.
- Select the appropriate monitoring station from the Site Selector dropdown menu.
- Select the proper start and end dates from the Log Query and Export field. Select the "Query Now' button.
- Ensure requested entries were retrieved.
- Press the "Export Results" button. Select where to create the file of log entries and name file.
- Use any Wordpad or Notebook to look at the log file. Print the log file.

d. Print a “Data Capture Report” for the site.

- Using DMS, select the “Data” tab.
- Select the “Data Capture Report” from the “Named Export” portion of the “Export” data screen.
- Ensure the appropriate site and start/stop dates and time are selected. Preview the report or export to a file. Print the contents of the report. The first level reviewer should explain any loss of data.

Note: DMS counts lapses in ambient data due to the automated QC routines as missing data. It is not necessary to address this type of data loss. Because of this, the maximum data capture for gaseous analyzers is 96%.

e. Once completed, the first level data reviewer will provide the monthly data submittal package to the assigned second level data reviewer for further validation and review.

5.2 General Guidelines on Data Review

Data review will be greatly enhanced if the station operator is conscious of several aids. These are listed below:

a. The station operator should be familiar with typical diurnal (daily) concentration variations (e.g., the times daily maximum concentrations occur and the interrelationship of pollutants). For example: carbon monoxide (CO), nitric oxide (NO), and hydrocarbon (HC) concentrations usually increase and decrease together; NO and ozone (O_3) cannot coexist at high concentrations; nitrogen dioxide (NO_2) and NO concentrations, or their sums, should not be greater than oxides of nitrogen (NO_x); methane (CH_4) plus non-methane hydrocarbon concentration should not be greater than total hydrocarbons (THC).

b. The station operator should be familiar with the type of instrument malfunctions that cause characteristic trace irregularities.

c. Cyclical or repetitive variations (at the same time each day or at periodic intervals during the day) may be caused by excessive line voltage or temperature variations. Nearby source activity can also cause erroneous or non-representative measurements and should be properly noted in the station logbook as well as with the use of Null/OP/QC codes.

d. Graphical displays of data on DMS showing little or no activity often indicate a loss of sensitivity, flow problems, or sample line leaks.

e. Nightly precision and/or span checks provide a means of detecting shifts in instrument performance. If instrument response varies by more than 5% from the expected value, the second level reviewer should be notified and troubleshooting should commence.

f. Station operators should perform “Buddy site” comparisons for like parameters between sites within close proximity of each other. Track the diurnal patterns for several days. Sites with instrument problems will be easily detected.

g. Station operators should compare collocated data, if available. The collocated data should track and compare well; if not, troubleshooting should commence.

h. Station operators should continuously review the twice-daily automated emails from their station’s CARBLogger. These automated emails provide information on any alarm conditions present on instrumentation monitored by CARBLogger.

i. For unusually high values, the station operator should thoroughly investigate to ensure that analyzer was operating properly and to determine if any abnormal sampling condition was present.

    1. The station operator will:

        - Ensure that the analyzer was operating within all established criteria and did not display other signs of malfunctions. The station operator will thoroughly investigate any available meta data to ensure proper instrument operation.
        - Ensure that the nightly precision and/or span checks previous to and just after the data in question were within established criteria (+/- 10% for all gases, +/- 7% for ozone). The precision/span checks tracked over the previous week and following week.
        - Determine if an abnormal event occurred that may have impacted the data such as close proximity to a fire, lawn maintenance, roadwork, construction, etc.

2. In addition, the station operator will investigate to determine if:

   - The value follows seasonal, diurnal, or historical trends.
   - The data compares to other collocated data, if available. Compare a high ozone value with NO data, or high BAM2.5 to BAM10 data.
   - The data follows data from other sites in close proximity when performing "Buddy site" comparisons.
   - The data does not appear as an anomalous spike when graphically displayed. The data ramps up to or down from the questionable data.
   - The data in question is **less than** three times the typical monthly maximum when compared to historical data, taking into account the season and time of day.
   - Either the station operator or the second level reviewer are confident that the value is valid.

If any of the items listed in Section 5.2.j.2 were observed, then the data point in question should not be flagged "Invalid". The data may be flagged "invalid" or with a qualifier code if the investigation performed in this section does not reveal a possible cause. If a cause is discovered through the course of performing an investigation, then the data point should be invalidated or assigned a qualifier code based on the discovered cause. When invalidating inexplicably a high data point, all the steps taken to arrive at this conclusion should be well documented and kept with the monthly data submittal package.

Note: Invalidating inexplicably high data should not occur on a regular basis. It should be the very rare occasions where data is invalidated without a reason.

j. The hourly average data completeness criteria are:

   1. At least 30 continuous minutes of valid data are required to determine an hourly average.

   2. In determining the hourly average concentrations, disregard both recorded excursions lasting less than ten minutes and excursions that indicate obvious deviations from actual conditions in the surrounding area.

k. For negative values less than the negative of the Minimum Detection Limit (MDL), the data should be flagged with appropriate Null/OP/QC codes. DMS details MDL for each specific instrument on the instrument configuration screen of the Administration menu.

5.3 QC Data Review

Data editing, editor's notes, and calibration control data editing are performed using DMS. Calibration control charts are viewed and printed using the Monthly Calibration Control Chart web page.

