



CO L O R A D O
Department of Public
Health & Environment

Air Pollution Control Division

Technical Services Program

APPENDIX D1

Standard Operating Procedure for the Collection of Ambient Air Quality Data

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Standard Operating Procedure for the Collection of Ambient Air Quality Data

1 SCOPE AND APPLICABILITY

1.1 Introduction

This standard operating procedure (SOP) document describes the procedures used by members of the Air Pollution Control Division (APCD) Technical Services Program (TSP) to collect ambient data for the State of Colorado, Department of Public Health and Environment’s (CDPHE) air quality monitoring sites. This includes operation of both on-site data loggers and the central data repository and management system (Central). The procedures given in this SOP are a supplement to APCD’s Quality Assurance Project Plan (QAPP), the latest information published in the Code of Federal Regulations, and the Operator’s manual for 8816, 8832, 8872, and AirVision systems.

1.2 Format and Purpose

The sequence of topics covered in this SOP follows 2007 US EPA [QA/G-6](#) “Guidance for Preparing Standard Operating Procedures (SOPs)”. This method was also written to help field operators understand how and why key procedures are performed.

2 SUMMARY OF SYSTEM

Data is generated by a variety of analyzers and detectors covered in their respective SOPs. This data is then gathered over a variety of protocols and averaged on the data logger, where it is then stored until it is collected by Central. Storage time varies by data logger, at a minimum, one month of hour-average data and three days of minute-average data is required to be. New data loggers have the ability to retain months of data. Polling happens at least once per hour and as often as every five minutes so the month-long data storage on the data logger is more than adequate. Criteria pollutant data is stored in perpetuity on a Microsoft SQL Server operated by the Governor’s Office of Information Technology (GOIT), and minute metadata such as analyzer diagnostic data are stored for a period of sixteen weeks, with hourly metadata data stored in perpetuity.

On-site data loggers also serve as logic controllers controlling when test gasses are introduced to air sampling systems and recording the responses while discounting the responses from ambient data averaging. These performance checks play a critical role in determining the health of the system, see Appendix D2 of this QAPP. Data loggers also provide a mechanism for the site operator to view and control analyzers, initiate weekly quality control (QC) checks, and leave messages to Central for later review.

Data is made available to publication systems that reach both the EPA and the public. The data publication is outside the scope of this SOP.

3 DEFINITIONS

The CDPHE/APCD/TSP QAPP contains an appendix of acronyms and definitions. Any commonly used shorthand designations for items such as the sponsoring organization, monitoring site, and the geographical area will be defined and included in this SOP or in the QAPP Appendix P2.

4 HEALTH AND SAFETY WARNINGS

Electrical Hazards

1. Always use a third ground wire on all instruments.

2. If it is necessary to work inside a logger while it is in operation, use extreme caution to avoid contact with high voltage inside the logger. The logger has high voltages in certain parts of the circuitry, including a 110 volt AC power supply. Refer to the manufacturer's instruction manual and know the precise locations of these components before working on the logger.
3. Avoid electrical contact with jewelry. Remove rings, watches, bracelets, and necklaces to prevent electrical burns.
4. Always unplug the logger whenever possible when servicing or replacing parts. Generally the only serviceable part in a logger is a translator card which requires power to be disconnected before removing or replacing.

5 CAUTIONS

To prevent damage to the equipment, the following precautions should be taken:

1. Keep the exterior of the logger clean, including ports and connectors.
2. Inspect the system regularly for structural integrity.
3. To prevent communication problems with analyzers, make sure all connections between analyzers and the logger are secure and fastened.
4. Inspect wiring for cracks.
5. The data logger and modem must be plugged into a surge protected circuit.
6. While the logger requires no gas standards, every site with a logger has either a test gas source or a NIST-traceable gas cylinder:
 - i. Use and transport of cylinders are a major concern. Gas cylinders may contain pressures as high as 2000 pounds per square inch. Handling of cylinders must be done in a safe manner. If a cylinder is accidentally dropped and the valve breaks off, the cylinder can become explosive or a projectile.
 - ii. Transportation of cylinders is regulated by the Department of Transportation (DOT). It is strongly recommended that all agencies contact the DOT or Highway Patrol to learn the most recent regulations concerning transport of cylinders.
 - iii. Shipping of cylinders is governed by the DOT. Contact the DOT or your local courier about the proper procedures and materials needed to ship high pressure cylinders.

6 INTERFERENCES

Most circuitry in the loggers is optically isolated and should not interfere with each other. However, an occasional draw-down in some signals have been seen when connecting some devices, particularly when connecting several devices to one translator card. Caution should be taken when connecting new equipment so that all other equipment using the same platform continues to operate properly.

Timing is an important issue with serial RS-232 communications between the data logger and an analyzer. If an inappropriate timing offset is introduced in the data logger programming it may interfere with other channels being collected from that analyzer. As a general format the scan interval for an analyzer in seconds must be at least equal to the number of channels for that analyzer and the offset should start at zero and increment by one second for each channel.

It is also possible for high static charge to interfere with low-voltage analog signals. Analog wiring should be kept within the shelter as much as possible and should be as short as feasible. Preference should always be given to digital communication whenever possible.

On occasion when network interference within the CDPHE domain is restrictive, Central may “clog” by continually polling data loggers without being able to access the GOIT SQL server. In such cases, the Task Manager on Central will indicate an overly burdensome consumption of memory resources. The solution, once network connectivity is restored, is to restart the AirVision Server Service. Click Start>Services and highlight AirVision Server. Click Restart the service and wait for the process to finish. ***This should only be done when absolutely necessary and notice should be given to all potential AirVision Client users that the restart is occurring. They will need to save any work before the service is restarted.***

7 PERSONNEL QUALIFICATIONS

General Personnel Qualifications are discussed in the CDPHE/APCD/TSP QAPP.

8 APPARATUS AND MATERIALS

8.1 System Design

Beginning in 2010 the APCD changed the central data polling system from a DOS-based ESC central software system called EDAS to a Windows-based Agilaire central software system called AirVision (Agilaire, 2009). This change was done in part because some flaws with the ESC system were becoming apparent, such as the auto-zero adjustment module. The change was also in response to the availability of new technology to make system visualization and data validation more user-friendly and to routinely and automatically deploy standard QC validation rules on the data in near-real-time.

Central is a Windows Server 2016 server with Ethernet and analog connections. It resides on the CDPHE network and is protected by the GOIT firewall and network protocols. As a “server” on the GOIT network it is the primary responsibility of TSP to perform any updates, maintenance, warranty issue, costs, or repairs. As a fallback, a second nearly identical Windows Server 2008 server was purchased at the same time with the idea that if the primary polling server were to catastrophically fail the second server could be brought online immediately. They are referred to as APCPolling1 and APCPolling2 (the latter being the redundant server) and are addressed as such in the CDPHE Domain Name System. Since the inception of the fallback idea, however, APCPolling2 has become the repository management system for all external non-TSP monitoring sites such as City of Aspen as well as manually imported site information from the private sector sites such as power plants conducting compliance studies.

The data collected by Central’s APCPolling1 (and 2) do not reside on the servers. The server digests and repackages the data and sends it to the AVData (and AVData_External respectively) databases located in the GOIT data warehouse. GOIT houses a Microsoft SQL server instance that is a version designed to match the current AirVision software on the polling computers (presently SQL Server 2005, 2008 R2, or 2012). The separation of data from the software environment serves two major purposes. First, the GOIT-operated SQL server is in a fully redundant environment that is protected by GOIT protocol and is backed up routinely by GOIT according to a Memorandum of Understanding, being backed up to FileVault nightly and off-site once per week. Second, with the data, which includes system configuration data, stored on a separate server, should either polling computer catastrophically fail another server can be brought online without data loss and can be employed to immediately start polling data exactly as the failed server had (see the RealPort exception in Section 8.1.2.1).

The APCD employs three different models of onsite data loggers in the operations of its air monitoring network. These are the ESC 8816 data logger, the ESC 8832 data logger, and the Agilaire 8872 data logger. The 8816 model is the oldest type of data logger in the network and is a predecessor to the 8832 data logger. The 8872 data logger is an entirely redesigned data logger. The following are descriptions of these data loggers.

ESC 8816 Data Logger

The ESC Model 8816 Data System Controller is a microprocessor-based data acquisition system designed to acquire, process, store, report, and telemeter data in a multi-tasking environment. The 8816 is designed around an expansion bus that gives the user great flexibility in configuring the unit with a combination of analog and serial input and output (I/O) types.

For more details, refer to the operator manuals (Environmental Systems Corporation, 2001).

ESC 8832 Data Logger

The ESC Model 8832 Data System Controller is a microprocessor-based data acquisition system designed to acquire, process, store, report, and telemeter data in a multi-tasking environment. The 8832 is designed around an expansion bus that gives the user great flexibility in configuring the unit with almost any combination of input and output types. It is the successor to the 8816 data logger and is more robust in numerous areas. Of significance is expanded memory, faster processing speeds, faster communication speeds, remote Ethernet communications and polling, and Modbus enabled communications with peripheral devices.

For more details, refer to the operator manuals (Environmental Systems Corporation, 2006).

Agilaire 8872 Data Logger

The Model 8872 is a Windows-based data logger, a departure from the earlier 8816 / 8832 embedded systems designs. The 8872 includes a number of hardware and software features to ensure that the device matches the field reliability of the 8832, while offering the convenience of a Windows-based platform and integration with Agilaire's AirVision software.

The core of the 8872 is a fan-less PC, typically 2 GB of RAM. The device can be equipped with a 160 GB standard hard drive or, more commonly, a 64 GB solid state flash drive (SSD). For all digital versions of the 8872, the remainder of the enclosure simply provides convenient universal serial bus (USB), serial, and VGA I/O connections in a standard 3U rack mount enclosure, a form factor similar to the 8816 / 8832 family. However, the 8872 also supports traditional analog/discrete I/O via a variety of internal I/O modules and a protection / connector board to provide familiar detachable terminal block connections to the back. The layout of the connections is designed to make the unit easy to use as a 'drop in' replacement for an 8816 or 8832. (Agilaire, 2013)

Figure 1 illustrates the logical layout of the polling system.

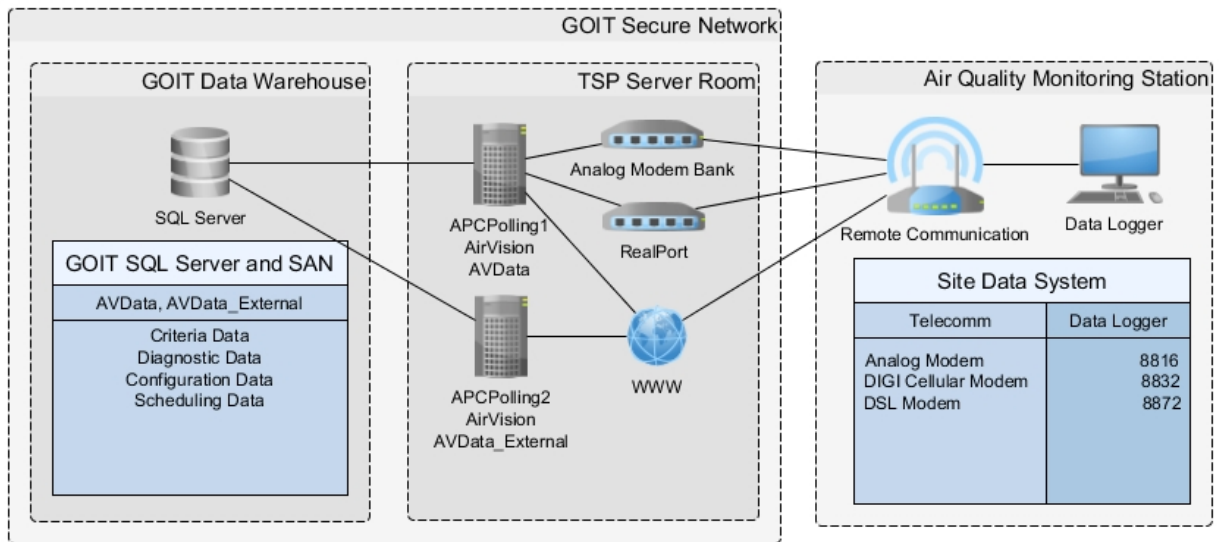


Figure 1. Logical Data Polling Layout

8.1.1 Database Size Management

Starting in 2015 problems with the infrastructure in the GOIT Data Warehouse were causing data collection and publication failures. It was determined that the best intermediary solution was to split the AVData database into two databases.

The first is a historical database from the beginning of the data import during the switch away from EDAS (2005) through the beginning of two years prior to the current year. This database does not actively poll data and is not actively used by the data validation process. It is only accessed in cases of special studies or historical trends.

The second is a live database responsible for collecting current real-time data and providing that to the data publication system. The live database only contains data from January 1 of two years prior to the current year up to the present.

8.1.1.1 Accessing the Historical AVData Database

The historical database resides on APCPolling2 and is backed up to a network storage device. Since APCPolling2 is a live polling system feeding AVData_External it cannot access the historical database through the AirVision interface without an alteration to the connection string in the Server Settings Editor.

To make such changes, open the Server Settings Editor and click yes for the Windows security warning.

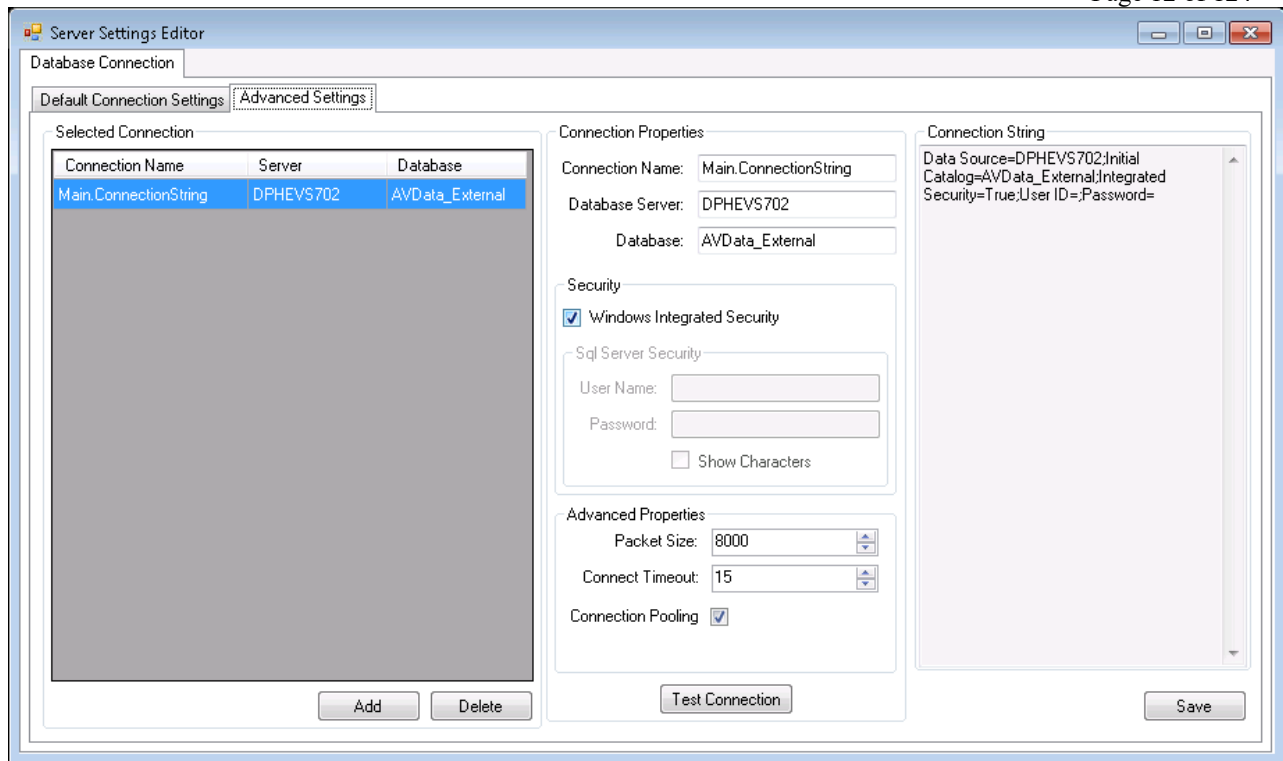


Figure 2. Server Settings Editor

The live AVData_External connection settings are:
Database Server: DPHEVS702
Database: AVData_External

The historical AVData connection settings are:
Database Server: APCPolling2\TSPMS1
Database: AVData

Enter the appropriate settings, click Test Connection, and if successful, click Save. Note that nothing will happen when Save is clicked. The system must be returned to the live settings as soon as possible. Close the program.

8.1.1.2 Truncating the Live AVData Database

This is a placeholder for when this methodology is developed. It will involve using the database import/export tool within AirVision, see Section 9.2.16).

8.1.2 Communication Protocols

Ethernet is the predominant protocol especially within the GOIT Secure Network. APCPolling1 and 2 are connected to the GOIT Data Warehouse and through a firewall to the larger World Wide Web. A Universal Serial Bus hub is used on APCPolling1 to connect to several USB to Analog modems that comply with the V.90 protocol, which are in turn connected to several analog phone lines. Many stations are connected to the internet by cellular modems with static Internet Protocol addresses and are contacted directly by Central. Finally, a proprietary platform is used to connect 8816 data loggers to Central called RealPort.

8.1.2.1 RealPort

RealPort is a proprietary software package written by DIGI. For specifics about RealPort, see http://ftp1.digi.com/support/documentation/90000630_D.pdf. *It is important to note that the RealPort configuration resides ONLY on APCPolling1 and is non-transferrable to another server. In the event of failure on APCPolling1 the entirety of the RealPort configuration must be recreated on a new server.*

RealPort drivers may be downloaded here: <http://www.digi.com/support/productdetail?pid=3037> (or by searching for RealPort Drivers). The driver is specific to the operating system. The current driver is located on APCPolling1 at C:\Docs and Manuals\Communication\RealPort.

Configuration for RealPort endpoints is straight-forward. Open Setup64:

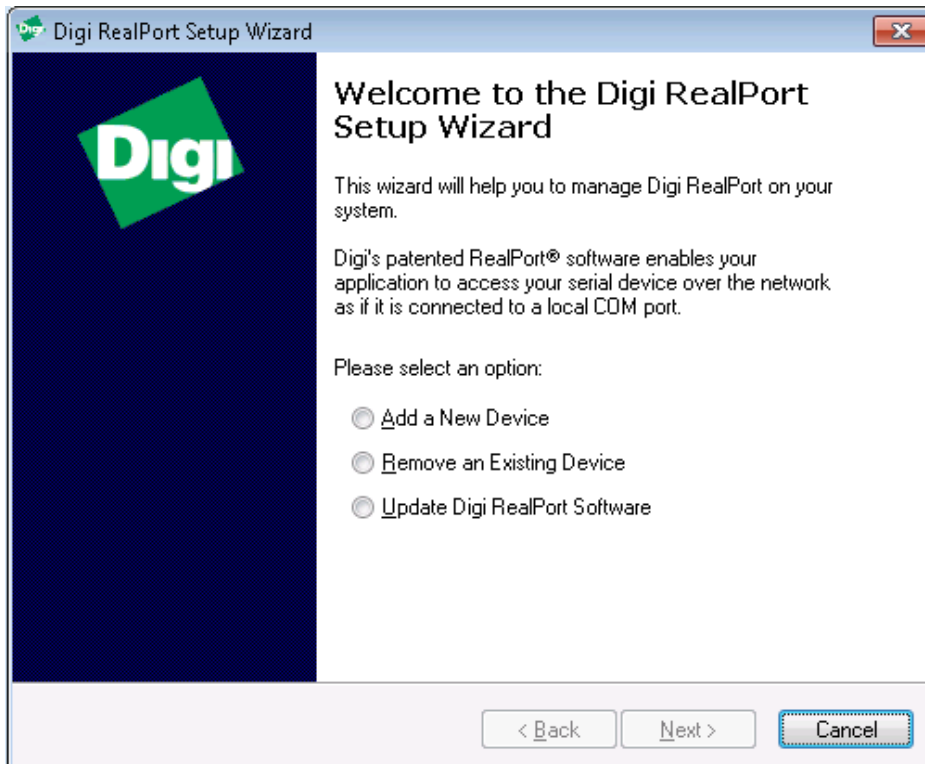


Figure 3. RealPort Welcome Dialog

Select Add a New Device and click Next. After a moment, <Device not listed> is available. Highlight <Device not listed> and Click Next.

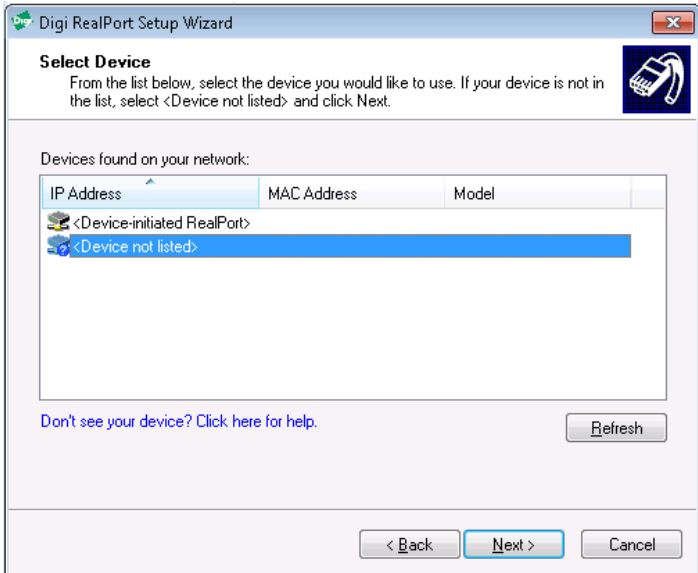


Figure 4. RealPort Device Not Listed Screen

In the Describe the Device dialog, it is highly recommended that you change Device Model Name to include the site, the COM port and the IP address for easy recognition in the future. Type in the IP address of the remote modem in the Network Settings group, and change the number of ports (some DIGIs have more than one) and select the correct Starting COM: value in the COM Port Settings group. For example:

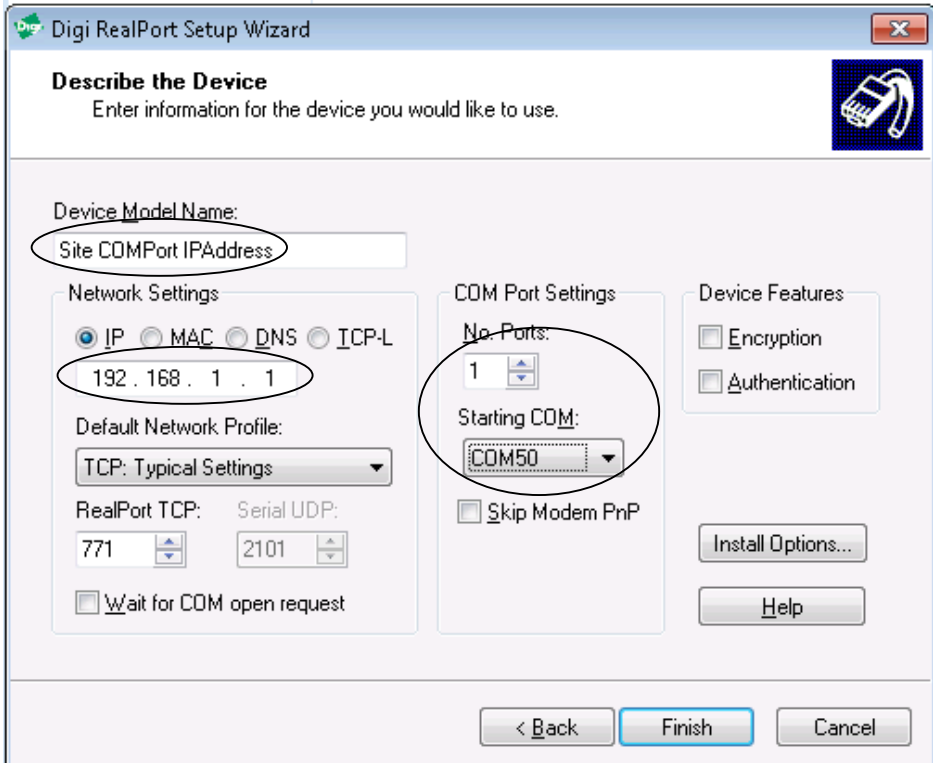


Figure 5. RealPort Configuration

Click Finish. If executed properly, RealPort will now emulate a serial connection over the entered IP address using the entered COM port. This means an 8816 data logger without Ethernet capability will be able to communicate with Central over IP. In AirVision the 8816 will be addressed by a Direct COM Route using the entered COM port (see Section 9.2.2.2.1).

Current configuration of the RealPort driver settings can be found in the Server Manager as seen below.

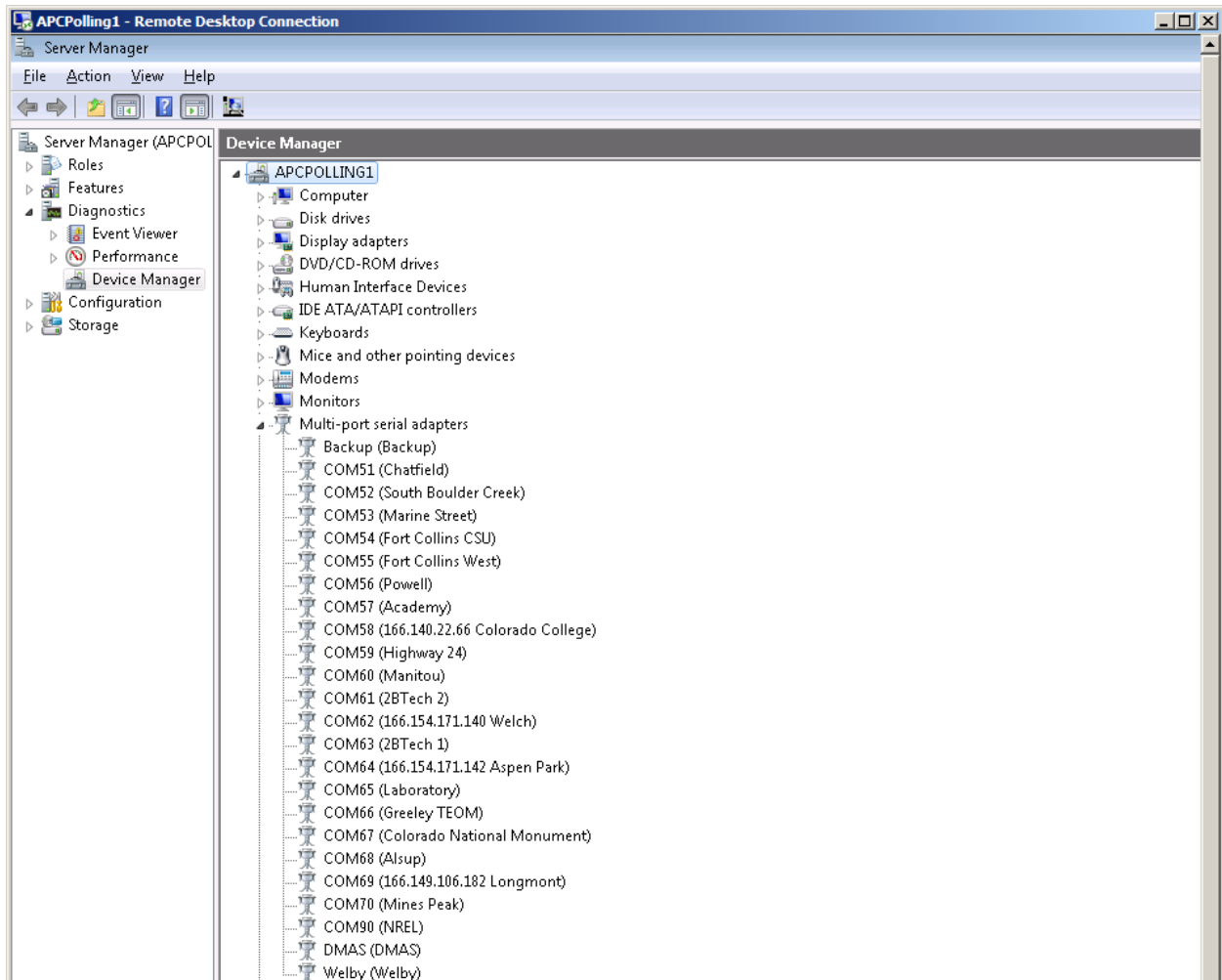


Figure 6. RealPort Configuration in Server Manager

8.1.2.2 Server Restart and RealPort

Up-time of the polling servers should be managed with all the care appropriate to the operating system and needs of the data stream reaching the public. For example patches that require restarting the server should not be conducted during a wildfire or other high-profile event and should not generally be conducted during Ozone Season without first consulting a forecaster.

In the event a polling server needs to be restarted, it will lose contact with the RealPort modems. In order to regain communication, the modem must be restarted as well. Below is a list of instructions for restarting the remote modem (applicable to any DIGI modem):

In a web browser, go to the address of the modem to be restarted. The desktop for the polling server should have a collection of IP addresses for the modems.

Log into the modem using APCD and 4180 as the user name and password respectively.

On the left in the navigation ribbon, click Reboot.

On the next screen, click Reboot, ensuring that the “Immediately” bullet is selected (which is the default).

The reboot process takes approximately 1 minute. Verify that the modem rebooted by going to the IP address for that site and logging in again. The presence of the login web page is sufficient to evince the modem is powered up. The site may be polled using the Scheduled Task Status screen, see Section 9.2.7. Figure 7 shows the DIGI restart screen.

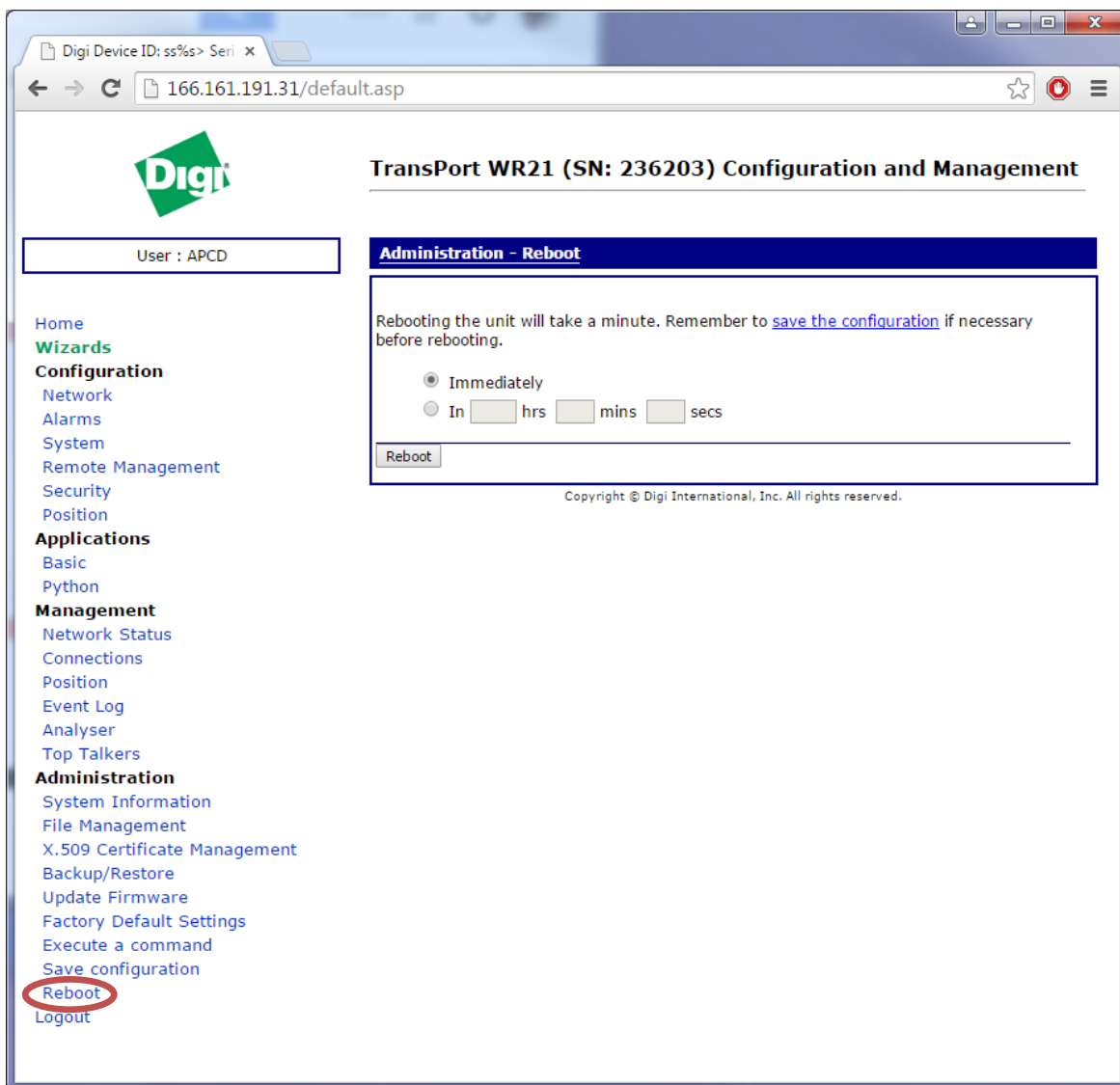


Figure 7. DIGI Modem Restart Screen

9 OPERATION AND MAINTENANCE

Data loggers can be configured in the field but this is not the preferred method. If such configuration is required, refer to the respective technical manual. The preferred method is to push data configuration from Central to the data logger.

As such, the majority of this SOP will focus on configuration of Central. Two purposes are served. First, a copy of the configuration for each data logger is in a centrally managed location and can be pushed to a replacement data logger easily. Second, the configurations must match (with some exceptions in the details) between Central and the data logger for data to be properly collected.

Section 9.1 discusses some on-site operation required for proper field use of the data logger. Section 9.2 discusses configuration and operation of Central including pushing configurations to data loggers.

9.1 Field Configuration and Operation

As described in Section 2 and 8.1 above, data is originally generated by the analyzer or detector over a variety of protocols, averaged and stored by the data logger before being collected by Central.

If data acquisition fails it will be noted by the data management staff in either routine data checks or in daily quality control reviews.

In such cases, the site operator should check that the analyzer, data logger, and modem (as well as any switches) have power. Even if power is available it may be beneficial to power cycle each component. Ozone sources, modems, and switches seem to respond well to power cycling.

Check that all connections are secure and under no tension or stress from other cabling. In the case of analog connections, raw connection can be shown by the Display > Voltage screen on an 8816 or 8832. Log into the data logger and press D, then V. The analog input being read on each channel will be displayed. On an 8872, open the Adam Apex Utility. Right-click the 10.1.0.n address and select “Search” which will find any Adam D/A converters in the system. Open the subsequent converters using the password of 00000000. A display showing each analog reading for all ports will then be displayed on the screen.

To verify serial communication on an 8816 or 8832, log into the data logger and press X, scroll to the appropriate COM port, which are zero-based, and hit enter. For Teledyne analyzers, type “?” without quotes and press enter. A splash screen will scroll by verifying you have connectivity. For Thermo analyzers, hold down the Alt key and type “176” (128 plus the Machine ID of 48), release the Alt key and type “co” and press enter. A result will echo back indicating a proper serial connection. On an 8872, open HyperTerminal, connect to the appropriate COM port and use the instructions listed for the 8832. The most common reason for serial communication failure is a mismatch in baud rates. 115200 is the currently used baud rate.

In the past the solid state hard drives on the 8872s have become full which will force the AirVision service to stop. The available capacity on the hard disk can be found by clicking Start > Computer. On the desktop is a shortcut to the log folder. Open it and delete all but the most recent files of each type (there are two files that only occur once and one file that is iterated every day). Do the same in the two sub-folders GSI and ModBus. Empty the trash in Windows, verify that enough space is available on the hard disk by pressing F5 in the Computer window, and restart the AirVision service by clicking Start > Services, highlighting AirVision Server and clicking the start button. Starting the service is also an available function in the right-click context menu.

9.1.1 Realtime Data Trending (8872 Only)

To setup the real time graph single click Realtime Data Trending from the Status Displays menu.

Select from the query the Site and Parameter, the Average Interval data type, and the Number of Hours for the graph to look back to retrieve data. Use Dynamic Scaling and Suppress Reading Flag colors can be selected if needed to change the graphs scale or to keep the data as one color on the graph.

The data can be retrieved by selecting the **Manual Refresh button** on the Ribbon at the top above the Main Navigation menu, or as long as the trending screen remains open the **Auto Refresh button** can be selected and the software will automatically update the graph after the poll runs.

The graph is shown on the left side of the screen while the same data is also shown in column form on the right side of the screen.