QC checks identify the operational condition of the monitor and assure quality data. A QC check is performed by introducing a standard gas of known concentration (the "expected value") into the sample stream of an air quality monitoring instrument (analyzer) and recording the monitor's response. Although this data is intended for use by the end-user for data precision purposes, it can also be used for troubleshooting purposes by comparing the monitor's response to the expected value, and a degree of accuracy (expressed as % difference) of the monitor is then determined. QC checks are automatically run between 0350-0510 hours daily at air monitoring stations, 0400-0500 for ozone-only stations. The statistical evaluation of QC check responses to an identical standard gas provides a measure of the monitor's precision. Like air monitoring instruments, QC systems may fail, yielding invalid QC data. For this reason, ambient data should not necessarily be invalidated based solely on QC check data.

DMS distinguishes air quality data from QC data through the use of QC and OP codes. Refer to Section 4.3 of this document to ensure QC data are being appropriately identified.

The following applies only to valid QC data:

a. The percent difference is calculated between the monitor's response value and the expected source value. When the percent difference is less than +/- 7% (5% for ozone) and zero is within +/- 5 ppb of zero (+/- 0.04 ppm for CO), we can assume that the monitor is operating properly and the ambient data bracketed by acceptable QC checks are valid. The station operator should investigate and initiate corrective actions once this limit is exceeded. The station operator should also inform management and the site's second level data reviewer of the condition of instrumentation. If the percent difference exceeds the control limit of +/- 10% (7% for ozone), ambient data collected before and after that QC checks may not be valid. Station operators and site second level reviewer's should work together to determine if the cause stems from sample stream leaks, faulty analyzers, or faulty QC equipment. Faulty QC equipment will not invalidate the collected ambient data.

   When QC check results exceed the established limits, corrective action must be initiated by the station operator to identify and resolve the problem. Corrective action limits are designed around the data quality objective outlined in the U.S. EPA's CFRs. If the control limit exceedance is the result of calculations and/or formulas not being applied correctly (i.e. temperature/pressure corrections, slope and intercept, etc.) and is verified independently by the calibration staff, post-processing of data may be utilized to correctly reflect true concentrations. It should be stressed that these

corrections are to be made to true values (i.e. 0% from true), not to bring the data to within the control or action limits. Otherwise, the appropriate data qualifier or null code must be applied.

First Level Reviewer: Determine whether an instrument malfunctioned, QC instrumentation malfunctioned, or leaks exist in the sample stream. Troubleshoot and repair the problem in a timely manner. Inform second level reviewer to determine if follow up actions are needed (ie. calibrations, etc.). First level reviewers should view QC data daily, if possible.

Second Level Reviewer: Contact the station operator and notify him/her that the QC data indicates a problem exists. Inquire whether the problem was identified and repaired. Determine validity of reading by confirming the expected source gas values, interpolation of the minute averages using DMS, or flagging the data invalid, if necessary. Edit and ensure the QC data is appropriately flagged using the minute averages on DMS. In addition, corrective action taken **must** be documented in the station logbook and monthly maintenance check sheet, also document the corrective action on DMS's Editor's Notes only if data is affected. Second level reviewers should view QC data daily, if possible, and weekly, at a minimum.

Follow up by reviewing the Monthly Calibration Control Chart webpage to confirm that the edits were incorporated into DMS.

b. View "Calibration Control Charts" using the Monthly Calibration Control Chart webpage (arbaqdms/dms/index.php). Review Calibration Control Charts to see if the data values are within the upper and lower control limits (+/- 5% for ozone, +/-7% for all other gases). Upon the completion of each calendar month, station operators should print these control charts and submit them as part of the monthly data submittal package detailed in Section 5.1 of this document.

c. View the target values for the QC data by selecting the appropriate air monitoring site on the "True Value" tab of DMS's Administration menu. Review the latest True Value entries to ensure they correspond to the latest QC instruments' calibration reports. Following the periodic calibrations of the QC instrumentation, ensure that the new True Values are entered using the date of the calibration.

   Note: Do not overwrite previous True Value entries. Enter new True Values on new lines with the dates they were verified. Overwriting entries will alter historical QC check results.

d. Establish QC data validity by referring to the DMS graphical display of the analyzer's minute averages and analyzer monthly maintenance sheets.

5.4 Air Quality Data First Level Review

Station operators should review minute values on a frequent basis (weekly if possible, daily is desired) to confirm normal operation of monitors, and take corrective action in a timely manner, if required. DMS collects both minute and hourly averages for each analyzer, which amounts to 1464 data points per pollutant or parameter per day.

a. Review data for outliers, maximum and minimum values, consistently repeating data values, automatically flagged values, and diurnal and seasonal trends.

   DMS employs several automated QC checks that are designed to flag data that meets certain “suspect” criteria, outlined in AQSB Policy titled DMS Automated QC Checks (April 22, 2013). These “suspect” flags occur when hourly values: exceed a set limit, exceed rate of change from previous hour, stay the same value for a period of time, and fall below the negative of the MDL for a specific instrument. DMS also applies automated QC checks to BAM hourly concentration data based upon the BAMs total flow rate (Q_{tot}, total volume sampled in m3). All of the “suspect” data should be addressed through investigation to determine the data’s validity. If the data is found to be valid, the OP/QC codes should be changed to the valid coding. If found to be invalid, flag the data with appropriate OP/QC/Null to note reason for invalidating the data.