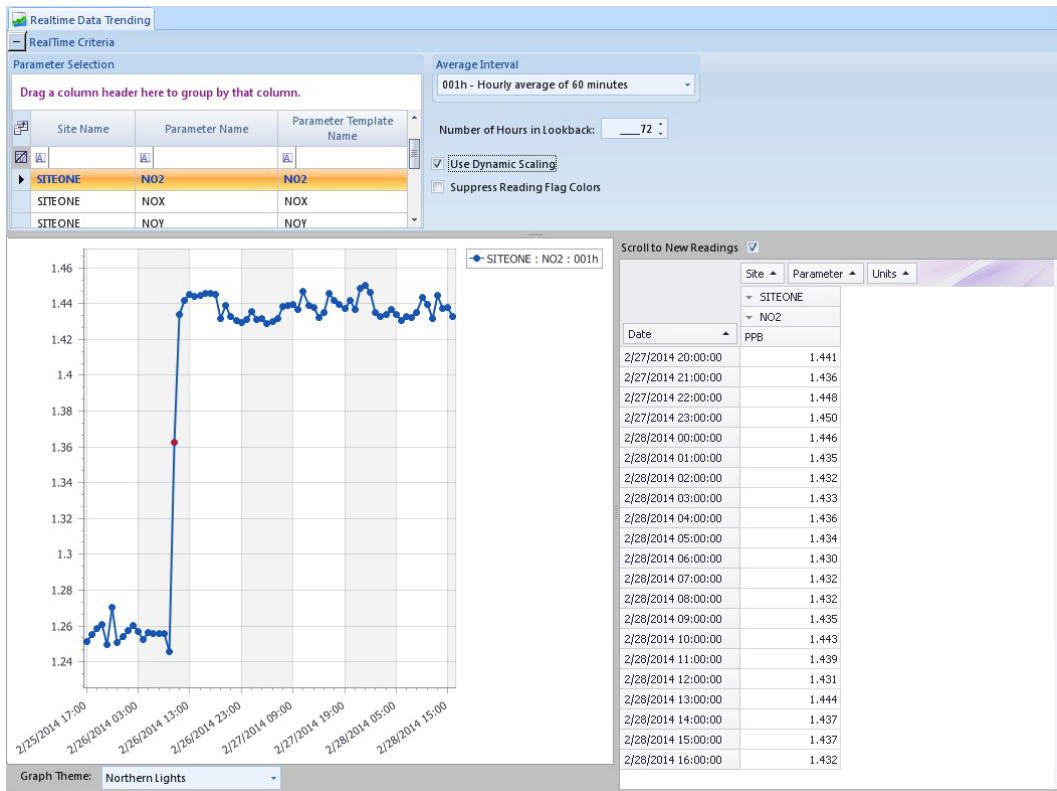


Figure 8. Real Time Data Trending

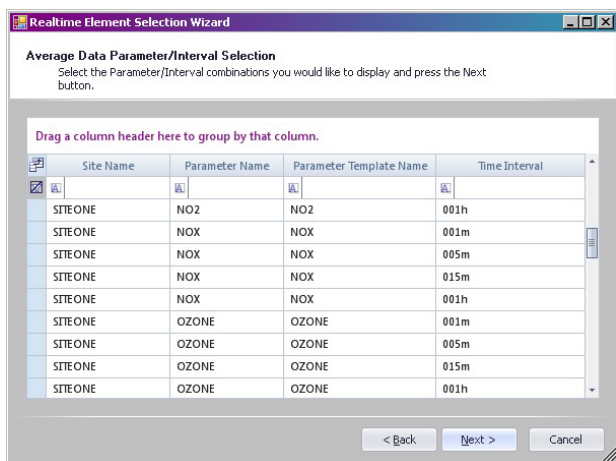
Select the **Open Selection in Data Editor button** on the Ribbon at the top to bring this same data selection up in the Average Data Editor. The graph or chart can be shown separate by selecting or deselecting the **Show Grid and Show Chart buttons** on the Ribbon at the top.

9.1.2 Realtime Tabular Display (8872 Only)

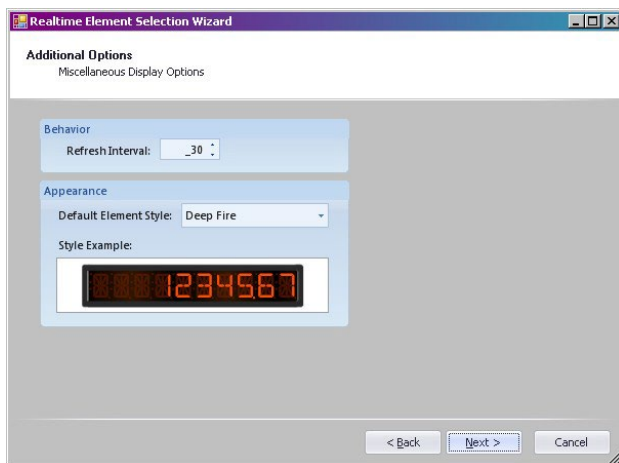
To setup the real time display single click Realtime Tabular Display from the Status Displays menu.

To add a new display, select the **Select Display Elements button** on the Ribbon at the top above the Main Navigation menu. It will open the Realtime Element Selection Wizard. Click Next to continue to the next screen.

Select the Site(s), Parameter(s), and Time Interval data type(s) that is to be displayed and click “Next”.



The Refresh Interval defaults to 30 seconds but can be changed. The appearance for the Default Element Style defaults to Deep Fire but can be changed by clicking the down arrow on the right side of the field and selecting from the drop down list one of the other element options. It will show in the Example box below the field selection what the element choice looks like. Click Next.



When all selection choices have been made, click Finish to complete the setup of the display. The display(s) will open with the selections that have been created.



Select the **Save Current Layout** button on the Ribbon at the top to save the display so that it can be opened again at a later time if the display gets closed. To open a previously created display, select the **Load Display Layout** button on the Ribbon at the top.

9.1.3 Disable/Enable Analyzer in Data Logger

ESC 8816/ 8832

Disable analyzer data channel:

From the top level menu, to disable a data channel from reporting to the data logger, the user must:

1. Choose menu options **CDM (C Configuration Menu > D Configure (Data) Channels > M Disable/Mark Channel Offline)** to view the list of available channels.
2. From the keyboard, using the down arrow button, scroll to the target channel name and hit the **Enter** or **Return** key.
3. Next, hit the **Esc** (Escape) key twice to get back to top level menu.
4. Select menu option **DF (D Real-Time Display Menu > F Display Readings w/flags)** to ensure the proper machine was disabled. You should see the letter “D” within parenthesis and adjacent to the targeted channel indicating it has been disabled.

Enable analyzer data channel:

From the top level menu to enable the data channel to resume reporting to the data logger, the user must:

1. Choose menu options **CDE (C Configuration Menu > D Configure (Data) Channels > E Enable /Mark Channel Online)** to view the list of available channels.
2. From the keyboard, using the down arrow button, scroll to the target channel name, and hit the **Enter** or **Return** key.
3. If all machines/instruments and/or channels are already on line, the user will receive a message stating “No channels are offline” at the bottom left screen. Otherwise a list of channel names will appear.

4. Next, hit the **Esc** key twice to get back to the top level menu.
5. Select menu option **DF (D Real-Time Display Menu > F Display Readings w/flags)** to ensure the proper channel was enabled. You should see parenthesis adjacent to the targeted channel without the letter “D” inside indicating the machine/instrument channel is enabled and reporting to the data logger.

Agilaire 8872

Disable analyzer data channel:

1. After logging in to AirVision™, if the Site Node Logger Toolbox is not open, from the top level menu select the **Home** tab > **Utilities** > **Site Node Logger Toolbox** > then select the **Channels** tab.
2. Identify the channel to be disabled. At the right side of the form, under the “Disabled” heading, click on the row with the target channel name. This action will change the channel state from “False” to “True” indicating that it is now disabled and not reporting to the data logger.

Enable analyzer data channel:

1. After logging in to AirVision™, if the Site Node Logger Toolbox is not open, from the top level menu select the **Home** tab > **Utilities** > **Site Node Logger Toolbox** > then select the **Channels** tab.
2. Identify the channel name to be enabled. At the right side of the form, under the “Disabled” heading, click on the row with the target channel name. This action will change the channel state from “True” to “False” indicating that it is now enabled and will now report to the data logger.

9.1.4 Message to Central Procedure

ESC 8816 or 8832

1. Log in to the data logger.
2. From the top level menu Type **SMC (S Status Menu > M Message Menu > C Leave a Message for Central)** followed by hitting the **Enter** or **Return** key.
3. When the text entry display appears, type in up to 80 characters of text explaining the site visit, followed by your initials, example, “Weekly completed. No problems noted. – JJ” then hit the **Enter** or **Return** key on the keyboard to accept the log entry.

Agilaire 8872

1. Log in to the data logger using the AirVision™ application.
2. Select the **Home** tab > then **Data Editors** drop down menu.
3. From the drop-down menu select, **LogBook Entry Editor**, and click the round green icon with white “plus” symbol, entitled, **New Log Entry**.
4. Next, click on the **Category:** drop-drop down menu and choose **Logger Message**.
5. Select the drop-down menu item, **Site** and choose the appropriate site, for example, **Welby**.

6. Enter text explaining the purpose of the site visit, followed by your initials. Example, “Weekly completed. No problems noted. – JJ” hit the **Save** button at the top left to save your comments. The application will allow more characters than 80, but they are truncated for the Central computer.

9.1.5 LogBook Report (8872 Only)

To run the logbook report single click the LogBook Entry Report from the Reports menu. After making the date range selection, pick one or more sites, and one or more categories the log entries were assigned. To open the report, select the **Generate Report button** on the left side on the Ribbon above the Main Navigation menu. This will bring up the report below the query in the Report Output section. Each site is shown per page with any entries made in the date range selected in the query. An example of the report is shown below.

Logbook Report				
SITEONE				
01-Jan-2011 00:00 to 04-Apr-2012 00:00				
<u>Category</u>	<u>User Name</u>	<u>Entry Time</u>	<u>Event Time</u>	<u>Entry</u>
Adjustment	Admin	02/09/11 17:00	02/09/11 17:00	TEST
Logger Message	Admin	03/01/11 10:18	03/01/11 10:16	TEST MESSAGE FOR CENTRAL.
Logger Message	Admin	08/19/11 15:23	08/19/11 14:20	LEAVING A TEST MESSAGE FOR CENTRAL AV POLLING ON

9.1.6 Perform Manual Precisions

ESC 8816 or 8832

1. Login to the data logger.
2. From the top level menu type **CCS (C Configuration Menu > C Configure Calibrations > S Start a Calibration Program.)**
3. A list of calibration options appears (see below). To run a Quality Control Precision select, **QC-*nn*** by scrolling down to that option and hitting the **Enter** or **Return** key.
4. Hit the Esc (escape) key twice to get back to the top level menu, then type, DF to verify the Precision Calibration was initiated. You should see the letter, “C” next to the reading indicating it is in the calibration mode, as shown. It will run for about 10 minutes. After a Manual Precision has run to completion, the new precision value will appear in the RL list.
5. Hit the **Esc** key twice to get to the top level menu then type **RL** to view, shown below.
6. Continue to step 8 in the Agilaire 8872 section

Agilaire 8872

1. Login to the 8872 data logger.
2. From the **Home** tab select **Utilities > Site Node Logger Toolbox**.
3. When the **Site Node Logger Toolbox** tab appears, select the **Calibration** tab. Once the Sequence Name page appears, select the proper calibration sequence that you wish to run. Each precision choice will have “QC” in the Sequence Name.

4. Once the Precision has completed, on the **Home** tab click on **Reports**. From the drop-down menu, select **Calibration Results**.
5. When the “Report Criteria” window appears, notice the “Parameter Selection” section. On the keyboard, hold the **Ctrl** button down and click on each parameter for which you wish to see calibration results.
6. Now look at the “Date Range” section of the window. Modify the “Start Date” and time and “End Date” and time to coincide with the Precisions that you just ran.
7. Finally in the “Calibrations Results” section click on **Generate Report** to see the Precision results, presented in a report format.
 - a. The “Value” column will show the average value collected by the analyzer. The “Expected Value” column contains the value that should have been generated by the calibration equipment. With O₃, the O₃ Cal “Expected Value” column shows the value the O₃ calibration equipment was attempting to generate and the “Value” column shows what it actually did generate. With NO₂, the ACTCONC section “Expected Value” column shows the value the NO₂ calibration equipment was attempting to generate and the “Value” column shows what it actually did generate.
8. Enter the results into the ZSPTracking database within 48 hours of completion.
 - a. Open the database and click on Enter Manual
 - b. In the new form, select your site from the Site Name drop list
 - c. Select the appropriate criteria pollutant from the pollutant drop list. Note that the first pollutant is automatically selected.
 - d. Click the “Get” button
 - e. Verify the fields against the “Calibrations Results” report. If correct, click Capture Data. If not, contact the data manager.

9.2 Central Data Configuration and Operation

Not every option available in AirVision will be covered in this SOP. To learn more about options not covered here, see the 8816, 8832, 8872, and AirVision manuals. Options covered here are those commonly used by TSP and some that may be used in the future.

9.2.1 Creating a New Site

Channels of data are configured in AirVision in a hierarchy of the Parameter Template, the Parameter, and the Data Source Detail. The Parameter Template is the level at which ADVP rules operate (Section 9.2.21). Because of this, all channels should have an assigned hierarchy through the Parameter Template level.

To build a new site, follow this superstructure:

- Parameter Template Editor
 - Create any non-existing Parameter Templates and verify that existing Parameter Templates meet requirements

- Site/Parameter
 - Create the Site
 - Create Parameters (which can be considered as more configurable than the parameter template) associating them with Parameter Templates
- Data Source Details
 - Create a source for the site, a logical entity representing the data logger
 - Create any Modbus instruments
 - Create Channels, associating them with parameters
 - Create any performance checks and QC entities
- Server Settings Editor
 - Create a communication pathway
- Logger Download
 - Push the configuration from Central to the data logger
- Task Scheduler
 - Add the data logger to the scheduled polling tasks or create a new polling task

9.2.1.1 Parameter Template Editor

The purpose of the template editor is to setup templates for existing parameters that are going to be used at multiple sites, and will be used during the setup of each parameter in the Site/Parameter screen. This will help to save time for the user setting up parameters so they don't have to fill in every field manually, they can simply apply a template and it will automatically fill in the fields. The user can fill in the blank fields in the parameter setup if needed. Some of the fields are blank in the templates, and can be filled in by the user if needed. **It is highly recommended that the settings that have been preset for the parameter templates not be changed, and if changes are needed, it is best to select a different parameter template that the parameter can be associated with. If the proper template does not exist, then one should be created with the needed settings for that parameter to be associated with.** Some parameters that are imported in a configuration are likely to not have existing templates for those parameters, and if used at a number of sites creating a template would likely to prove helpful in saving time in setting up those parameters.

***Important!* - A template should be used once for one parameter per site. If a template is used for more than one parameter at the same site, it can cause the reports to not function properly as the reports will not know which parameter the template is supposed to be reporting for. There is a template already created for each type of parameter with the specific EPA Parameter Code selected.**

To setup parameter templates single click the Parameter Template Editor from the Configuration Editors menu. As parameters are added they will appear in the **Parameter Name column** on the left of the setup screen.

To add a new template, select the **“New” button** on the left side of the Ribbon above the Main Navigation menu. It will put blank fields on the right side of the screen.

To open an existing template single click the parameter name in the Parameter Name column to bring up the parameter settings on the right side of the screen. To delete an existing template highlight the parameter name in the Parameter Name column that you want to remove. Select the **Delete button** on the right side of the Ribbon above the Main Navigation menu. It will not prompt you to make sure you want to delete. Once the delete button is selected the template is immediately removed from the list.

Always save your changes!

Parameter – Enter in the name of a monitored pollutant, meteorological parameter, or other measured entity.

Description – Enter in a description of the parameter if one is needed. This is not a required field.

AIRNow Mnemonic – These names are what will show on the AIRNow report. If you want the name of the parameter as you have it set in the software to be the way it shows on the report, type in the same parameter name. If not, then type in the name that is required to appear on the AIRNow report. Example of a parameter that might have two different spellings one of which you have in the software and one of which is required on the report could be Ozone or O₃. This field is required if the parameter template is going to be associated with the parameter that is to be included on the AIRNow report.

Math Equation: (if Calculated) – This designates the parameter to be calculated from the central math pack engine, which makes it like a central only channel.

Enable AIRNow Reporting – Check this box if you want this parameter to be included as one of the parameter reported on the AIRNow report that will be submitted to EPA.

Parameter Data Type – Average (Continuous) is data that is to be collected on a regular basis, and this setting is the default. **Particulate Sample** is Non-Continuous data to be manually entered. This option is useful for parameters like TSP, PM10, or lead, for which data can be collected at different intervals. **Composite Sample** is a calculated measurement.

EPA POC – The parameter occurrence code. Enter in a one digit code used to distinguish between different monitors at one site that are measuring the same parameter.

EPA Method – Enter a three digit code indicating the sampling method code.

EPA Units – Enter a three digit code indicating the engineering units for the parameter.

EPA Parameter – Enter a five digit code indicating which parameter is being reported on.

Reported Digits – Number of digits displayed in reports between 0 and 6. This number should be greater than or the same as the precision.

Precision – Number of digits past the decimal between 0 and 6. This number should be the same as or less than the reported digits.

Truncate Round Rule – Enter a T for truncate and an R for round the end result. The field defaults to truncate.

Reported Units – Enter the engineering units to which the voltage or current inputs will be scaled.

Analyzer Units (if different) – Enter in the units that the analyzer uses if those units are different than the reported units used on the report.

Graph Minimum – Lower scale of the graphs. Changing this setting will change the scaling in the graphs in the Average data Editor.

Graph Maximum – Upper scale of the graphs. Changing this setting will change the scaling in the graphs in the Average data Editor.

Calibration Span – This field is determined by the instrument. Enter the configured calibration span value for the parameter to determine the parameter’s calibration error (at the data logger). For “Error Calculation,” the value is only used for Standard formula, not in the Difference or Linearity calculations.

Formula: $(ABS (Actual Value - Expected Value) * 100) / SPAN$

where ABS is the absolute value.

Instrument Detection Limit – Minimum concentration of a pollutant that can be measured above instrument background. The data logger is an estimate of concentrations at which one can be fairly certain that the compound is present. Concentrations below this limit may not be detected.

Limit Of Quantization – A minimum criterion or region for quantization that should be clearly above the detection limit. The lowest concentration of a pollutant in a sample that can be determined with acceptable precision and accuracy under the stated operational conditions of the method. Traditionally this is approximated as 10 times the signal-to-noise ratio.

Minimum Detectable Limit – This is the minimum limit, in engineering units, detectable by the instrument

Practical Quantization Limit – The lowest concentration of a pollutant that can be reliably measured within specified limits of precision and accuracy during routine operating conditions.

Totalize in Reports – Check this box to get a Total column in the Monthly report and Statistical report. If this box is not checked and the Monthly or Statistical report is ran on the particular parameter it will not show the Total column but instead will show the Average column. If this box is checked the Daily Summary report will give totals in the Total row at the bottom of the report, if it is not checked the Total row will still show on the report but the cells will be blank.

Minimum in Reports – Check this box to get a Minimum column in the Monthly report. If this box is not checked and the Monthly report is ran on the particular parameter it will not show the Minimum column but instead will show the Maximum column.

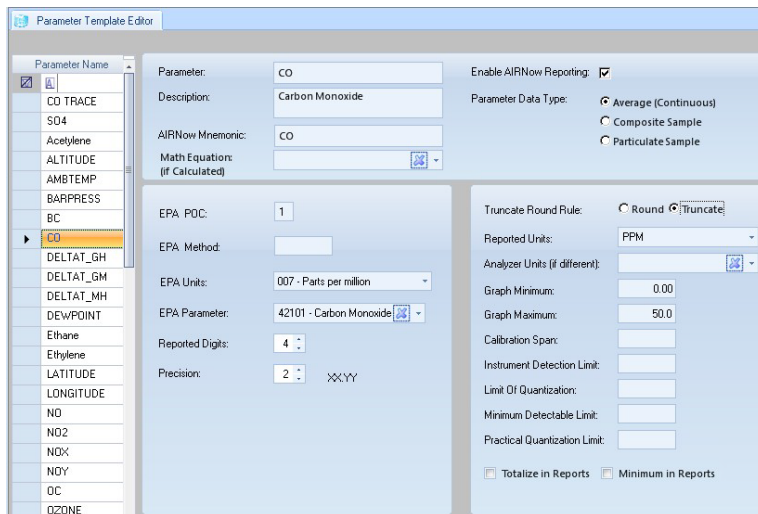


Figure 9. Parameter Template Editor

9.2.1.2 Site/Parameter

The Site/Parameter editor is used to setup Systems, Sites, and Parameters. To setup these features single click Site/Parameter from the Configuration Editors menu. This tab has a tree menu that expands each System's Sites and their Parameters once they have been created. All of the settings created here are for the software's purpose only when it comes to generating files and reports to be submitted. Each setup is described below.

9.2.1.2.1 Systems

A system is defaulted in the tree menu called System, but the name can be changed by double clicking on System to bring its setting up on the right side of the screen. Multiple systems are not usually needed unless they benefit organization such that each system is a separate reporting agency.

To add a new system, select the **Add System button** on the left side of the Ribbon above the Main Navigation menu. A new System tab will open on the right side of the screen that has one section that contains three fields.

To open an existing system, double-click the system name in the tree menu to bring up the System Name tab.

To delete an existing system highlight the system name in the tree menu you want to remove. Select the **Delete System button** on the left side of the Ribbon above the Main Navigation menu. It will prompt you by asking if you are sure you want to delete the current selection. Select Yes to continue deleting the system or select No to stop the deletion and retain the system. However, keep in mind that a system cannot be deleted if it has existing parameters.

Always save your changes!

General Tab

System Details section

System Name – Enter in the name of the System that will hold the Sites. You can setup more than one System, and it can hold other Sites as well. This is used in a situation where you may be monitoring Sites from another agency or customer and you want to keep different agency Sites separated from each other in different Systems.

Country Code – This code for the United States is 840, which should fill in automatically.

Agency Code – This is your unique four digit agency code established by the EPA, and will be used automatically by the information entered in the AIRNow Setup. The code for CDPHE is 0240.

Time Zone – Click the down arrow and select a time zone for the polling pc from the drop down list.



The screenshot shows a software interface with two tabs: 'General' and 'Advanced'. The 'Advanced' tab is selected. Under the 'System Details' section, there are four fields: 'System Name' (text box containing 'System'), 'Country Code' (text box), 'Agency Code' (text box), and 'Time Zone' (dropdown menu showing '(GMT-05:00) Eastern Time (US & Canada)').

9.2.1.2.2 Sites

To add a new site highlight the system name in the tree menu and select the **Add Site button** on the left side of the Ribbon above the Main Navigation menu. A new Site tab will open on the right side of the screen that has four sections that contain a number of fields each.

To open an existing site click the plus sign beside of the system in the menu tree to expand the sites. Double-click the site name to bring up the Site Name tab.

To delete an existing site highlight the site name in the tree menu that you want to remove. Select the **Delete Site button** in the middle of the Ribbon above the Main Navigation menu. It will prompt you by asking if you are sure you want to delete the current selection. Select “Yes” to continue deleting the site or select No to stop the deletion and retain the site.

Always save your changes!

General section

Name – Name of the site used to identify a data logger’s location or overall purpose.

Abbreviation – Enter an abbreviation name of the site for easier reference if the site name is too long

Description - Enter a description of the site, or possibly its location to help describe or reference the purpose of the site. This field is not required to be filled in.

Time Zone – Select the time zone from the drop down list where the site is located.

Enabled – Click the box to add or remove the check to enable or disable the site.

Miscellaneous section

Latitude – Enter a value for the site location (0-90 degrees) as a decimal.

EPA Site – Enter in the four digit code indicating the site of the data collection.

Longitude – Enter a value for the site location (0-180 degrees) as a decimal.

AIRNow Mnemonic – If you use Mnemonic site names for the AIRNow, enter the name in this field. Mnemonic names are used for when you need to report a pollutant by a specific name.

Surrogate Slope – If you are using Ozone Surrogate for the AQS report, enter in the slope for the Ozone Surrogate.

Surrogate Offset - If you are using Ozone Surrogate for the AQS report, enter in the intercept for the Ozone Surrogate.

File Import Code – This field is customer specific and will not apply to your setup and needs to be left blank.

EPA County or Tribal Code – Enter in the three digit code indicating the county or tribe where the data is collected, which can be selected from the drop down list.

Address section – Enter in the street address, city, county, state, and zip code of where the site is located.

Additional Information section – This section is used for the Site Metatags, but it can also be used as a free editor and note field. Click the row with the asterisks at the bottom to add in a new entry.

Name – The required Metatag name should be called SiteIdentifier.

Value – The value should be the EPA Site code for that particular site.

The screenshot shows a web-based form for site configuration. The 'General' section includes fields for Name (with a dropdown menu), Description, Abbreviation, Time Zone, and an Enabled checkbox. The 'Miscellaneous' section contains Latitude, Longitude, Surrogate Slope, Surrogate Offset, EPA Site, and AIRNow Memorium. The 'Address' section includes Street Address 1, Street Address 2, City, County, State Region, and Zip Code. The 'Additional Information' section is titled 'Site Metatags' and features a table with columns for Name and Value, and a plus sign at the bottom to add new entries.

9.2.1.2.3 Parameters

To add a new parameter highlight the site name in the tree menu and select the **Add Parameter button** in the middle of the Ribbon above the Main Navigation menu. A new blank tab will open on the right side of the screen that has multiple fields.

To open an existing parameter click the plus sign beside the system and site in the menu tree to expand each. Double-click the parameter name to bring up the Parameter Name tab.

To delete an existing parameter highlight the parameter name that you want to remove. Select the **Delete Parameter button** on the right side of the Ribbon above the Main Navigation menu. It will prompt you by asking if you are sure you want to delete the current selection. Select “Yes” to continue deleting the parameter or select No to stop the deletion and retain the parameter.

Always save your changes!

Site – The name of the site used to identify a data logger’s location or overall purpose, which is grayed out because it is propagated from the Site configuration screen.

Parameter – Enter the parameter name for a single monitored pollutant, meteorological parameter or other measured entity. This field will be automatically entered if the parameter template field is used.

Parent Parameter – This field is used for parameters that use other settings that form the parameter. Its main use is for data QA. A Parent Parameter can be designated to form relationships that can be used for drill-down in the Data Editor. For example, a primary analyzer pollutant such as NO_x could be a parent and designated diagnostic parameters such as sample flow or box temperature could be children.

Enabled – Click the box to add a check mark to enable the parameter to be used by the software.

Filter From Web Site – This field is for filtering a parameter from appearing on APCD’s public publication engine at <https://www.colorado.gov/airquality/>.

Parameter Template – This field uses the parameters created in the Parameter Template Editor. If this field is used it will propagate all of these settings used to create the parameter. If any of the settings that are brought over from the template are different, you can change any of the field simply by clicking in the field and editing the setting, with the exception of the Parameter Data Type. The Parameter Data Type needs to remain the same as the template that the parameter has been associated with. If the Parameter Data Type is not correct and needs to be changed, it is best to select a different parameter template that reflects the correct Data Type for the parameter to be associated with. If the proper template does not exist, then one should be created with the needed settings for that parameter to be associated with. A template should be used once for one parameter per site. If a template is used for more than one parameter at the same site, it can cause the reports to not function properly as the reports will not know which parameter the template is supposed to be reporting for. There is a template already created for each type of parameter with the specific EPA Parameter Code selected.

Parameter Report Order – Parameters are listed in the reports in the same order that they are shown under each site. If parameters need to be shown in a different order on the reports, this field can be set per each parameter setting the order number in which each one is to appear on the reports. This setting will only be seen in the Monthly report and Daily Summary report.

Additional Information section – This section is used for the Parameter Metatags, but it can also be used as a free editor and note field. Click the row with the asterisks at the bottom to add in a new entry.

Name – The required Metatag name should be called ParmIdentifier.

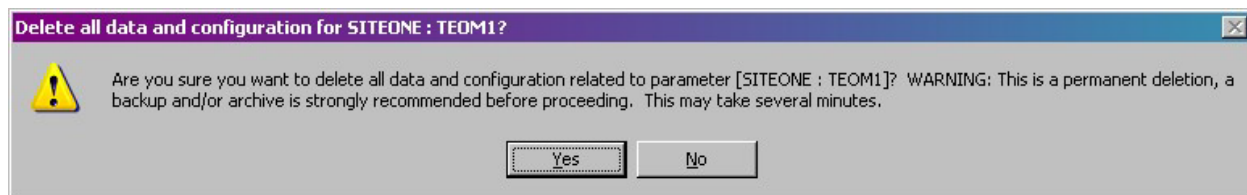
Value – The value should be the EPA Parameter code for that particular parameter.

The remaining fields have already been discussed in the Parameter Template section.

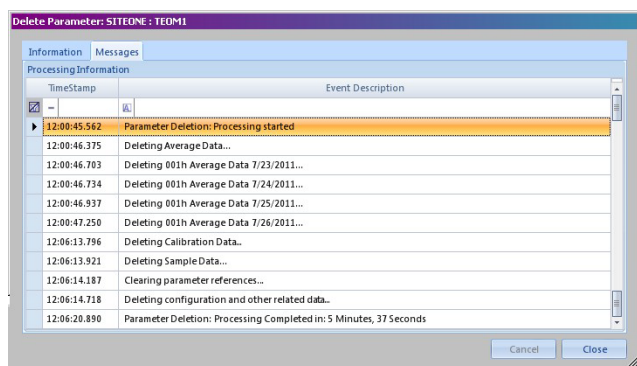
The screenshot shows a web-based configuration interface for a parameter named 'OZONE' at 'Site: SITEONE'. The interface is divided into several sections:

- Basic Information:** Site (SITEONE), Parameter (OZONE), and Parent Parameter (empty).
- Settings:** Enabled (checked), Enable AIRNow Reporting (checked), Filter From Web Site (unchecked).
- Parameter Data Type:** Radio buttons for Average (Continuous) (selected), Composite Sample, and Particulate Sample.
- Description:** Ozone PPM.
- Units and Codes:** Math Equations (if Calculated) (empty), EPA POC (1), EPA Method (321), EPA Units (007 - Parts per million), EPA Parameter (44201 - Ozone), Reported Digits (4), Precision (3).
- Truncation and Graphing:** Truncate Round Rule (Round selected, truncate unselected), Reported Units (PPM), Analyzer Units (if different) (empty), Graph Minimum (0.00), Graph Maximum (50.00), Calibration Span (1.00).
- Limits:** Instrument Detection Limit, Limit Of Quantization, Minimum Detectable Limit, Practical Quantization Limit.
- Reporting:** Parameter Report Order (empty), Totalize in Reports (unchecked), Minimum in Reports (checked).
- Additional Information:** A section for Parameter Metatags with a table containing one row with Name and Value columns, and an asterisk at the bottom to add a new entry.

A parameter cannot be deleted if there is data still attached to the parameter. When deleting a parameter, make sure all other tabs are closed before making the deletion. To delete a parameter expand the site and select the parameter, click the Delete button on the Ribbon at the top and it will ask if you are sure you want to delete the current selection. If OK is selected it will then ask if you are sure you want to delete all the data and configuration attached to the parameter. Selecting “Yes” will permanently delete the parameter and its data. Selecting No will cancel the deletion.



The deletion processes will then start scrolling through data types and time frames as it deletes the data. Once it has finished it will show the status as finished successfully.



9.2.1.3 Data Source Details

To setup the logger information single click Data Source Details from the Configuration Editors menu. This tab has a tree menu that expands each System’s Sites and their Loggers once they have been created. Expand each Logger to show the channels, calibrations, digital events, and average alarms. Each setup is described below.

9.2.1.3.1 Loggers

To add a new logger highlight the Site name in the tree menu then select the **Add button** on the right side of the Ribbon above the Main Navigation menu, and select Logger. A new Logger tab will open on the right side of the screen that has three sub-tabs; Logger, IO Labels, and Math Constants, each of which have multiple sections and fields.

To open an existing logger, click the plus sign beside of the System and the Site in the tree menu to expand each. Double-click the logger name to bring up the Logger Name tab.

To delete a logger highlight the logger name in the tree menu that you want to remove. Select the **Delete button** from the middle of the Ribbon above the Main Navigation menu. It will prompt you by asking if you are sure you want to delete the current selection. Select Ok to continue deleting the logger or select Cancel to stop the deletion and retain the logger. However, the logger cannot be deleted if it has existing channels.

Always save your changes!

Source tab – This tab has two sections.

Source Information section

Site – Grayed out to show it cannot be edited and is propagated from the Site/Parameter configuration screen.

Source Name – This is the data acquisition and control device that collects data from monitoring instruments (sensors), averages it, stores it temporarily, and passes it to the PC on request. Control functions include calibration control, alarms, and digital event programs.

Enabled – The site must be enabled before its configuration information can be downloaded to the data logger. If the site is disabled it will not be polled by Central.

Description – Used to describe specifics about the site or its location.

Retry Attempts – This is the total number of times Central will repeat sending a command string to a data logger in the event of communication problems. The default is 3.

Retry Delay – The amount of time to wait before attempting a communication retry to the logger.

Logger Details section

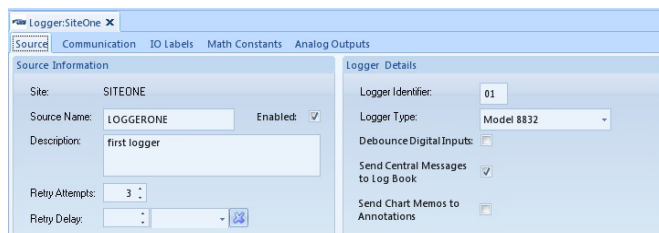
Logger Identifier – The ID that identifies which logger it is, and how it is referenced during the polling.

Logger Type – Select the type of data logger being used at this site.

Debounce Digital Inputs – Select this option for the input line numbers to remain in a new state for at least one second before the new state is recognized. If not selected, digital transitions take effect as soon as they are detected.

Send Central Messages to Log Book – If central messages are left on the logger, and the automatic polling is setup to poll for central message, checking this box will cause those messages to be written into the logbook in the database.

Send Chart Memos to Annotations - Check this box if the chart memos setup in the logger, if polled are to be written as annotations on the data in the database.



Communication tab

Important! Communication Routes section – This feature cannot be completed until the Communication Routes have been created in the Server Configuration setup, Section 9.2.5.2. The Communication Routes can also be configured from the Server Configuration setup screen.

Communication Routes section

Create New Route button – Click the Create New Route button to add the route. This will open a new screen where you select the server by clicking the down arrow and selecting the Executive name from the list. Select if the connection will be made by TCP, Modem, or serial (which is considered direct connection). Click the OK button to save the settings.

Route – Shows the communication option and executive name that was chosen when the route was created. To add a communication route highlight the new line entry by clicking the asterisks in the blue square. Put the mouse in the highlighted field under route and a drop down arrow will appear. Click the down arrow and it will drop down a list of communication options where you select the route created in the Server Config from the list.

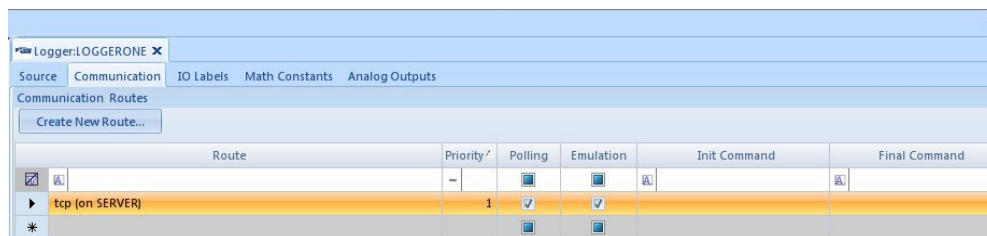
Priority – If you only have one communication route the priority should be set to 1. If you have more than one communication route setup for a site, then the priority has to be set in order of which route is to be used first to communicate with the site. If another site connection is configured, set the priority to 2. Never leave any of the priority fields set to 0.

Polling – Check this box if the communication route selected is to poll the site. If you have only one route to communicate with the site then this box will need to be checked.

Emulation – Check this box if the communication route selected is to be able to link to logger. If you have only one route to communicate with the site then this box will need to be checked.

Init Command – This field is only used for sites with T switch or switch boxes. If a switch box is used at a site that needs a command to know how to set the switches, enter in the command that is to be used. The command will be sent after the modem opens the connection.

Final Command – This field is only used to sites with T switch or switch boxes. Enter in the command that is needed to tell the switch the string is finished. The command will be sent before the connection disconnects.



IO Labels tab

Inputs – Enter in the field the number of inputs that are to be set up. If you are using Modbus do not set this field or it will cause the Modbus columns to become grayed out. It should remain blank.

Outputs – Enter in the field the number of outputs that are to be set up. If you are using Modbus do not set this field or it will cause the Modbus columns to become grayed out. It should remain blank.

Digital Input Labels section

IO Number – A digital input line number from 1 thru 96. This field has been preset.

Name – Input Line 1 thru 96. This field has been preset.

Description – Enter in the name of the Input line or description of what it controls.

Modbus Instrument & Modbus Coil – These two fields are mainly for calibration systems where the digital I/O points are mapped to the logger I/O points. If you do not use Modbus these fields need to remain blank. If you are using Modbus, click the down arrow at the right end of the fields and select from the drop down lists the instrument name and the driver name and coil number that is to be used.

Digital Output Labels section

IO Number – 1 thru 96. This field has been preset.

Name – Output Line 1 thru 96. This field has been preset.

Normally Closed – When a digital output is setup, its state has to be set to normally open or normally closed, so that when the state changes it will be detected. Check the box if the state is normally closed. Leave the box unchecked if the state is normally open.

Description – The name of the Output line or description of what it controls.

Modbus Instrument & Modbus Coil – These two fields are mainly for calibration systems where the digital I/O points are mapped to the logger I/O points. If you do not use Modbus these fields need to remain blank. If you are using Modbus, click the down arrow at the right end of the fields and select from the drop down lists the instrument name and the driver name and coil number that is to be used.

The screenshot shows the 'Logger:LOGGERONE' software interface. It has tabs for 'Source', 'Communication', 'IO Labels', 'Math Constants', and 'Analog Outputs'. The 'IO Labels' tab is active, showing 'Inputs' and 'Outputs' dropdown menus. Below are two tables:

Digital Input Labels					
IO Number	Name	Description	Modbus Instrument	Modbus Coil	
1	Input Line 1				
2	Input Line 2				
3	Input Line 3				
4	Input Line 4				
5	Input Line 5				

Digital Output Labels					
IO Number	Name	Normally Closed	Description	Modbus Instrument	Modbus Coil
1	OutPut Line1	<input type="checkbox"/>			
2	OutPut Line2	<input type="checkbox"/>			
3	OutPut Line3	<input type="checkbox"/>			
4	OutPut Line4	<input type="checkbox"/>			
5	OutPut Line5	<input type="checkbox"/>			

Math Constants tab - math constants can be used to represent parameters in the system that need to be changed only occasionally. The user can configure up to 32 math constants that can be used in equations for math pack channels in the Math Constants configuration screen. Calibration results and base averages can also be written to a math constant.

Number – This field has been preset.

Name – The name of the constant which is referred to as the capital letter K with a number to follow. This field has been preset.

Primary Value – Enter in the constant value that is to be used in the formulas for the math pack channels.

Secondary Pattern – When clicking in this field it brings up a Secondary Input Pattern box to specify which input lines will control the status changing condition.