   For values less than the negative of the MDL, the data should be flagged with appropriate Null/OP/QC codes. DMS details MDL for each specific instrument on the instrument configuration screen of the Administration menu.

b. Establish data validity by reviewing QC data, and analyzer maintenance sheets.

c. Use Section 4 of this document to edit, review, flag, and/or comment on data.

d. Submitting complete and accurate notes are important. The first level reviewer should document analyzer performance, malfunctioning instruments, or indicate interferences. These notes should be documented on the monthly maintenance data sheets, station logbooks, or on DMS editor notes. At the end of the month, the station operator can refer to these notes for data validation.

e. DMS runs several automated QC algorithms to identify “stuck” instrumentation (data that remains constant for a significant period of time) or big transitions in the data from one hour to the next. These DMS algorithms are detailed in AQSB Policy titled DMS Automated QC Checks (April 22, 2014). DMS will automatically flag the data as suspect (QC code 5) or invalid (QC code 9). Station operators should assess the quality of the data to determine if data is valid or not. If deemed valid, the QC code for the suspect/invalid data should be changed to valid (QC code 0). If deemed invalid, the QC/OP/Null codes for the suspect/invalid data should be changed appropriately.

f. The station operator **must** show that all data has been reviewed. Use DMS to electronically mark all the data as reviewed. Using DMS, right-click the graph or data screen and select the “Review Data” tab. Enter the dates covered by the first level review. Select the parameter and time averaging reviewed. Ensure the “Lock Data” and “Review Display” are not selected. Enter first level reviewer’s name and note the type of review being performed (ie. Level I) and then select the “Save” key.

6.0 SECOND LEVEL DATA REVIEW

A second level data review is a more site specific review focusing on diurnal and seasonal trends surrounding high/low values and exceedances. Also, a second level data review ensures that all the QC practices were performed to meet the data quality objectives for each pollutant or parameter (+/- 10-% for all gases, +/- 7% for ozone).

Second level reviewers must initial and date each page of each document in the monthly data submittal package signifying each has been reviewed and all data quality checks were performed.

6.1 Monthly Max/Mins and Exceedances

Using DMS, generate a “Monthly Exceedance Report”. Based upon the results of the report, the second level user will assess the quality of each exceedance based upon diurnal and seasonal trends, QC data, first level data edits, monthly maintenance worksheets, and logbook entries. If the second level reviewer finds a reason that may compromise the validity of the data, then the reviewer will make the necessary edits to the data. The second level reviewer should inform the station operator of any significant data edits.

a. Determine if the maximum values are greater than or equal to the level of the State Federal Ambient Air Quality Standard?
   - Are these values typical for the time of year?
   - Is the diurnal profile reasonable?
   - Is the hour of the daily max value typical?
   - Do the values trend up to a max or down to a min?
   - Is the day complete? Are the reasons for missing data noted?
   - Are the daily max/min values impacted by a source or unusual condition? Are the sources or unusual conditions noted?

b. Determine if the range between the min and max are reasonable.

c. Unusually high values may be flagged invalid if all the criteria outlined in Section 5.2.i of this document are met.

6.2 QC/Op/Null Codes

Determine if additional QC, OP, and/or Null codes are required.

- Ensure the QC checks are appropriately flagged.
- Ensure all power outages are flagged.
- Ensure equipment failures are appropriately flagged.
- Ensure the QC, OP, and Null codes match the comments on the monthly check sheet, station logbooks, and editor notes on DMS.
- Ensure the QC, OP, and Null codes adequately detail the situation.

6.3 Instrument Parameters

a. Ensure each instrument's parameter are within the established criteria by reviewing the Monthly Maintenance Checksheets.

b. Ensure indoor temperatures are within a range of 20 to 30 °C or the proper operational temperature specified in the appropriate SOP of the samplers and analyzers. Note: Do not invalidate temperature data. Invalidate any questionable data during the time the indoor temperature data fell outside of range by applying appropriate Null/OP/QC codes.

6.4 Perform Parameter Comparisons for a Site

a. CO, NO, NO2 and NOx concentrations tend to track each other. CO and NO usually increase and decrease together.

b. Ensure NO2 + NO are equal to or less than NOx. Ensure NO values are less than NOx values.

c. Ensure that high concentrations of NO and ozone do not occur at the same time.

d. For sites having PM2.5 and PM10 BAMs, ensure the PM10 values are higher than the PM2.5. PM10 includes the subgroup of finer particles with aerodynamic diameter of 2.5 microns and smaller (PM2.5).

e. Second level reviewers should compare collocated data, if available. The collocated data should track and compare well.

f. Met Parameters
   - Ensure RWD/RWS values vary from hour to hour.
   - Ensure OT and RH follow diurnal patterns.

6.5 Perform Buddy Site Comparisons

Buddy site comparisons are performed for like parameters between sites within close proximity of each other and/or in the same air basin. Track the diurnal patterns for several days. Sites with instrument problems will be easily detected.

6.6 Chain of Custody

After site operators submit data to the second level reviewer, it becomes their responsibility and changes shall be made in coordination with second level staff. No changes are allowed without notice/coordination of the second level staff.