Secondary Value – Secondary value based on digital inputs can also be defined for the math constants. These were designed for fuel-switching systems, which must constantly adjust the fuel factor and can provide digital inputs representing the exact fuel loaded.

Tertiary Pattern - When clicking in this field it brings up a Tertiary Input Pattern box to specify which input lines will control the status changing condition.

Tertiary Value – Tertiary values based on digital inputs can also be defined for the math constants. These were designed for fuel-switching systems, which must constantly adjust the fuel factor and can provide digital inputs representing the exact fuel loaded.

Description – These fields have been preset.

Number	Name	Primary Value	Secondary Pattern	Secondary Value	Tertiary Pattern	Tertiary Value	Description
1	K01	1	Select Lines	1	Select Lines	1	K01
2	K02	1	Select Lines	1	Select Lines	1	K02
3	K03	1	Select Lines	1	Select Lines	1	K03
4	K04	1	Select Lines	1	Select Lines	1	K04
5	K05	1	Select Lines	1	Select Lines	1	K05
6	K06	1	Select Lines	1	Select Lines	1	K06
7	K07	1	Select Lines	1	Select Lines	1	K07

Analog Outputs tab – Analog outputs are used to output the result of a calculation performed by the Logger. Any channel can be used to drive the outputs, the unit may even be used as a simple voltage to current loop converter if desired (i.e., a current loop output driving the result of a single analog input).

DAC Channel Number – Type in the Digital-to-Analog Converter channel number.

Channel – Click the down arrow and select from the drop down list the channel that will be affected.

Interval – Click the down arrow and select from the drop down list the data type that will be affected.

High Input – The high reading in engineering units of the driving input.

Low Input – The low reading in engineering units of the driving input.

High Output – The high value of the analog output corresponding to the High Input in mA.

Low Output – The low value of the analog output corresponding to the Low Input in mA.

Action On Error – The action to take when the input parameter has been flagged with an error code indicating bad data. Click the down arrow and select from the drop down list:

Ignore - continue to output values normally

Zero - hold output at 0mA

Hold - hold output at the last good output setting

Lowval – hold output equal to 0.0 EU. For instantaneous data, this action is taken when one or more of the following flags exist: R, -, +, A, U, O, M, C, B, F, T, D or P. For an average interval, this action is taken when the < flag is present. A current output can be set to a constant value by setting both the Low Output and High Output fields to the desired value.

DAC Channel Number	Channel	Interval	High Input	Low Input	High Output	Low Output	Action On Error
<input checked="" type="checkbox"/>	-	<	-	-	-	-	<

9.2.1.3.2 Instruments

Direct polling of an instrument is covered in Section 9.2.3.2.

To add a new instrument, highlight the Site name in the tree menu then select the **Add button** on the right side of the Ribbon above the Main Navigation menu, and select Instrument. A new Instrument tab will open on the right side of the screen which has multiple fields.

To open an existing instrument, click the plus sign beside of the System and the Site in the tree menu to expand each. Double-click the instrument name to bring up the Instrument Name tab.

To delete an instrument highlight the instrument name in the tree menu that you want to remove. Select the **Delete button** from the middle of the Ribbon above the Main Navigation menu. It will prompt you by asking if you are sure you want to delete the current selection. Select Ok to continue deleting the instrument or select Cancel to stop the deletion and retain the instrument.

Always save your changes!

Source tab

Source Information section

Site – Defaults to the name of the site the instrument is being created for and is grayed out to indicate that it cannot be changed.

Source Name – Enter in a name that identifies the instrument.

Enabled – Click to check the box if this instrument is to be used.

Description – Enter in a description for the instrument or for what it is used for. This is not a required field and can be left blank.

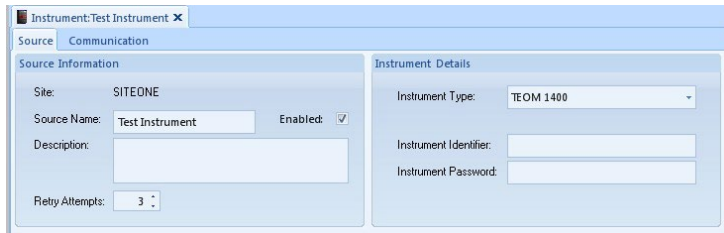
Retry Attempts – This is the total number of times Central will repeat sending a command string to an instrument in the event of communication problems. The default is 3.

Instrument Details section

Instrument Type – Click the down arrow and select an instrument name from the drop down list.

Instrument Identifier – Enter in the identifier number for the instrument.

Instrument Password – Enter in the password for the instrument if it requires one for communication.



The screenshot shows a software window titled "Instrument: Test Instrument" with two tabs: "Source" and "Communication". The "Source" tab is active and divided into two sections: "Source Information" and "Instrument Details".

Source Information:

- Site: SITEONE
- Source Name: Test Instrument
- Enabled:
- Description: (empty text box)
- Retry Attempts: 3

Instrument Details:

- Instrument Type: TEOM 1400 (dropdown menu)
- Instrument Identifier: (empty text box)
- Instrument Password: (empty text box)

Communication tab

Important! Communication Routes section– This feature cannot be completed until the Communication Routes have been created in the Server Configuration setup in Section 9.2.5.2. The Communication Routes can also be configured from the Server Configuration setup screen.

Communication Routes section

Create New Route button – Click the Create New Route button to add the route. This will open a new screen where you select the server by clicking the down arrow and selecting the Executive name from the list. Select if the connection will be made by TCP, Modem, or serial (which is considered direct connection). Click the OK button to save the settings.

Route – Shows the communication option and executive name that was chosen when the route was created. To add a communication route highlight the new line entry by clicking the asterisks in the blue square. Put the mouse in the highlighted field under route and a drop down arrow will appear. Click the down arrow and it will drop down a list of communication options where you select the route created in the Server Config from the list.

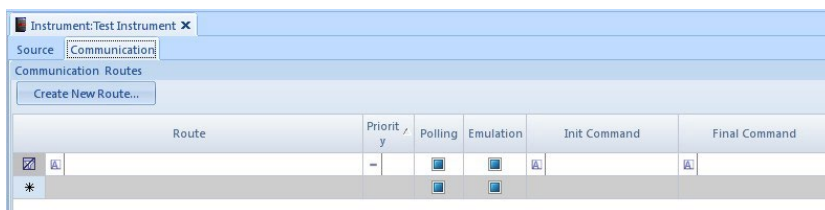
Priority – If you only have one communication route the priority should be set to 1. If you have more than one communication route setup for a site, then the priority has to be set in order of which route is to be used first to communicate with the site.

Polling – Check this box if the communication route selected is to poll the site. If you have only one route to communicate with the site then this box will need to be checked.

Emulation – Check this box if the communication route selected is to be able to link to logger. If you have only one route to communicate with the site then this box will need to be checked.

Init Command – This field is only used for sites with T switch or switch boxes. If a switch box is used at a site that needs a command to know how to set the switches, enter in the command that is to be used. The command will be sent after the modem opens the connection.

Final Command – This field is only used to sites with T switch or switch boxes. Enter in the command that is needed to tell the switch the string is finished. The command will be sent before the connection disconnects.



9.2.1.3.3 Channels

Some effort has been put into normalizing the order channels appear on the data logger. This assists both data management personnel and site operators by unifying the appearance of both the data logger and the selection criteria in reporting and data editing, Sections 9.2.12 and 9.2.8 respectively. Below is the general guidance for channel numbers.

Table 1. Preferred Channel Numbering

Parent	Channel	Parameter
	1	CO_TRACE
	2	CO_RAW
	3	CO_PPB
	4	O3
	5	O3_PPB
	6	O3CAL
	7	NO
	8	NO2
	9	NOx
	10	NOy
	11	SO2
	12	SO2MAX
	13	ACTCONC
	14	ITEMP
	15	WS
	16	RS
	17	WD
	18	RD
	19	SIGMA
	20	RH
	21	TEMPU
	22	TEMPL
CO	23	BIAS VOLTAGE (DC)
	24	INTERNAL TEMP. (degC)
	25	CHAMBER TEMP. (degC)

Parent	Channel	Parameter
	26	Sample Pressure
	27	SAMPLE FLOW (LPM)
	28	AGC INTENSITY (Hz)
	29	Signal Ratio
	30	Coefficient (Slope)
	31	Motor Speed
O3	32	O3 MEASUREMENT (mv)
	33	O3 REFERENCE (mv)
	34	BARO. PRESSURE (in. Hg)
	35	SAMPLE FLOW (cc/min)
	36	SAMPLE CELL TEMP. (degC)
	37	PHOTO. LAMP TEMP. (degC)
	38	BOX TEMP. (degC)
	39	SLOPE
	40	OFFSET
NO2	41	SAMPLE FLOW (cc/min)
	42	OZONE FLOW (cc/min)
	43	HVPS (volt)
	44	REACT. CELL TEMP. (degC)
	45	BOX TEMP. (degC)
	46	PMT TEMP. (degC)
	47	CONVERTER TEMP. (degC)
	48	REAC. CELL PRESS. (in. Hg)
	49	SAMPLE PRESSURE (in. Hg)
	50	NOXSLOPE
	51	NOXOFFSET
	52	NOSLOPE
	53	NOOFFSET
SO2	54	STABIL [<0.075 PPB]
	55	PRESS [AMB \pm 2" Hg A]
	56	SAMP FL [650 cc \pm 10%]
	57	PMT [-20 to 150 mV]
	58	UV LAMP [2000-4000 mV]
	59	LAMP RATIO [30-120%]
	60	STR LGT [<100 ppb]
	61	DRK PMT [200 - 325 mV]
	62	DRK LMP [-50 to +200 mV]
	63	SLOPE [1.0 \pm 0.3]

Parent	Channel	Parameter
	64	OFFSET [< 250 mV]
	65	HVPS [~400-900 V]
	66	DCPS (mv)
	67	RCELL TEMP [50 ± 1 deg C]
	68	BOX TEMP [AMB + ~5 deg. C]
	69	PMT TEMP [7 ± 2 deg. C]
Cal	70	ActualCalFlow
	71	TargetCalFlow
	72	ActualDilFlow
	73	TargDilFlow
	74	TargetConcentration
	75	DCPS
	76	
	77	
	78	TAMB
	79	PAMB
	80	PMFINE_H
	81	PMFINE
	82	BASEMC
	83	REFMC
	84	SMPDEW
	85	AMBDEW
	86	RHAMB
	87	TMNOISE
	88	FTLOAD
	89	TMFREQ
	90	STATUS
	91	PM10LTP
	92	PM10STP
	93	TNNOISE
	94	TNLOAD
	95	TNFREQ
	96	TNSTAT
	97	
	98	
	99	

To add a new channel highlight the logger name in the tree menu and select the **Add button** on the right side of the Ribbon above the Main Navigation menu, and select Add Channels. It will open another menu with channel types to choose from. Once you choose the channel type a new Channel tab will open on the right side of the screen that has three tabs; Channel, Validation, and Misc. The Validation tab has the same setup fields for all channel types, but the Channel and Misc. tabs vary in difference or do not exist for each channel type. Each setup is described below.

To open an existing channel, click the plus sign beside of the system, site, and logger in the tree menu to expand each. Double-click the channel name to bring up the Channel Name tab.

To delete a channel highlight the channel name in the tree menu that you want to remove. Select the **Delete button** from the middle of the Ribbon above the Main Navigation menu. It will prompt you by asking if you are sure you want to delete the current selection. Select Ok to continue deleting the channel or select Cancel to stop the deletion and retain the channel.

Always save your changes!

9.2.1.3.3.1 Standard Averaging channel

Channel tab – Most of the channels will have identical fields on the Channel tab as the Standard channel setup has, but will be noted on the channels description when fields are different. Avoid using equation symbols in an instrument name as it can cause problems with math channels if such a channel name is used in a math equation.

General section

Associated Source – This field is already filled in for you as it is propagated from the logger name, and it does not allow you to edit it.

Channel Type – Click the down arrow and select what type of channel you need for data collection from the drop down list. For a standard type channel select Standard Averaging.

Channel Number – The channel number must match between the data logger and Central in order to poll properly.

Channel Name – Enter the parameter name for a single monitored pollutant, meteorological parameter or other measured entity. The default is Chan and a number that will represent the number of the channel in the channels list.

Enable Channel – Click to check the box to enable the channel to be downloaded to the logger.

Parameter – Click the down arrow and select from the drop down pollutant list propagated from the Site/Parameter configuration editor.

Base Average

Average Interval – The data logger will average instantaneous readings over the Base Avg Interval, which defaults to one minute and is entered in as 001M. To change the interval click the down arrow and select another interval type from the drop down list.

Storage Time – This is the length of time the data logger will store base averages. Use the radio buttons to select the time or click in the field and type in a value from 0 to 999. Click the down arrow and select from the drop down list the time unit: S = seconds, M = minutes, H = hours, D = days.

Extended Averages section

Extended Average 1

Average Interval – The averaging interval for the first extended average defaults to 15 minutes and is entered in as 015M. This is not an average of instantaneous readings, but an average of the Base Average. If the Base Average Interval is 1 minute, then the first extended average may be an auxiliary, hourly, or daily interval type (of which have to be divisible by 60). To change the interval click the down arrow and select another interval type from the drop down list. Sites with meteorology should have a 015M value if possible, however this is superseded if a site has SO2 which requires this value to be 005M for the 5-minute standard.

Storage Time – Same type of field as explained for the base storage time field.

Extended Average 2

Average Interval – The averaging interval for the second extended average defaults to one hour and is entered in as 001H. Do not change this value since regulatory requirements are based on 1-hour averages.

Storage Time – Same type of field as explained for the base storage time field.

The screenshot shows a software window titled "Channel-Ozone" with three tabs: "Channel", "Validation", and "Misc". The "Channel" tab is active, showing the following configuration:

- Associated Source: LOGGERONE
- Channel Name: Ozone
- Parameter: OZONE
- Channel Type: Standard Averaging
- Channel Number: 1
- Base Average: 001m
- Storage Time: 2 : Hour(s)

The "Extended Averages" section contains two sub-sections:

- Extended Average 1:** Average Interval: 015m, Storage Time: 2 : Hour(s)
- Extended Average 2:** Average Interval: 001h, Storage Time: 7 : Day(s)

Validation tab – All of the channels will have identical fields on the Validation tab as the Standard channel setup has. The validation has columns for each of the three average intervals.

Average Level Validation section

Base Average, Extended Average 1, Extended Average 2 sections

High-High Alarm Limit (H) – Enter the high compliance alarm limit in engineering units (exceedance limit) for the base average and each extended average. Any average exceeding this limit will be marked with an “H” alarm flag, which is also marked as invalid data.

High Alarm Limit (h) – Enter the warning level high alarm limit in engineering units for the base average and each extended average. The value can be specified separately for all three averaging intervals. Any average exceeding this limit will be marked with an “h” alarm flag.

Both High and High-High alarm limits can be used to describe an alarm condition for the same parameter. The High alarm limit might be used to define a warning threshold and the High-High alarm limit to specify a standard violation.

Low Alarm Limit (l) – Enter the warning low alarm limit in engineering units for the base average and each extended average. Any average below this limit will be marked with an “l” alarm flag.

Low-Low Alarm Limit (L) – Enter the compliance low alarm limit in engineering units (exceedance limit) for the base average and each extended average. Any average below this limit will be marked with an “L” flag, which is also marked as invalid data.

High ROC Alarm Limit (J) – Rate of Change. Enter the error threshold in engineering units for the difference between one average and the next. Any difference that exceeds this limit will be marked with a “J” alarm flag.

Low ROC Alarm Limit (j) – Enter the warning threshold in engineering units for the difference from one average to the next. Any difference below this limit will be marked with a “j” alarm flag. The alarm limit can be specified separately for all three averaging intervals.

Floor Limit (f) – Enter a minimum value in engineering units for each averaging interval. If the average falls below the floor limit, the average will be marked with an “f” information flag and the average will be replaced with a specified floor value.

Floor Value – Enter the value in engineering units. This field will replace an average in the event the average falls below the floor limit.

Percent Valid – This field specifies the percentage of valid data points required for an average to be marked as valid. Any average that falls below this percentage will be flagged with “<” to indicate it is invalid. Valid values are 1-100. Without exception data is considered valid at 75% so this value must be 75.

Ceiling Limit (c) – Enter a maximum value in engineering units for each averaging interval. If the average exceeds the ceiling limit, the average will be marked with a “c” information flag and the average will be replaced with a specified ceiling value.

Ceiling Value – Enter a value in engineering units. This field is used to replace an average that exceeds the ceiling limit.

Overwrite Math Constant – If a math constant (K01 through K32) is entered in the field, the average interval value will be written to that math constant each time the average is calculated. Click the down arrow and select the constant you want to use from the drop down list. Select a separate math constant for each average interval.

Information Flags section

Digital Info#1 (V), #2 (W), #3 (X), #4(Z) Status – When one or more input status lines cause a V, W, X, Y, or Z information flag to be appended to averaged data, the Digital Info Status (#1 - #5) buttons are used to define the conditions.

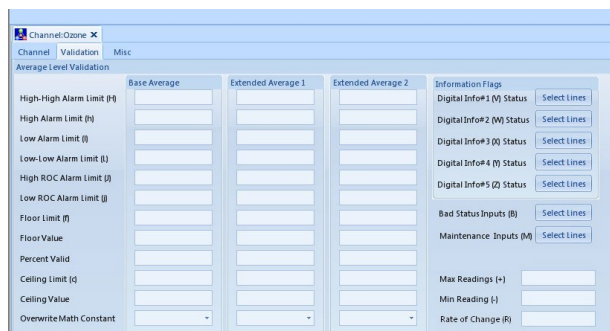
Bad Status Inputs (B) – Use the Bad Status Lines (B) screen to specify which input status lines will be monitored for an off or on state. Entries here determine which input lines will be monitored for data flags. Data will be flagged when the specified Off/On line conditions occur, according to the Or/And selection at the bottom of the screen. When specified lines are in the designated state, the associated data will be marked with a “B” validation flag. This is currently used to indicate that monitors are in non-sample states such as internal zeros not otherwise visible to the data logger.

Maintenance Inputs (M) – The input line pattern in the Maintenance Status Line screen is used to signify maintenance being performed. The associated data will be marked with an “M”, which is a validation flag.

Max Readings (+) – Enter the highest allowable instantaneous reading in engineering units. The data will be flagged with a “+” validation flag if any instantaneous value is equal to or more than this limit. This value should be set to just above scale of the instrument, such as 101 for wind speed when the instrument limit is 100.

Min Reading (-) – Enter the lowest allowable instantaneous reading in engineering units. The data will be flagged with a “-” validation flag if any instantaneous value is equal to or less than this limit. This value should be set just below scale of the instrument, such as -1 for wind speed when the instrument limit is 0.

Rate of Change (R) – Enter the maximum allowable difference from one reading to the next in engineering units. The data that the data logger receives from the analyzers will be flagged with an “R” validation flag if there is a difference that exceeds this limit between one reading and the next. This value is generally set as ten percent of scale.



Misc. tab – Some of the channel types do not have the Misc. tab as an option, but will be noted on the channels description when tab exists and the fields are different. If the channel has been enabled to be downloaded to the logger, and the fields on the Misc. tab are left blank; the logger will fill in these settings in its setup with the minimum settings that it can use, which can cause the stored values to be calculated incorrectly.

Analog Input section

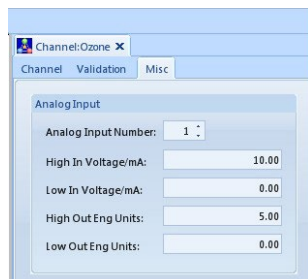
Analog Input Number – Use the radio button to select a number that specifies the actual physical input line. The input numbers do not have to be entered in succession.

High In Voltage/mA – In the text box, enter the high voltage or current input to the data logger from the instrument. Typical values are -10 to +10 V for a voltage card and 4 to 20 mA for a current card.

Low In Voltage/mA – In the text box, enter the low voltage or current input to the data logger from the instrument. Typical values are -10 to +10 V for a voltage card and 4 to 20 mA for a current card.

High Out Eng Units – In the text box, enter the high reading of the instrument, in engineering units, corresponding to the High Input. Enter up to six digits.

Low Out Eng Units – In the text box, enter the low reading of the instrument, in engineering units, corresponding to the Low Input. Enter up to six digits.



9.2.1.3.3.2 Average Math Pack channel

Average math pack channels function like math pack channels except instead of performing calculations on instantaneous readings and then averaging the results, these channels wait until the end of an averaging interval and perform calculations on the averages. Any equation using operators other than addition or subtraction will yield

different results using this method. The Average Math Channel configuration screen is identical to the Math Channel configuration screen except for the channel name, number, and type. The Channel and Validation tabs have the same setup fields as the Standard channel.

Misc. tab

Round Constituents – Check this field to round the sampled constituents to the number of places specified in the Decimal Positioner field before the equation and average are calculated.

Math Pack Equation – Enter an equation in the Equation text box to define the Math Channel result. It can be entered just as it would be on a calculator, but equations must be terminated by an equal sign (=).

General channel – Used to evaluate data in six different channel types: accumulative, maximum, minimum, number of valid runs, percent complete number of runs, and difference – which is a setting that can be used on an 8872 logger only. For example, a general channel can store the maximum five-minute average for each hour. The Validation tab has the same setup fields as the Standard channel. The fields under the General section are the same as the setup of the standard channels minus the interval and storage time fields.

Misc tab

Specific section

Input Average Interval – Click the down arrow and select from the drop down the data type you want the general channel to be based on. For the five-minute SO2 standard, select 005M.

Input Channel Number – Use the radio button and select the channel number of the configured channel that will be the data source.

General Value Duration – Enter how long the data will be collected for the Input Average Interval value. For SO2 five-minute reporting, this should be set to 001H.

General Value Storage Time – Enter the length of time the data logger stores data for this channel.

Data Channel Type – Click the down arrow and select from the drop down list which type of data you want to use; accumulative, maximum, minimum, number of valid runs and percent complete number of runs. For SO2 five-minute reporting, select maximum.

Ignore Input Channel Flag(s) – Click the Channel Flags button and a pick list will open where you select the flags you want to ignore when verifying the validity of the current data point.

Reset Input Status Pattern (Max of 8) – Click the Status Pattern button to select the line numbers and set the Off or On status. When the pattern is met, a reset will be generated to the general channel based on the Data Channel Type at the next Input Average Interval.

9.2.1.3.3.3 GSI channel

Generic Serial Interface channel is a serial communications interface used by the data logger to retrieve data from devices such as analyzers and digital control systems. The interface can receive data strings and stores values into GSI Channels for data collection. The interface can also receive alarm strings or send strings to an analyzer to execute functions like calibrations, either on a repeating timed basis or on a given status input pattern. The Channel and Validation tab are the same as the Standard channel with an additional field on the Channel tab called Hold Data Between Updates? can be set to Yes or No. If Yes is selected it will use the last value received until the next value arrives. The default is No and should remain that way.

Misc tab

GSI Driver Info section

Driver Instrument – Click the down arrow and select the driver from the drop down list that best suits your instrument.

Driver Parameter – Click the down arrow and select the GSI parameter from the drop down a list the driver is associated with.

Serial Port – Use the radio buttons to select the port number that is to be used by using the radio buttons, or you can click in the field and delete the current number and type in the new port number, or you can highlight the current number and type over it.

Using Dongle? - The dongle is used when daisy chaining analyzers in serial, because their response does not include the ID of the analyzer sending the response. The dongle helps the logger figure out which analyzer is sending the response. The default is set to No.

Hold Data section

Hold Data Between Updates? – Select Yes or No if the data is to be help from the previous update to the next. It is defaulted to No because this feature has not been implemented at this time in the logger.

9.2.1.3.3.4 Linear Sigma channel

Takes data from an analog input to calculate a standard deviation/mathematical sigma on three averaging intervals. The base and extended intervals all calculate their averages using instantaneous data, i.e., the extended averages have no dependency on the base average. The Channel and Validation tabs have the same setup fields as the Standard channel.

Misc. tab

WDR Analog Input Number –If using a voltage card it would be the analog input you chose to use.

WDR High In Voltage and WDR Low In Voltage – The high and low input voltage settings of the meteorological equipment.

WDR High Out Voltage and WDR Low Out Voltage – The high and low output EU's of the meteorological equipment.

9.2.1.3.3.5 Math Pack channel

Math pack channels are useful when special functions are required. Math pack channels are used to calculate results by combining information from other channels and/or constants according to user-defined equations. The Channel and Validation tabs have the same setup fields as the Standard channel.

Misc. tab

Round Constituents – Check this field to round the sampled constituents to the number of places specified in the Decimal Positioner field before the equation and average are calculated.

Math Pack Equation - Enter an equation in the text box to define the Math Channel result. It can be entered just as it would be on a calculator, but equations must be terminated by an equal sign (=). CO is a zero-adjusted channel

that uses the formula CO_RAW-K1 where K1 is a math constant overwritten by the result of the most recent zero phase of a performance check. PM2.5 and PM10 have a variety of calculations to incorporate standard temperature and pressure.

9.2.1.3.3.6 Modbus channel

The Modbus channel type is used to take data from a distributed control system over a Modbus link. The Channel and Validation tabs have the same setup fields as the Standard and GSI channels.

Misc. tab

Hold Data Between Updates? – Select Yes or No if the last value received is to be used until the next value arrives.

Modbus tab

Modbus Instrument – Click the down arrow and select from the drop down list the name of the Modbus instrument.

Driver – Click the down arrow and select from the drop down list the driver used to communicate with the instrument.

9.2.1.3.3.7 Vector Wind Speed channel

The Vector Wind Speed Channel computes average wind speed as a vectored average. A corresponding Vector Wind Direction Channel must also be configured to support the Vector Wind Speed Channel. Zero crossovers and 0-540 degree instruments are automatically supported by the data logger. If you have scalar wind channels setup, you can use their inputs for the vector setup as well. The Channel and Validation tabs have the same setup fields as the Standard channel.

The Vector Wind Speed channel uses Equation 1:

Equation 1. Vector Wind Speed

$$VWSP_B \sqrt{\left(\frac{\sum_{i=1}^N WSP_i * \cos WDR_i}{N}\right)^2 + \left(\frac{\sum_{i=1}^N WSP_i * \sin WDR_i}{N}\right)^2}$$

Misc. tab

WSP Analog Input Number –If using a voltage card it would be the analog input you chose to use.

WSP High In Voltage and WSP Low in Voltage – Enter in the high and low input voltage settings of the met equipment.

WSP High Out Voltage and WSP Low Out Voltage – The high and low output EU's of the met equipment.

Companion channel field - Vector Wind Direction Channel. The Wind Direction and Wind Speed channels are companion channels and work off of each other so if the Report Channel Number is 07 for the Wind Speed, then the companion channel of the Wind Direction needs to be 06 or 08. Before this field can be filled in both the vector wind and vector speed channels have to be created and saved, then you can go back and fill in the companion channel field.

9.2.1.3.3.8 Vector Wind Direction channel

The Channel and Validation tabs have the same setup fields as the Standard channel. The Vector Wind Direction channel uses Equation 2:

Equation 2. Vector Wind Direction

$$VWDR_E = \tan^{-1} \left(\frac{\sum_{j=1}^M (\sum_{i=1}^N WSP_i * \sin WDR_i)}{\sum_{j=1}^M (\sum_{i=1}^N WSP_i * \cos WDR_i)} \right)$$

Misc. tab

WDR Analog Input Number –If using a voltage card it would be the analog input you chose to use.

WDR High In Voltage and WDR Low in Voltage – The high and low input voltage settings of the meteorological equipment.

WDR High Out Voltage and WDR Low Out Voltage – The high and low output EU’s of the meteorological equipment.

Companion channel field - Vector WindSpeed Channel. The Wind Direction and Wind Speed channels are companion channels and work off of each other so if the Report Channel Number is 07 for the Wind Direction, then the companion channel of the Wind Speed needs to be 06 or 08. Before this field can be filled in both the vector wind and vector speed channels have to be created and saved, then you can go back and fill in the companion channel field.

9.2.1.3.3.9 Wind Speed channel

The Channel and Validation tabs have the same setup fields as the Standard channel. The Misc tab has the same setup at the Vector Wind Speed channel, minus the Vector Wind Direction Channel field.

The Wind Speed channel uses Equation 3:

Equation 3. Scalar Wind Speed

$$\frac{\sum_{i=1}^N WSP_i}{N}$$

9.2.1.3.3.10 Wind Direction channel

The Channel and Validation tabs have the same setup fields as the Standard channel. The Misc tab has the same setup at the Vector Wind Speed channel, minus the Vector Wind Speed Channel field.

The Wind Direction channel uses Equation 4:

Equation 4. Scalar Wind Direction

$$WDR_B = \tan^{-1} \left(\frac{\sum_{i=1}^N \sin WDR_i}{\sum_{i=1}^N \cos WDR_i} \right)$$

9.2.1.3.4 Calibrations

AirVision refers to any controlled introduction of a known gas to an analyzer as a “calibration”. These are NOT actual calibrations as no alteration is made to the analyzer’s calibration coefficients as a result of the test. They are

performance checks as referenced in any other TSP SOP. In this section, however, the term “calibration” is kept because it is embedded in the software.

To add a calibration highlight the logger name in the tree menu and select the **Add button** on the right side of the Ribbon above the Main Navigation menu, and select Add Calibrations. It will open another menu with calibration types to choose from. Once you choose the calibration type a new Sequence tab will open on the right side of the screen that has three tabs; Sequence, Phase(s), and Alarms(s). The Sequence tab has the same setup fields for all calibration types with the Automatic cal having a couple extra fields, the Phase(s) tab has the same setup for all cal types minus one of the fields on the Instrument Controlled cal, and the Alarms(s) tab has the same setup for all cal types.

To open an existing calibration, click the plus sign beside of the system, site, and logger in the tree menu to expand each. Double-click the calibration name to bring up the Sequence Name tab.

To delete a calibration highlight the calibration name in the tree menu that you want to remove. Select the **Delete button** from the middle of the Ribbon above the Main Navigation menu. It will prompt you by asking if you are sure you want to delete the current selection. Select Ok to continue deleting the calibration or select Cancel to stop the deletion and retain the calibration.

Always save your changes.

9.2.1.3.4.1 Automatic calibration sequence

Sequence tab – Most of the calibrations will have identical fields on the Sequence tab as the Automatic calibration setup has, but will be noted on the channels description when fields are different. Click the disk icon at the very top to save the settings.

Sequence section

Calibration Type – This field is already filled in for you as it is propagated from the calibration type you selected, and it does not allow you to edit it.

Calibration Name – The name you choose to call the calibration sequence. This field has an eight character limit. Typical syntax is xx-SPAN, xx-PREC, and QC-xx where xx is the species being tested.

Enabled – Check for the calibration to be downloaded to the logger.

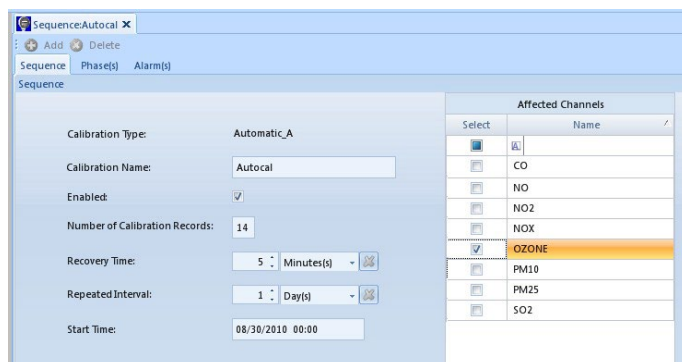
Number of Calibration Records – Determines how many calibration records are stored. The default is 14. Given the frequency of calibration polling, this default is adequate.

Recovery Time – Enter the time required to purge the calibration gases after calibration phases are completed. This function provides a delay before normal sampling and averaging resumes. Use 2 minutes for all species except SO₂, which requires 3 minutes.

Repeated Interval – How often you want the cal to run. Typical configuration is to run a calibration every 002D, so that span and precision level checks run on subsequent days.

Start Time – Click the down arrow and select a date from the drop down calendar when the calibration is supposed to start running. Calibrations should be universally aligned so that each site in the network is running either a precision or a span. Copy and paste a date from an existing calibration to be certain the new calibration will be in alignment with other sites.

Affected Channels – Channels that are affected by or included in the running of the calibration sequence, in which the data for these channels will be marked with a C flag to show that it was collected during the running of the calibration. Click the Select box to put a check mark beside of the channel(s) that are to be affected during the calibration.



Phases(s) tab – Has the same setup for all calibration types minus one of the fields on the Instrument Controlled calibration.

To add a phase click the **Add button** above the Sequence tab, then select Phase from the popup menu and it will put a new row under the columns in the Phases section. Do the same when adding channels to the phases, just choose phase channel instead of phase when the option is given. Click the disk icon at the very top to save the settings.

To delete a phase click the row of the phase you want to delete so that it is highlighted with a right arrow on the left end of the row. Click the **Delete button** above the Phase(s) tab, then select Phase from the popup menu. It will bring up a message box stating that you have selected to delete Phase: (and give the phase name), then ask if you are sure you want to delete. Click “Yes” to delete the phase or click No to retain the phase. Do the same when deleting phase channels, just choose phase channel instead of phase when the option is given.

Phases section

Phase Name – A new phase entry will default with name of New Phase and a number depending on which phase number you are at the time of adding the phase. This phase name can be changed to the phase name desired by the user. TSP convention is xx_SPAN, xx_PREC, xx_ZERO where xx is the analyte being tested.

Phase Number – Use the radio buttons to select the order in which you want the phases to run.

Duration Type – Enter a time to specify how long the affected lines will be switched on for the phase to run. Defaults to five minutes (005M), minimum TSP convention is 010M.

Response Time – Specifies how long data will be averaged during a calibration phase. If the Duration Type is longer than the Response Time, the Response Time occurs at the end of the Duration Type. Referenced in the logger as Data Time. TSP convention is 005M.

Enabled – Check this box to enable the phase to run. If the field is unchecked the phase will not run. Defaults to being disabled on new entries.

Status Pattern – When clicking in this field it brings up a Line Status Pattern box where you can select the lines that will control the calibration phase. You can select up to 8 output lines. If you select more than 8, all of the output lines that are above 8 must be set up in the data logger manually. A list of the input lines and their on/off states that signal the beginning of this phase of an instrument controlled calibration.

Teledyne 700 dynamic gas calibrators have two possible inputs that alter how the Status Pattern correlates. A combination of the first 8 output lines can be used when it is being controlled by a Digital Output card, and the 700 must have a corresponding Sequence Init Input setup. A Modbus entry can be created that starts at coil 00 but sequences on the 700 must start with the corresponding Modbus coil in its title, for example 00_CO_Prec. The latter requires a 700 with an Ethernet interface and firmware capable of accepting Modbus coils.

Level – Applies to those who have the Calibration Adjust Tool to identify the calibration levels, such as zero, span, or precision, regardless of how they are named. This field is also used to allow the Precision phase of a calibration to be identified and reported on the AQS report when the Cal Precision Data Records box is selected on the report query. Click the down arrow and select from the dropdown list, ZERO, SPAN, PREC, 20%, 40%, 60%, or 80%.

Phase Channels section

Channel – Click the down arrow and select a parameter that will be affected by the calibration, from the drop down list. When adding a phase channel the Channel field is blank by default.

Expected Value – Enter a value in this text box to specify the expected value of the calibration for the phase. Enter a number, in engineering units, or a constant (e.g., K3). The expected value is the (numerical) bottle value or the expected calibrator output after dilution. The default is zero for new entries.

Expected Value From Constant – The expected value held in a math constant can be used for the calibration. To use the expected value from a constant click the down arrow and select the constant you want to use from the drop down list. TSP does not use this approach.

Warning Drift Limit – Enter the maximum amount each calibration result is allowed to differ from the expected value, in engineering units or percentage. The default is zero for new entries. This field represents the Warning Drift Tolerance field in the logger. If this field is set in the logger, the logger will put a d flag on the calibration data, which will be polled back and show on the cal data in the Calibration Data Editor and on the Calibration Results report. If you do not want this field to be set in the logger, remove the zero and leave the field blank and it will leave the field in the logger not set when the calibration information is downloaded to the logger.

EV for Auto Correct – This field is for an automatic zero adjustment and is not used by TSP.

Store Calibration Results – Check this box to enable the data point to be stored in the calibration record. Where the data is normally stored, the user may choose that this data point not be stored in the calibration record. This feature may be used when a parameter is in the calibration for correction or write to math pack purposes, but should not be included in calibration records (i.e., if the parameter is not required by regulations to be calibrated). Default is enabled on new entries. Pre-conditioning phases for NOx and SO2 do not store results.

Write Result To Constant – A calibration result can be written to a math constant to be used for other purposes such as in a math pack channel formula. To write the result to a constant click the down arrow and select the constant you want to use from the drop down list. TSP uses this approach for CO zero adjustment. In any CO_Zero phase, the result should be written to K1 (or some other K in the event K1 is used by another algorithm).

Error Method – Enter in the method to be used for calculating calibration error: Difference, Standard, and Linearity. The table in “Calibration Error Calculation” in the data logger manual shows the methods with and without rounding. The default is Difference to mimic the data logger, which shows the actual difference, not a percentage, between the expected value and the actual value. TSP uses Difference exclusively.

The error method calculations the logger performs:

<u>Method</u>	<u>Rounding</u>	<u>Error Calculation Used</u>
Standard	Off	(ABS(Actual – Expected) * 100) / Span

Standard	On	$((ABS(Actual \sim RP - Expected \sim RP) * 100) / Span \sim 3) \sim 1$
Difference	Off	$ABS(Actual - Expected)$
Difference	On	$ABS(Actual \sim RP - Expected \sim RP)$
Linearity	Off	$(ABS(Actual - Expected) * 100) / Expected$
Linearity	On	$((ABS(Actual \sim RP - Expected \sim RP) * 100) / Expected \sim RP) \sim 1$

Where:

ABS = absolute value

Actual = actual calibration result for the parameter

Expected = configured expected value for the parameter

Span = configured calibration span value for the parameter

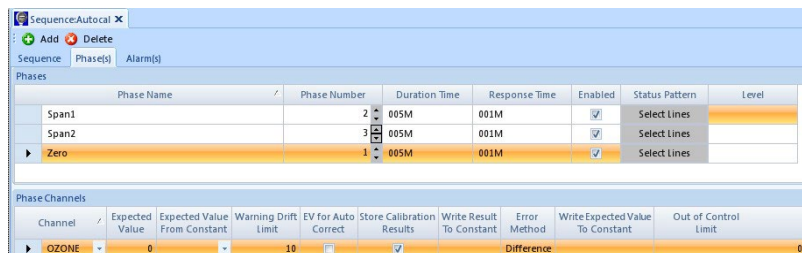
~ = rounding operand (a~b means a rounded to b places)

RP = configured rounding precision for the parameter

Write Expected Value To Constant – The expected value can be written to a math constant to be used for other purposes. To write the expected value to constant click the down arrow and select the constant you want to use from the drop down list.