6.7 Review Data on DMS

The second level reviewer **must** show that all data has been reviewed. Use DMS to electronically mark all the data as reviewed. Using DMS, right-click the graph or data screen and select the “Review Data” tab. Enter the dates covered by the second level review. Select the parameter and time averaging reviewed. Ensure the “Review Display” selection is not selected. In addition, the second level reviewer should lock all reviewed hourly data by selecting the “Lock Data” selection. Enter second level reviewer’s name and note the type of review being performed (ie. Second Level) and then select the “Save” key.

Note: Second level reviewers should only lock hourly data. Minute data should not be locked. Periodically, DMS purges unlocked historical data. Only locked data will be archived. Also at NCore sites, 5 minute averages for trace level SO2 should be reviewed and locked.

6.8 Data Submittal to Management

Any significant issues at a site should be highlighted and described in sufficient detail on the cover page of each data package. This will at a minimum include all 72 hour background checks and any other interruptions of data which are 48 consecutive hours. Include start dates and times, hours affected, and the reason for the interruptions.

7.0 THIRD LEVEL DATA REVIEW - MANAGEMENT REVIEWS

7.1 Section Manager Review

The section manager reviews the documents to ensure that the data are complete, the stations have been maintained properly, and that the instruments are operating within acceptable criteria. Any concerns should be addressed to the appropriate section staff.

a. The section manager assembles the documentation for the Branch Chief under a initialed cover memo, which includes:

    1. All of the control charts.
    2. All of the percent data capture reports.
    3. Site/parameter monthly data summaries.
    4. Copies of the station logs.
    5. The cover memo should contain:
        - summarize any event out of the ordinary condition that disrupts the collection of quality data (of which the section manager decides the Branch Chief should be made aware).

b. Section managers should perform “Buddy site” comparisons for like parameters between sites within close proximity of each other and/or in the same air basin. Track the diurnal patterns for several days. Sites with instrument problems will be easily detected.

c. Section managers should use DMS to compare collocated data, if available. Collocated data should track and compare well.

d. Section managers should ensure that all QC practices were performed by staff.

7.2 Branch Chief Review

The Branch Chief reviews and initials the cover memos with the attached documents signifying approval of the data for submittal to AQS. The Branch Chief gives the initialed memos to the designated staff in the Operation Support Section for submittal to EPA's AQS. The Branch Chief will provide copies of the cover memo to station operators and second level data reviewers to inform them that the data is being released to AQS.

a. The Branch Chief should perform "Buddy site" comparisons for like parameters between sites within close proximity of each other and/or in the same air basin. Track the diurnal patterns for several days. Sites with instrument problems will be easily detected.

b. The Branch Chief should perform collocated data reviews using DMS, if available. Collocated data should track and compare well.

8.0 CORRECTING DATA POST-AQS SUBMITTAL

Section managers and the branch chief can authorize corrections to the data once submitted to AQS, with ODSS staff performing the actual correction in AQS. There are several tools that may be used to correct the data already submitted to AQS: a Data Correction Memo, a Corrective Action Notices (CANs) and Air Quality Data Action Requests (AQDAs). Refer to the CAN and AQDA SOPs for their intended use.

8.1 Data Correction Memo

A Data Correction Memo is used in conjunction with a CAN or an AQDA, however, it can also be used as a stand-alone tool for correcting data within AQS. In conjunction with a CAN or AQDA, it acts as a cover letter that documents the findings of the CAN or AQDA and specifies how the data on AQS is to be corrected. The Data Correction Memo should contain:

a. Action requested.
b. Detail reason for requested action.
c. The site information (Site name and ID).
d. Parameter affected by request (including parameter/method codes, POC numbers, instrument property numbers).
e. Timeframe affected and sampling duration.
f. Have the corresponding CAN or AQDA attached.

The Data Correction Memo, with the attached AQDA or CAN (if initiated) should be sent to the Branch Chief through the section manager, with the ODSS manager cc'd. Upon approval, the ODSS manager will direct staff to carry out the request.

AQSB staff can submit a Data Correction Memo without a CAN or AQDA when the request is initiated internally within AQSB and the scope of the correction is very focused. AQSB should initiate a CAN, in lieu of a stand-alone Data Correction Memo, when the findings may affect other station operators or can affect instruments network wide.

9.0 DATA QUALITY ACTIVITIES

This section outlines data quality activities that are employed by AQSB to aid with data quality, completeness, and documentation.

9.1 Weekly Status Report

Complete data sets, with minimal data lost to QA/QC activities and instrument/site maintenance, are necessary for making regulatory decision critical to our agency, local districts, U.S. EPA, industry, and the people of California. The following actions should be taken by all AQSB staff to minimize data loss.

a. Station Operators

1. The station operators should perform the following and report to their section manager on the last workday of the week by 1:00 p.m.

   - Include the status of all operational and non-operational equipment.
   - Include plans to bring equipment back online.
   - Note reason for any missed/invalid samples and the planned date for a make-up.
   - Note any disruption in sample shipping that may have compromised the validity of the samples (for instance, samples shipped late).

2. Check daily precision and zeros for assigned sites each day.

3. For part requests, alert your supervisor if the part(s) you need are not available or not expected to be available within three working days. Return repairable parts and equipment to the warehouse/shop promptly.

4. Be proactive and follow up on non-operational equipment until it is operating properly.

5. For planned absences, inform your supervisor of any maintenance, shipping, or sampling required during your absence.

b. Air Pollution Specialists/Air Resources Engineers

1. Act as Quality Control Officer for all equipment at assigned sites and report to your supervisor on any issue that may compromise data/sample quality or completeness.

2. On a weekly basis, check daily precision and zeros for assigned sites and recommend action to station operator as needed.

3. When assigned sites, and at least twice annually, check that maintenance is done as required by SOPs, monthly check sheets, technical bulletins, etc. (For instance, verify probe has been cleaned/replaced per schedule). Report any deficiencies to station operator and supervisor.

4. When assigned sites, check that the log book is being maintained properly. Make recommendations to station operator if problems are found.

5. Each month while doing second level data review of Monthly Quality Control Check Sheets, verify operating parameters of the instruments. In particular, check instrument flows and ozone analyzer lamp intensities. If a sampler is close to being out of specification, recommend specific action to the station operator. Also verify that the precision gas cylinder certification dates and pressure are within specifications.

c. Shop/Warehouse Staff

1. Notify your supervisor when spare instruments are not available (for example when shipping last serviceable unit).

2. Promptly address parts requests and ship to field ‘next day’ delivery when requested by field staff. Initiate a phone conversation with the requester to verify part need if in question.

3. Provide constructive feedback to field staff when equipment ‘failure’ cannot be duplicated in the shop and/or if failure was likely preventable.

4. Track and verify that the equipment and repairable parts are returned from the field (see above Section 9.1, item a.3).

c. Section Supervisors

Report the section network status to the AQSB Chief on the last workday of the week by 3:00 p.m., including above section 9.1, item a.1. Section managers should also follow upon these items to ensure they are dealt with appropriately to minimize data loss and reestablish data quality.

9.2 Site Reports

Air monitoring site information shall be documented in the form of a site report. The purpose of a site report is to ensure that the most accurate and current information relating to an air monitoring site within our network is documented and updated on AQS.

For each air monitoring site in our network, a site report should be submitted to the appropriate air monitoring section manager by the station operator and/or site specialist/engineer. Once reviewed by management, the site report should be forwarded and maintained by the data submittal staff, currently the Operation and Data Support Section (ODSS). The ODSS staff will update AQS with any changes to the ambient monitoring network.

a. Responsibility

Each air monitoring section manager is responsible for confirming accurate site information is maintained for each monitoring site in their section.

Each station operator and specialist/engineer should meet and review the site report annually for accuracy. The station operator should maintain a copy of the most recent site report in a binder located at the site.

It is the responsibility of ODSS to store the site reports and update AQS with any changes.

b. Content

A complete site report should include the following four forms:

- Form MLD-4 Site ID Report, see Appendix D.
- Form MLD-5 Probe Sampler ID Report, see Appendix E.
- Form MLD-6 Pollutant Project ID Report, see Appendix F.
- Site Installation/Termination Report, see Appendix G.

A complete site report may contain several MLD-5s and MLD-6s, if a site has multiple pollutant parameters.

Note: These documents are available online on the Air Monitoring Web Manual (http://www.arb.ca.gov/airwebmanual/) under the other AQSB Documents link.

9.3 Management Site Visits

Section managers should perform site visits to all air monitoring sites in their section network on a biennial basis. Use site checklist outlined in Appendix B, The Supervisor's Site Visit Check Sheet, when performing visits. Any discrepancies found should be discussed with station operator. Section managers should follow up with station operators to ensure all discrepancies are addressed in a timely manner.

Section managers should retain the completed Site Visit Check Sheets until their next site visit in order to track discrepancies that need addressing over an extended period of time.

APPENDIX A

2016 Data Review Schedule[1]

End of reporting period	Data due to 2nd Level Reviewer	Data due to Manager for Review	Data due to Branch Chief for Review	Data due to MLD-ODSS	Data in AQS
	15 Days	35 days	45 days	50 days	60 days
12/31/15	01/15/16	02/04/16	02/14/16	02/19/16	02/29/16
01/31/16	02/15/16	03/06/16	03/16/16	03/21/16	03/31/16
02/29/16	03/14/16	04/03/16	04/13/16	04/18/16	04/28/16
03/31/16	04/15/16	05/05/16	05/15/16	05/20/16	05/30/16
04/30/16	05/15/16	06/04/16	06/14/16	06/19/16	06/29/16
05/31/16	06/15/16	07/05/16	07/15/16	07/20/16	07/30/16
06/30/16	07/15/16	08/04/16	08/14/16	08/19/16	08/29/16
07/31/16	08/15/16	09/04/16	09/14/16	09/19/16	09/29/16
08/31/16	09/15/16	10/05/16	10/15/16	10/20/16	10/30/16
09/30/16	10/15/16	11/04/16	11/14/16	11/19/16	11/29/16
10/31/16	11/15/16	12/05/16	12/15/16	12/20/16	12/30/16
11/30/16	12/15/16	01/04/17	01/14/17	01/19/17	01/29/17
12/31/16	01/15/17	02/04/17	02/14/17	02/19/17	03/01/17

[1] These dates may vary slightly from the calculated due dates because of weekends and holidays