Out of Control Limit – The maximum value of a calibration result can drift for determining out-of-control status. If a calibration exceeds this value, the data will be flagged with a T in the logger to indicate that it is out-of-control. Mainly used for CEMs monitoring, and almost never used in ambient monitoring. If this field is set in the logger and the calibration drifts past the limit indicated it will mark the calibration data with an o flag, which will be polled back and show on the cal data in the Calibration Data Editor and the Calibration Results report. The logger will also put a T flag on the hourly data that indicated the cal failed, and the only way to remove the T flag from the data is to make the same cal run again and pass. If you do not want this field to be set in the logger leave the field blank and it will leave the field in the logger not set when the calibration information is downloaded to the logger.

Previous problems with this field have resulted in -9999 used instead of a blank. If this is encountered, it does not need to be changed.



Alarms(s) tab – Not used by TSP.

Instrument Controlled, Interactive (Menu), and User Initiated calibration sequences – The settings for the Sequence, Phase(s), and Alarms(s) tabs are the same as the Automatic calibration setup minus a few fields on each. Instrument calibration is initiated and controlled by external equipment, and the current state is sensed via digital inputs, and cannot be manually started or stopped.

Interactive calibration type uses a menu interface to control data acquisition and to move from one calibration phase to another, and is often used for highly manual procedures such as testing opacity instruments against standard filters.

User Initiated is similar to the Automatic Calibration, but there is no automatic start time or repeat time. The calibration begins when Start a Calibration Program is selected from the Cal Configuration Menu on the logger. The timing, control, and phase configuration is the same as for an Automatic Calibration.

Of these, the TSP only currently uses User Initiated calibration sequences for the QC-xx tests, where xx is the analyte being tested.

9.2.1.3.5 Modbus Instruments

For Modbus to be downloaded to the logger the Modbus feature has to pre-exist on the logger. This feature is usually purchased along with the purchase of the logger, but can be purchased after the logger has already been put into use. However, if the logger does not have the Modbus feature, then there is no need to setup Modbus in the software.

To add a Modbus instrument highlight the logger name in the tree menu and select the **Add button** on the right side of the Ribbon above the Main Navigation menu, and select Logger Modbus Instrument. It will open a Modbus Instrument tab on the right side of the screen, which is described below.

To open an existing Modbus instrument event click the plus sign beside of the system, site, and logger in the tree menu to expand each. Double-click the instrument name to bring up the Modbus Instrument Name tab.

To delete a Modbus instrument highlight the instrument name in the tree menu that you want to remove. Select the **Delete button** from the middle of the Ribbon above the Main Navigation menu. It will prompt you by asking if you are sure you want to delete the current selection. Select Ok to continue deleting the instrument or select Cancel to stop the deletion and retain the instrument.

Always save your changes!

Modbus Instrument tab

Modbus Instrument Details section

Modbus Instrument Name – Enter in the name you choose to identify the instrument. TSP convention is the instrument model number such as 200 for a NO_x analyzer or 48i for a Thermo CO analyzer.

Driver Type – Click the down arrow and select appropriate driver for the instrument that will be communicating with the Modbus.

Modbus Code – Enter in the Modbus ID or Slave ID depending on how it has been setup. The Modbus ID is unique for each machine and can be set between 1 and 999.

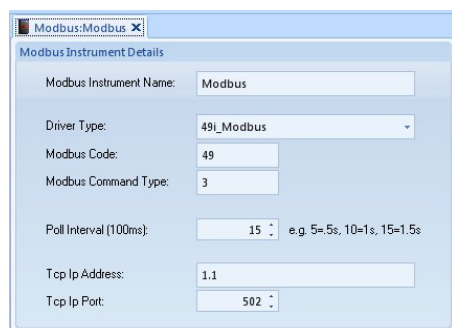
Modbus Command Type – Modbus support commands 1- thru 6, 15 and 16. Only 3, 6, and 16 support floating point operations., which occupy two regular Modbus registers. Enter in the command type needed.

Poll Interval (100ms) – Use the radio buttons or type in the number of intervals it is to poll. The interval is broken down into milliseconds, so depending how you type in the number will depend if it is a partial second or whole second. Entering in 5 equals out to be 500 milliseconds or .5 seconds; 10 would be one whole second.

TCP/IP Address – Enter in the IP address of the instrument and the Modbus ID as both are required with TCP/IP.

TCP/IP Port – The standard TCP/IP that is used and already preset is port 502, and should only be changed under special circumstances.

Many of these fields will be populated when the Driver Type is selected. Normally these values should be accepted.



9.2.1.4 GSI & Modbus Drivers

When opening the GSI Drivers from the Configurations Editors menu it will open a GSI Drivers tab on the right side of the screen which is described below.

The GSI Drivers has been pre-set with the existing GSI and Modbus drivers for various types of instruments. These drivers are needed for GSI and Modbus channels setup in the logger to communicate digitally with the instrument. To add additional drivers select the **New** button on the left side of the Ribbon above the Main Navigation menu. It will put blank fields on the right side of the screen. As drivers are added they will appear in the **GSI Instrument and Entry columns** on the left of the setup screen.

The GSI drivers on Teledyne instruments depend directly on the firmware version and are not guaranteed to be the same between versions. After a data logger has been programmed, you must verify that each channel is working properly and matches the front panel of the analyzer. Adjustments can be made at the site to correct, and new GSI drivers should be created for it on Central for future use. Do not alter existing drivers since analyzers in the field have different firmware versions.

To delete an existing driver highlight the driver name in the GSI Instrument and Entry columns that you want to remove. Select the **Delete** button on the right side of the Ribbon above the Main Navigation menu. It will ask if you are sure you want to delete the selected driver. Select “Yes” to continue deleting the driver, select No to cancel the deletion.

To make changes to an existing unit click the blue box to the left side of the unit name to highlight the row, then make the correction to the particular field needing the change.

After adding in new entries or making any changes in the GSI/Modbus Drivers select the disk icon on the Quick Access Toolbar at the very top to save the new or changed settings before exiting this screen.

GSI Driver Entry tab

Details section

Driver Entry Name – Enter in the name that the driver will be referred to as, and that will likely be what the GSI channel is referred to as well. This is a required field.

Associated Instrument – Click the down arrow and select the instrument name from the drop down list that used with this driver. This is a required field.

Data Field Type – Click the down arrow and select from the drop down list the type of data field that is to be used with the driver. The float type converts ASCII text to a number.

Modbus Register – Has been defaulted to a number associated with the particular Modbus instrument. If this field has not been set and is required or needs to be changed, use the radio buttons or type in the number that is needed.

Data Value Format – Click the down arrow and select from the drop down list the format in which the data that will be parsed into the database.

Autosend section

Send Name – Enter in the name of the GSI channel.

AutoSend Repeat Interval – Enter in the interval time the autosend should repeat. Less than 3 seconds is not usually required and as infrequently as 10 seconds is acceptable.

AutoSend String – The string to be sent out of the GSI port. This string can contain time formatting and time offset characters.

Parsing section

Parse Name – Enter in the tag name to identify the GSI delimited parse entry.

Parse Sync String – One or more characters that signal the beginning of the data stream to be parsed.

Fixed section

Number of Chars of Data – Use the radio buttons or type in the number of characters (0-512) between the end of the Start String and the beginning of the channel data field. Zero indicates that the next byte after the Start String is the first character of the channel data.

Data Field Width – Use the radio buttons or type in the number of characters (0-32) in the channel data field of the incoming stream.

Number of Chars in String – Use the radio buttons or type in the number of characters that is to be received after the last byte of the start string before the string is parsed.

Delimited section

Delimited Chars – Enter in the characters that define the beginning of each new field in the data stream. Up to 32 characters may be entered. If any of the delimiter characters are found, a new field begins with the following character and ends with the character preceding the next delimiter character.

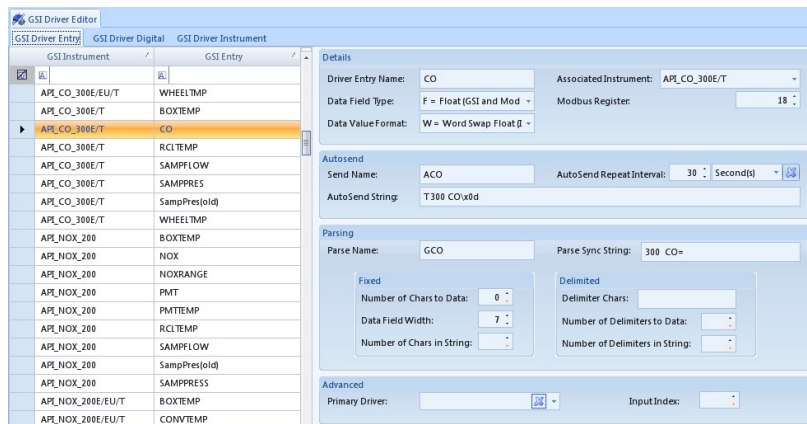
Number of Delimiters to Data – Use the radio buttons or type in the number between the end of the Start (sync) String and the beginning of the Validation String field, 0 to 99.

Number of Delimiters in String – Use the radio buttons or type in the number of delimiters that must be received after the last byte of the start (sync) string before the string is parsed. The configuration of this field allows for more than one GSI Data Parse Entry to contain the same start (sync) string and for data to be received for multiple channels from a single GSI string.

Advanced section

Primary Driver - Click the down arrow and select the driver entry name from the drop down list that used with this instrument.

Input index - Use the radio buttons or type in the number of input indexes.



GSI Driver Digital tab - This tab is only to be used with Modbus. If the logger has not been setup with Modbus, this tab is to remain with its default settings.

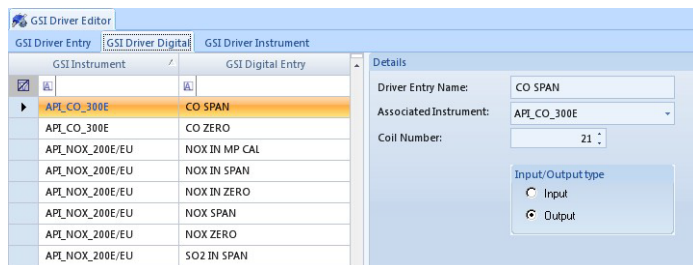
Details section

Driver Entry Name – The driver name is usually associated with the process the instrument is controlling.

Associated Instrument – Click the down arrow and select the name that identifies the instrument.

Coil Number – Using the radio buttons select the coil number this driver is set to.

Input/Output type – Click the circle beside of the correct selection.



GSI Driver Instrument tab – This tab is only to be used with Modbus. If the logger has not been setup with Modbus, this tab is to remain with its default settings.

GSI Instrument Details

Instrument Name – Name of the type of instrument/analyzer being used.

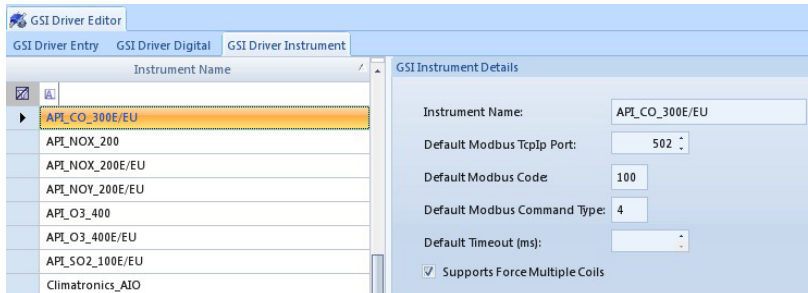
Default Modbus TcpIp Port – The TCP/IP port number the Modbus is using, which is usually Industry Standard Port 502 used to communicate with the slave.

Default Modbus Code – The ID code for the slave address, which is usually 100.

Default Modbus Command Type – The command ID for the function code, which is usually 1, 2, 3, 4, 5, 6, 15, & 16.

Default Timeout (ms): - If a timeout needs to be set click in the field and type in the number or use the radio buttons to enter in the number, which is set in milliseconds.

Supports Force Multiple Coils – Defaults to “enabled” for the use of multiple coils.



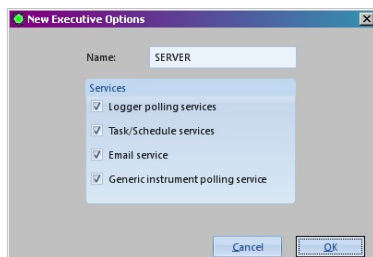
9.2.2 Server Configuration

To setup the server configuration select Server Configuration from the Configuration Editors menu. This tab has a tree menu that expands each System’s Executive (or PC’s) and their communication routes once they have been created. Expand each Executive to show the communication routes and service configuration.

9.2.2.1 Executive

An Executive represents an instance of a computer running the AirVision Server process within its operating system. An Executive represents a point that a Client can log into, and also a point where one or more of the background AirVision processes can run. TSP uses the default Executive as a single instance on each of the two polling servers. Two executives cannot be run on the same server.

To add or remove these settings to the existing executive highlight the executive under the System in the tree menu and select Configure Executive from the right side of the Ribbon above the Main Navigation menu.



To open an existing executive double click on the Executive name below the System in the tree menu. Always save your changes.

Executive tab

General tab

Executive Information section

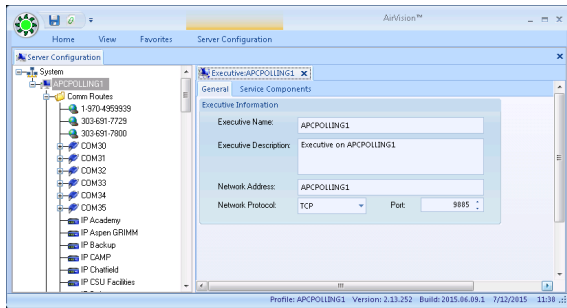
Executive Name – Either APCPolling1 or APCPolling2.

Executive Description – The default is Executive on the pc listed in the Executive Name field, unless it is a new entry then this field will be blank.

Network Address – Either APCPolling1 or APCPolling2.

Network Protocol – The default is TCP and should remain at the default. The other option is HTTP and is a place holder in the software for possible future development.

Port – This port is what the client software uses to communicate with the server software. The default is 9885 and although the field allows you to change the port number it needs to remain at the default setting in order for the client and server to communicate.

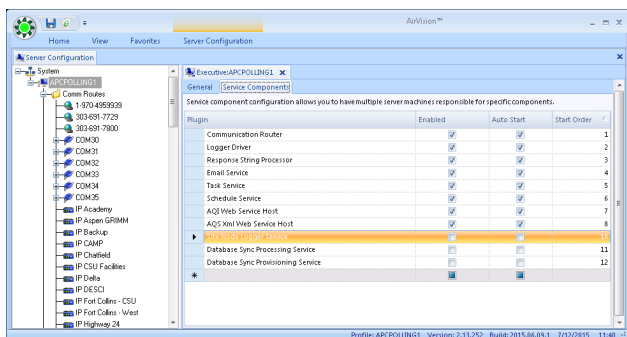


Service Components tab – To enter in a new service component select the blank row with the asterisk, and click the down arrow under **Plugin** to select one of the options from the list. The options in the list are described below. These options are needed for the scheduled programs and all should remain enabled.

Enabled – Check the box for selected service to function on this server. If the box is checked it means that the service is configured. You can disable specific services instead of deleting them.

Auto Start – Check the box for the selected service to be running on startup. In most cases this needs to be set to True, but there are some cases where it can simply call the service when it is needed. For example Data Access can be set for False, and it will simply be invoked whenever someone requests data. However, things like the polling and file processing need to be set to True. As a general rule this column should always be set to True unless directed otherwise.

Start Order – This controls which order the services are started. Enter in the field the order number in which you want the selected service to run. For the polling related services you need to make sure the Communication Router is started first before the services that need communication.



9.2.2.2 Communication Routes

To add communication routes highlight the Executive name under the System in the tree menu. There are three communication routes that can be added from the Ribbon above the Main Navigation menu. TCP Route for

connection via a TCP/IP connection, Serial Route for direct connection including RealPort, and Modem Route from the Central to each of the loggers that use modems.

9.2.2.2.1 Serial Route

To add a serial connection or comport connection, highlight the Executive under the System in the tree menu and select the **Add Serial Route button** from the middle of the Ribbon above the Main Navigation menu. This will open a COM tab on the right side of the screen.

Note: A serial route configured on its own is also considered a “direct connect” for a connection between the PC and the logger using a 9 pin to 9 pin null modem cable. Once a modem is configured on the communication port it can no longer be used as a direct connect, and a phone line and modems must be used to communicate between the PC and the logger.

To open an existing COM expand the Executive and Comm Routes by clicking the plus sign beside them in the tree menu. Double-click on the COM you want to open on the right side of the screen.

To delete an existing COM expand the Executive and Comm Routes by clicking the plus sign beside of them in the tree menu. Click once to highlight the COM you want to delete and select the **Delete button** on the left side of the Ribbon above the Main Navigation menu. It will prompt you by asking if you are sure you want to delete the current selection. Select Ok to continue deleting the COM or select Cancel to stop the deletion and retain the COM.

Always save your changes!

COM tab

General tab

Serial Connection Details section

Route Name – Enter in the name you want to give the comm port.

TSP naming convention for Comm routes is:

COMnn – Modems attached to the server

IP Site Name – TCP/IP connections to data loggers

Serial Site Name – RealPort connections to data loggers

T-Site Name – Modems attached to the data loggers.

Comm Port – Enter in the actual comm port number. Example: COM1.

Baud Rate – Enter in the speed the central modem and port should be talking at. The default 115200 is the rate for communicating with the 8816’s and 8832’s.

Data Bits – Default and setting for best results is 8.

Stop Bits – Default and setting for best results is 1.

Parity – This setting is for RS232 and the default is set to “None”.

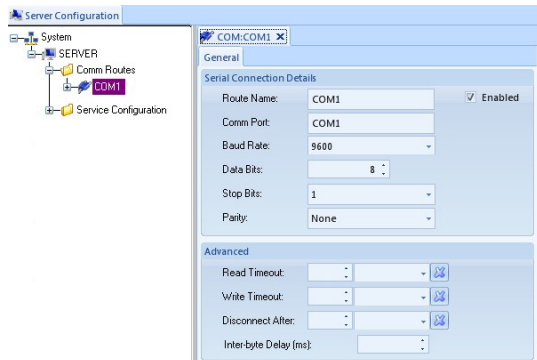
Advanced section

Read Timeout – The timeout used when trying to read the response before it deems the response empty and gives up. If the field is left blank it defaults to 60 seconds. Recommendation is to leave the field blank.