APPENDIX B

Supervisor Site Visit Check Sheet

Site: _____ Date: _____

Supervisor: _____ Station Operator: _____

		Yes	No	COMMENT
Does wind direction reading seem accurate?				
Does wind speed reading seem accurate?				
Is site secure? Are all equipment secured to prevent theft? Are ladders locked and climbing restrictions in place?				
Is site exterior clean? (no vandalism or graffiti)				
Are site safety features up to date? Fire extinguishers? Safety rails intact and appropriate? CO detector?				
Is site interior clean and orderly?				
Is site temperature 20 to 30°C				
CARBLogger	Time and date correct?			
	Channel scan ok? Are channels displayed in Red?			
	Data downloaded on schedule?			
Log book (current)	Are entries current, complete, and initialed?			
Log book (historical)	Present?			
Are monthly check sheets current and complete?				
Are nightly auto-calibration records current?				
Is most recent semiannual multipoint calibration available at site?				
Is sample manifold clean?				
Is sample tubing clean?				
Is date recorded in logbook when sample manifold and tubing last cleaned?				
Instrument fault lights OFF?				
Any instrument down? Why?				
Cylinders	Expiration date (> 3 months)?			
	Is pressure > 500 psi?			
Monthly PM-10 flow check performed?				
PM-10 flow check within spec (+/- 7%)?				
BAM bi-weekly flow check and leak check performed?				
BAM flow and leak check within spec (+/- 4%, < 1.0 LPM)?				
Sample residence time calculated? Is < 20 seconds? Is calculation in logbook or posted?				

APPENDIX C

REFERENCES

Quality Assurance Requirements for SLAMs, SPMs, and PSD Air Monitoring; Code of Federal Regulations, Title 40, part 58, Appendix 58.

Data Quality Performance Requirements; Code of Federal Regulations, Title 40, part 58, Section 2.3.

DMS Automated QC Checks (April 22, 2013), AQSB Policy.

APPENDIX D

MLD-4, Site ID Report

DATE: _____

Site Identification Report

California Air Resources Board
Monitoring and Laboratory Division
Air Quality Surveillance Branch

ATTACH AN 8 ½" X 11" PORTION OF A U.S. GEOLOGICAL SURVEY (OR LOCAL STREET) MAP INDICATING SITE LOCATION.
INCLUDE PHOTOGRAPHS OF THE FOUR QUADRANTS SURROUNDING THE SITE

REPORT COMPLETED BY: ☐ NEW SITE ☐ AMENDS A PREVIOUS REPORT

TO BE COMPLETED BY REPORTING AGENCY

AQS SITE IDENTIFICATION NUMBER ☐☐ ☐☐☐ ☐☐☐☐
STATE CODE COUNTY CODE SITE ID

AGENCY RESPONSIBLE FOR SITE

SITE LOCATION (AIR BASIN) COUNTY

GEOGRAPHICAL COORDINATES (ENTER LATITUDE & LONGITUDE OR UTM COORDINATES)

DECIMAL LONGITUDE - ☐☐☐ - ☐☐☐☐☐☐ DECIMAL LATITUDE + ☐☐ - ☐☐☐☐☐☐

OR

UTM ZONE ☐☐ EASTING COORDINATES (METERS) ☐☐☐☐☐☐☐☐ NORTHING COORDINATES (METERS) ☐☐☐☐☐☐☐

CHECK ONE ITEM IN EACH CATEGORY THAT PERTAINS TO THE SAMPLING SITE:

LOCATION SETTING

☐ 1. URBAN AND CENTER CITY ☐ 2. SUBURBAN ☐ 3. RURAL

LAND USE TYPE

☐ 1. INDUSTRIAL ☐ 2. RESIDENTIAL ☐ 3. COMMERCIAL ☐ 4. FOREST ☐ 5. DESERT ☐ 6. MOBILE ☐ 7. BLIGHTED AREA ☐ 8. MILITARY RESERVATION
☐ 9. AGRICULTURAL ☐ 10. OTHER (SPECIFY IN COMMENTS)

PROJECT TYPES

☐ 1. POPULATION-ORIENTED SURVEILLANCE ☐ 2. SOURCE-ORIENTED AMBIENT SURVEILLANCE ☐ 3. BACKGROUND SURVEILLANCE ☐ 4. COMPLAINT INVESTIGATION ☐ 5. SPECIAL STUDIES
☐ 6. EPISODE MONITORING ☐ 7. GLOBAL SURVEILLANCE ☐ 8. DUPLICATE SAMPLING ☐ 9. CONTINUOUS AIR MONITORING PROGRAM ☐ 10. EXPOSURE STUDIES

EST. TRAFFIC VOLUME ON NEAREST STREET (VEH./DAY) ☐☐☐☐☐☐☐ EST. CITY POPULATION ☐☐☐☐☐☐☐☐

IS THE AREA WHERE AIR MONITORING INSTRUMENTS ARE LOCATED TEMPERATURE CONTROLLED AT 25° C ± 5° C? ☐ 1. YES ☐ 2. NO

ELEVATION OF SITE (INSTRUMENTS) ABOVE GROUND (METERS) ELEVATION OF GROUND ABOVE MEAN SEA LEVEL (METERS)

SITE ADDRESS: NUMBER STREET

CITY STATE ZIP CODE

COMMENTS (ENTER COMMENTS THAT WILL HELP IDENTIFY THE SITE SUCH AT LANDMARKS, TERRAIN FEATURES, ETC.)

ARB APPROVAL (INITIALS, DATE)

AIR QUALITY MONITORING: QA: AIR QUALITY DATA:

MLD-4 (Revised 3/31/87)

APPENDIX E

MLD-5, Probe Sampler ID Report

CALIFORNIA AIR RESOURCES BOARD
MONITORING AND LABORATORY DIVISION
AIR QUALITY SURVEILLANCE BRANCH

PROBE/SAMPLER IDENTIFICATION REPORT

This report is to be completed when installing or relocating any probe or individual sampler at the site identified below. Attach a dimensioned schematic showing (A) The configuration of each probe and distribution manifold; (B) The location of each individual sampler in respect to other samplers and (C) Any obstructions which meet the criteria presented below. Identify on the schematic the pollutants sampled from each probe or sampler.

This Report : ☐ Is for a New or Relocated Probe or Sampler ☐ Amends a previous report

STATE CODE ☐☐ COUNTY CODE ☐☐☐ SITE ID ☐☐☐☐

Report Completed by: Date :

Site Name :

Site Address (Number, Street, City) :

Site Location (Air Basin) : County :

CHECK ONE SAMPLER CATEGORY FOR WHICH THE PROBE OR SAMPLER SPECIFIED BELOW IS USED

☐ Continuous Sampler ☐ Tape Sampler ☐ Acid Deposition

☐ 24-Hour Sampler ☐ Wind Sensor ☐ Toxic Sampler

Operating Period (Enter Either Initiate or Terminate Date)

INITIATE YEAR ☐☐ MONTH ☐☐ TERMINATE YEAR ☐☐ MONTH ☐☐

Air Intake/Wind Sensor/Sampler Height Above Ground ☐☐☐.☐ (METERS)

Horizontal Distance Of Air Intake/Wind Sensor/ Sampler From Nearest Street ☐☐☐ (METERS)

DISTANCE OF AIR INTAKE/WINDSENSOR/SAMPLER ABOVE/BELOW ROOF LEVEL

☐☐☐.☐ DISTANCE (METERS) ☐ ABOVE ☐ BELOW

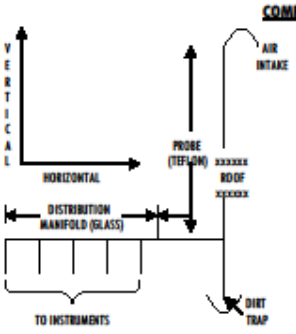
DIRECTION OF NEAREST STREET FROM AIR INTAKE/SAMPLER (CHECK ONE) :

☐ NORTH ☐ NORTHEAST ☐ EAST ☐ SOUTHEAST ☐ SOUTH ☐ SOUTHWEST ☐ WEST ☐ NORTHWEST

IF A LINE EXTENDED 30° UP FROM THE HORIZONTAL AT THE AIR INTAKE/WINDSENSOR/SAMPLER AND ROTATED 360° INTERSECTS ANY OBSTRUCTION WITHIN 30 METERS, GIVE IDENTIFYING INFORMATION BELOW

OBSTRUCTION DIRECTION DISTANCE (METERS)

COMPLETE FOR CONTINUOUS SAMPLING PROBES AND TAPE SAMPLERS ONLY



PROBE INSIDE DIAMETER (MILLIMETERS) ☐☐☐.☐ PROBE AIR FLOWRATE (L/MIN) ☐☐☐ TOTAL PROBE LENGTH (METERS) ☐☐.☐ AIR SAMPLE RESIDENCE TIME IN PROBE (SEC.) ☐☐ IF AIR INTAKE BELOW ROOF, INDICATE DISTANCE FROM WALL (METERS) ☐☐.☐

HOW MANY INSTRUMENTS SAMPLE FROM THIS PROBE ☐☐ IF MORE THAN ONE INSTRUMENT IS A DISTRIBUTION MANIFOLD USED ☐ YES ☐ NO IF YES, COMPLETE → DIST. MANIFOLD INSIDE DIAMETER ☐☐.☐ DIST. MANIFOLD LENGTH ☐☐.☐

ORIENTATION OF AIR INTAKE (CHECK ONE) : ☐ VERTICAL ☐ DOWN ☐ HORIZONTAL

PROBE MATERIAL : ☐ TEFLON ☐ GLASS ☐ OTHER, SPECIFY : _____

DISTRIBUTION MANIFOLD MATERIAL (CHECK ONE) : ☐ TEFLON ☐ GLASS ☐ OTHER SPECIFY : _____

ARB APPROVAL (INITIALS, DATE) AIR QUALITY MONITORING _____ QA _____ AIR QUALITY DATA _____
MLD Revised 3/07

APPENDIX F

MLD-6, Pollutant Project ID Report

POLLUTANT/PROJECT IDENTIFICATION REPORT
CALIFORNIA AIR RESOURCES BOARD
MONITORING AND LABORATORY DIVISION
AIR QUALITY SURVEILLANCE BRANCH

ONE OF THESE REPORTS MUST BE SUBMITTED UPON INSTALLATION OR RELOCATION OF ANY SAMPLING INSTRUMENT

REPORT COMPLTED BY: DATE: THIS REPORT: ☐ ESTABLISHES A NEW PROJECT OR POLLUTANT MONITORING ☐ AMENDS A PREVIOUS REPORT

THE INFORMATION PRESENTED BELOW WILL BE USED TO ESTABLISH THE CATEGORY (PROJECT) INTO WHICH DATA FOR SPECIFIED POLLUTANTS WILL BE ENTERED

PURPOSE OF SAMPLING (AMBIENT MONITORING, SPECIAL STUDY, ETC.):

SITE NAME (AS ASSIGNED BY ARB):

SITE ADDRESS (NUMBER, STREET, CITY)

SITE LOCATION: AIR BASIN COUNTY

AGENCY RESPONSIBLE FOR DATA SUBMITTAL:

POLLUTANT SAMPLING INFORMATION ENTERED BELOW PERTAINS TO THE "PURPOSE OF SAMPLING" DESCRIBED ABOVE

POLLUTANT SAMPLED POLLUTANT CODE ☐☐☐☐☐ POC ☐

COLLECTION/ANALYSIS METHOD: METHOD CODE: ☐☐☐ REPORTING UNITS: UNIT CODE ☐☐☐ DURATION CODE ☐

INSTRUMENT MANUFACTURER: MODEL NO.

SAMPLING PERIOD (ENTER EITHER INITIATE OR TERMINATE DATE) INSTRUMENT PROPERTY NUMBER (ENTER THE LAST FIVE DIGITS)

INITIATE DATE		TERMINATE DATE		
YEAR	MONTH	YEAR	MONTH	
☐☐	☐☐	☐☐	☐☐	☐☐☐☐☐

POLLUTANT SAMPLING INFORMATION ENTERED BELOW PERTAINS TO THE "PURPOSE OF SAMPLING" DESCRIBED ABOVE

POLLUTANT SAMPLED POLLUTANT CODE ☐☐☐☐☐ POC ☐

COLLECTION/ANALYSIS METHOD: METHOD CODE: ☐☐☐ REPORTING UNITS: UNIT CODE ☐☐☐ DURATION CODE ☐

INSTRUMENT MANUFACTURER: MODEL NO.

SAMPLING PERIOD (ENTER EITHER INITIATE OR TERMINATE DATE) INSTRUMENT PROPERTY NUMBER (ENTER THE LAST FIVE DIGITS)

INITIATE DATE		TERMINATE DATE		
YEAR	MONTH	YEAR	MONTH	
☐☐	☐☐	☐☐	☐☐	☐☐☐☐☐

ARB APPROVAL (INITIALS, DATE)

AIR QUALITY MONITORING: QA: AIR QUALITY DATA:

MLD-6 (Revised 4/07)

APPENDIX G

Site Installation/Termination Report

CALIFORNIA AIR RESOURCES BOARD
Monitoring & Laboratory Division
SITE INITIATION/TERMINATION REPORT

New site or parameters:
Objective – Provide reason(s) for establishing air monitoring site or initiating new parameters. Specify applicable federal or state standards, the objectives of the monitoring and expected duration of monitoring.

☐ Population Exposure ☐ General/Background ☐ Highest Concentration ☐ Regional Transport ☐ Extreme Downwind
☐ Source Oriented ☐ Max Ozone concentration ☐ Upwind Background ☐ Max Precursor Emissions Impact ☐ Welfare Related Impacts

_____
_____
_____

Sample Periods: Begin Date _____ (YYYYMMDD) End Date _____ (YYYYMMDD)

Terminate site or parameters:
Provide reason for terminating air monitoring site or parameters.

_____
_____
_____

Measurement Scale: (Check as appropriate)

Pollutant	Pollutant Code	Spacial Scale* Micro	Middle	Neighborhood	Urban	Regional	Monitoring Type NAMS	SLAMS	SPM	Other
Ozone	44201	☐	☐	☐	☐	☐	☐	☐	☐	☐
Carbon Monoxide	42101	☐	☐	☐	☐	☐	☐	☐	☐	☐
Nitrogen Dioxide	42602	☐	☐	☐	☐	☐	☐	☐	☐	☐
Bam 2.5	88501	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other (specify in comments) _____		☐	☐	☐	☐	☐	☐	☐	☐	☐

Comments:

* Microscale = 0 M to 100 M Middle Scale = 100 M to 500 M Neighborhood Scale = 500 M to 4 KM Urban Scale = 4 KM to 50 KM Regional Scale = 50 to hundreds KM

Signatures:

Prepared by: _____ Site Name: _____
Title: _____ AQS Site Number: _____
Date: _____ Effective Date: _____

MLD-87 (03/07)

APPENDIX H

Description of Edition Changes

Second Edition:

List of Acronyms -	Added MDL.
Section 2 –	More accurately describe the data collection process.
Section 4 –	Modify Table 4. Add Table 5, List of Qualifier codes.
Section 5 –	Revise text pertaining to post-processing data corrections, high data values, and data completeness criteria.
Section 6 –	More accurately describe the second level review process.
Section 7 –	Moved management site visits portion to Section 9.
Section 8 –	Add section to correct data, post-AQS submittal.
Section 9 –	Add section for data quality activities. Encompasses first edition's Section 5, added provisions for Site Reports, and moved site visits from first edition's Section 8.
Appendix A –	Updated data review schedule to calendar year 2016.
Appendix B –	Added personnel safety checks.
Appendix D -	Add form MLD-4, Site ID Report.
Appendix E -	Add form MLD-5, Probe Sampler ID Report.
Appendix F -	Add form MLD-6, Pollutant Project ID Report.
Appendix G -	Add Site Installation/Termination Report.
Appendix H -	Add Description of Edition Changes.