Write Timeout – The amount of time to allow for sending (writing) data to the device. If the field is left blank it defaults to 60 seconds. Recommendation is to leave the field blank.

Disconnect After - The amount of time that should pass before disconnecting in the event that the communication connection has timed out.

Inter-byte Delay (ms) - The amount of time command strings communications will be sent to the logger or instrument with the specified gap between each character. This setting does not affect the responses from the logger or instrument. This will help any sites that drop characters if the command is sent too fast. If the field is blank, it defaults to being null and the entire string will be sent at once. If the field is set to zero, then each character is sent individually with zero milliseconds between them.



9.2.2.2.2 Modem

To add a modem for the comport, highlight the COM under the Comm Routes in the tree menu and select the **Add Modem button** from the right side of the Ribbon above the Main Navigation menu. This will open a Modem tab on the right side of the screen.

To open an existing modem, expand the Executive, Comm Routes, and the COM by clicking the plus sign beside of them in the tree menu. Double-click on the modem you want to open on the right side of the screen.

To delete an existing modem expand the Executive, Comm Routes, and the COM by clicking the plus sign beside of them in the tree menu. Click once to highlight the modem you want to delete and select the **Delete button** on the left side of the Ribbon above the Main Navigation menu. It will prompt you by asking if you are sure you want to delete the current selection. Select Ok to continue deleting the modem or select Cancel to stop the deletion and retain the modem.

Always save your changes!

If a site needs to be forced to use a low baud rate different than the other sites, that restriction can be forced in the setup for the modem at the site on Central (the T-Site Name modem). In the modem profiles define a max baud rate for that modem type. Then when defining the modem route to the slow site, select the Preferred Baud Rate to the slow speed.

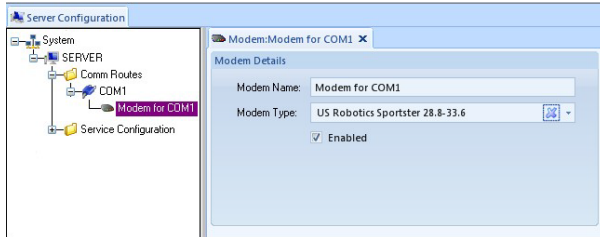
Modem tab

Modem Details section

Modem Name – Enter in the name you want to give the modem.

Modem Type – Click the down arrow and select from the drop down list which modem you are using. If your exact modem is not listed select the closest model in the list to the modem that you have.

Enabled – Check the box to enable this modem to be available for use.



9.2.2.2.3 Modem Route

To add a modem route or phone line for the modem to use highlight the Executive under the System in the tree menu and select the **Add Modem Route button** from the right side of the Ribbon above the Main Navigation menu. This will open a MOD tab on the right side of the screen.

To open an existing modem route expand the Executive and Comm Routes by clicking the plus sign beside of them in the tree menu. Double-click on the modem route you want to open on the right side of the screen.

To delete an existing modem route expand the Executive and Comm Routes by clicking the plus sign beside of them in the tree menu. Click once to highlight the modem route you want to delete and select the **Delete button** on the left side of the Ribbon above the Main Navigation menu. It will prompt you by asking if you are sure you want to delete the current selection. Select Ok to continue deleting the modem route or select Cancel to stop the deletion and retain the modem route.

Always save your changes.

MOD tab

General tab

Modem Connection Details section

Route Name – Enter in the name you want to give the route.

Phone Number – Enter in the phone number of the modem at the logger it is to connect to.

Modem – Click the down arrow and select from the drop down list the modem you set up on the Modem setup screen to use to connect to the logger. “Use any available modem” should only be selected if there are multiple modems connected to multiple COM ports.

Preferred Modem Baud Rate – This field becomes available when “Use any available modem” is selected in the Modem field. This field defaults to “Any”, but is recommended to set it to the baud rate used for the particular sites the particular route was create for.

Redialing Options section

Redial Attempts – Defaults to 1. Use the radio buttons to select the number of attempts to make a connection with the logger modem. **NOTE:** All of the retries throughout the software if set are added up and used as the total retries

when the automatic polling runs. The higher the retries are set, the longer it will take the poll to pass up a site that may not be communicating during the particular poll.

Time Between Redial Attempts - Use the radio button to select the amount of time, or highlight the value and type in the needed time; click the down arrow and select from the drop down list the type of time. The options are Seconds, Minutes, Hours, and Days.

Advanced Options section

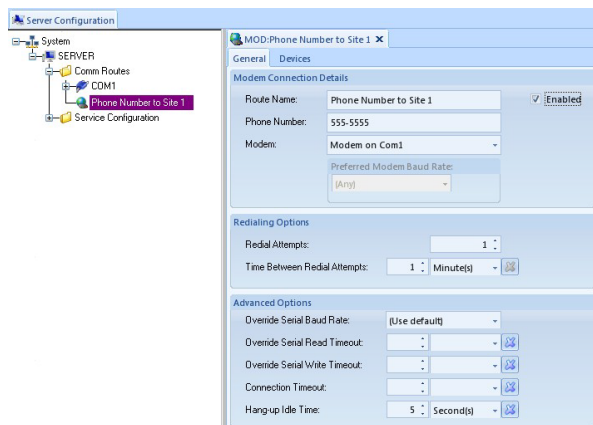
Override Serial Baud Rate – Defaults to “Use default”, which means it will use the baud rate that was set on the modem setup screen. If a baud rate is selected it will be used instead of the baud rate set on the modem setup screen.

Override Serial Read Timeout – If this field is set, this setting will be used rather than the Read Timeout setting for the timeout that is used when trying to read the response before it deems the response empty and gives up. If this field is left blank and the Read Timeout is set, it will use the Read Timeout setting. If the Read Timeout is left blank then it will default to 60 seconds.

Override Serial Write Timeout – If this field is set, this setting will be used rather than the Write Timeout setting for the amount of time to allow for sending (writing) data to the device. If this field is left blank and the Write Timeout is set it will use the Write Timeout setting. If the write Timeout is left blank then it will default to 60 seconds.

Connection Timeout – The amount of time that should pass before disconnecting in the event that the communication connection has timed out.

Hang-up Idle Time – Defaults to 5 seconds. Use the radio button to select the amount of time, or highlight the value and type in the needed time; click the down arrow and select from the drop down list the type of time. The options are Seconds, Minutes, Hours, and Days. Recommendation is to increase the time to make sure that the connection is not disconnected prematurely. If the logger has a delayed response time coupled with the short idle time, it could cause the connection to be terminated before the logger has time to understand the string and then send back a response.



Devices tab – This is used to assign the route to a specific site. Click the Add Device Route button at the bottom and it will put a new entry at the top. Click the down arrow at the right end of the new entry under the Source column and select which site the route is to be assigned to. Set the priority to 1 for the first entry, and check the boxes for polling and emulation. If another site connection is set up, set the priority to 2. Never leave any of the priority fields set to 0.

9.2.2.2.4 TCP Route

To add a TCP connection, highlight the Executive under the System in the tree menu and select the **Add TCP Route button** from the right side of the Ribbon above the Main Navigation menu. This will open a TCP tab on the right side of the screen.

To open an existing TCP route, expand the Executive and Comm Routes by clicking the plus sign beside them in the tree menu. Double-click on the TCP route you want to open on the right side of the screen.

To delete an existing TCP route expand the Executive and Comm Routes by clicking the plus sign beside them in the tree menu. Click once to highlight the TCP route you want to delete and select the **Delete button** on the left side of the Ribbon above the Main Navigation. It will prompt you by asking if you are sure you want to delete the current selection. Select Ok to continue deleting the TCP route or select Cancel to stop the deletion and retain the TCP route.

Always save your changes!

TCP tab

General tab

TCP Connection Details section

Route Name – Enter in the name you want to give the route name.

Enabled – Check the box to enable the TCP connection for use.

Network Address – Enter in the required IP address.

Polling port – The default is 9881, and is required by the logger as it is part of the logger’s code. Although the field allows you to change the port number, it needs to remain at the default setting in order for the logger to communicate with the automatic or manual polling.

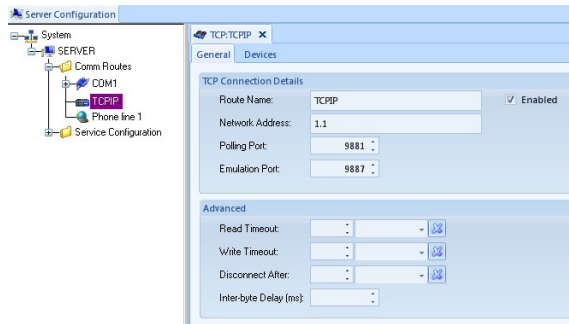
Emulation Port - The default is 9887, and is required by the logger as it is part of the logger’s code. Although the field allows you to change the port number, it needs to remain at the default setting in order for the logger to communicate through the link to logger function.

Read Timeout – The timeout used when trying to read the response before it deems the response empty and gives up. If the field is left blank it defaults to 60 seconds. Recommendation is to leave the field blank.

Write Timeout – The amount of time to allow for sending (writing) data to the device. If the field is left blank it defaults to 60 seconds. Recommendation is to leave the field blank.

Disconnect After – The amount of time that should pass before disconnecting in the event that the communication connection has timed out.

Inter-byte Delay (ms) – The amount of time command strings communications will be sent to the logger or instrument with the specified gap between each character. This setting does not affect the responses from the logger or instrument. This will help any sites that drop characters if the command is sent too fast. If the field is blank, it defaults to being null and the entire string will be sent at once. If the field is set to zero, then each character is sent individually with zero milliseconds between them.



Devices tab – This is used to assign the route to a specific site. Click the Add Device Route button at the bottom and it will put a new entry at the top. Click the down arrow at the right end of the new entry under the Source column and select which site the route is to be assigned to. Set the priority to 1 for the first entry, and check the boxes for polling and emulation. If another site connection is set up, set the priority to 2. Never leave any of the priority fields set to 0.

9.2.2.3 Service Components

To add Service Components they have to be selected when the Executive is configured or by highlighting the Executive and selecting the **Configure Executive button** on the right side of the Ribbon above the Main Navigation menu and selecting the options from the list. The options that appear under Service Components are the Email Service, Import Service, Logger Driver, and Instrument Manager.

The Logger Driver can have a logger added from the Ribbon above the Main Navigation menu, as well as the Instrument Manager can have an instrument added.

9.2.2.3.1 Email Service

GOIT prevents outgoing emails initiated from machine accounts unless an exception is filed. Currently the following settings are the only functional way to send emails from either polling server:

Email Service

Email Service tab

Email Setup section

SMTP Server – 10.48.200.202

Port – 25

From address – donotreply@dphe.state.co.us

Send email per recipient – Unchecked

Failed Email Retry Interval – Blank

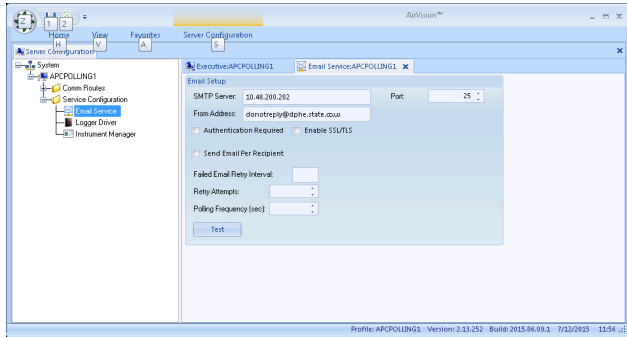
Retry Attempts – Blank

Polling frequency (sec) – Blank

Authentication Required – Unchecked

Enable SSL/TLS – Unchecked

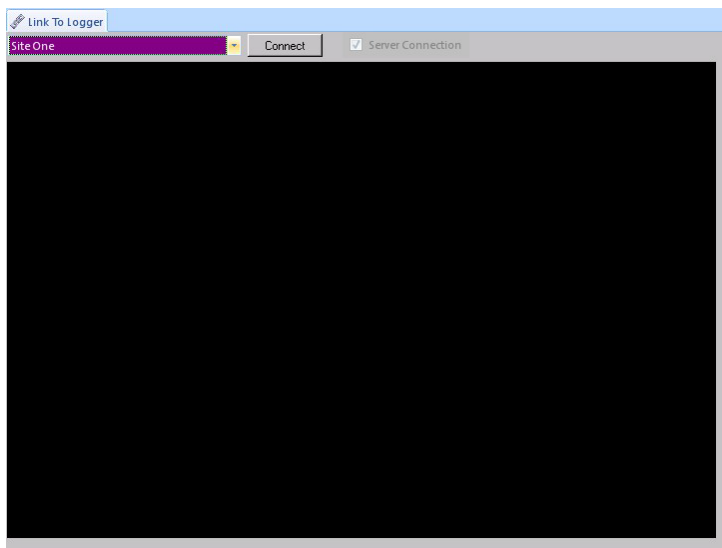
Authentication Criteria section – Only shows if Authentication Required is checked, which should not be the case.



9.2.3 Linking to Logger

To link to the logger single click Link to Logger from the Utilities menu and it will open a Link to Logger tab with a HyperTerminal emulation. Click the down arrow on the blank field and select a logger from the drop down list that you want to connect to. Click the Connect button. The button will then change to disconnect.

The Server Connection field is defaulted to being selected so that the Telnet connection goes through the database to connect to the site. This field will remain grayed out for sites using modem or direct connections, and is only available to be selected or deselected for sites using TCP connections. If deselected the Telnet connection will go straight to the site without going through the database. When you are finished working in the logger, always select “O” to log out of the logger before disconnecting. Once you have logged out click the Disconnect button to end the connection to the logger.



The logger itself does not support an upload command but it has always had the ability to dump to a file. The software now has the capability to parse that file and import it into the software. However, the GSI and Modbus settings cannot be uploaded. These settings will have to be configured manually in the software.

To upload the configuration from the logger, link to the logger and log in. From the menus select **Status** and **Dump Setup**, then select the **Start Recording** button on the Ribbon at the top. On the link to logger screen select **Dump**

All to Curr Port and press enter to start the dump process. When the dump has finished, select the **Stop Recording button** on the ribbon at the top and it will bring up a save screen. Give the file a name and select a location for it to be saved to. Press the escape key until you have returned to the Home Menu, and select O to log out. Click the Disconnect button on the link screen to completely disconnect from the logger.

To import the information open the Data Source Details screen, expand the site and select the logger. Then select the **Parse Config File button** on the Ribbon at the top. Browse to where the file is stored and double click on the file, or select the file and click Open. The parsing will then begin and give a status complete when it is finished.

The resulting configuration must be verified since this method has been highly error-prone.

9.2.4 Logger Download

To download setting to the logger single click Logger Download from the Utilities menu.

Site and Source Name – Select the site and source that you want to download by clicking the blue square to the left side of the name to highlight the row. To download to multiple sites use the shift or control keys while selecting the sites in site and source name list.

Download Type – Select from the list what you want to download to the logger. To select all types to be downloaded you can check each of the boxes manually or you can select the **Select All Download Types button** on the left side of the Ribbon above the Main Navigation menu. Selecting the button again will deselect all download types.

Cold Start - Selecting cold start wipes out everything that is currently stored in the logger, the logger ID included unless set in the EEPROM of the logger, which is current TSP practice. If cold start is selected a disclaimer will come up warning the user of the potential of wiping out the logger's ID. If you do not want to cold start the logger, simple click the enable box again to remove the check and deselect the option.

If the type of channel already existing on the data logger is being changed, from Standard Averaging to GSI for example, Cold Start must be used or the existing channel will NOT be overwritten.

NOTE: If you are unsure if the logger ID is set in the EEPROM, link to the logger and check the first and second screens of the Configure System Parameters menu. Control U will take you to the second screen of the System Parameters configuration.

Time Sync –Downloads the time from the computer clock running Server to the logger for the selected site.

Important Note! – The 8872 data logger receives its time from the computer. The computer is to be set to Mountain Standard Time and is not to be adjusted for daylight savings. The computer clock should appear to be running 1 hour late from March to November (daylight savings time period, clocks move one hour forward). Reference a calendar or other source to determine the exact and end dates of daylight savings.

Calibrations –Downloads all calibrations that have been configured and enabled in the Data Source Details screen for the selected site.

Digital I/O labels –Downloads the labels that have been entered in the Data Source Details screen for the digital input and output lines for the selected site.

Digital Events –Downloads the timed event or triggered event configured and enabled in the Data Source Details screen for the selected site.

Digital Out –Downloads the digital output line configuration for the timed or triggered event for the selected site.

Warm Start – Reboots the logger without removing any of the configuration or data.

Channels –If this box is checked it will allow you to pick specific channels that you want to download to the site selected. If the **All** box is checked it will download all channels that have been configured and enabled in the Data Source Details screen for the selected site.

Average Alarms –Downloads all alarms configured and enabled in the Data Source Details screen for the selected site.

Math Constants –Downloads all math constants that have been configured in the Data Source Details screen, which are mainly used in conjunction with math pack channels, but can be used for other scenarios.

Modbus Master File – Downloads the Modbus configuration to loggers that have Modbus enabled.

Details – Allows specific channels to be selected to be download to the site if the **Channels** box is checked. This area will be grayed out if the channels **All** box is checked.

To download the selected types to the logger select the **Start Download button** on the left side of the Ribbon above the Main Navigation menu.

To abort the download before it has finished sending the configuration select the **Cancel button** on the left side of the Ribbon above the Main Navigation menu.

The **Show Log Viewer** and **Scroll With Messages buttons** are selected by default so the log will appear. If you do not want to view the log you can deselect the buttons on the left side of the Ribbon above the Main Navigation menu.

To clear the results sent back from the logger from the screen select the **Clear Results button** on the left side of the Ribbon above the main Navigation menu.

The results sent back from the logger will be displayed in detailed columns below the query.

Time Initiated – The time the download was started.

Logger – Indicates which logger is being configured.

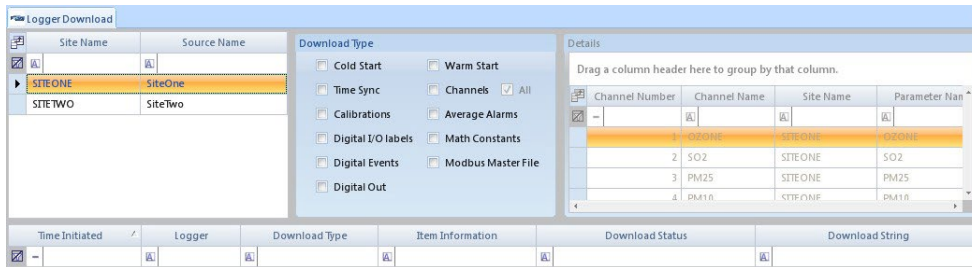
Download Type – Indicates what was sent to the logger.

Item Information – This shows the command string being sent and received.

Download Status - Shows the response sent back from the logger and if it was successful.

Download String – Shows the string being sent to the logger.

While TSP does not use Digital Events or Average Alarms, and in many cases does not use I/O labels, there is no harm in selecting all download types. Indeed this has been standard practice. If a SIGMA channel is being downloaded to a logger it is typical to see a FAILURE for three entries as a result during download. This is because the logger is expecting three time bases and is only receiving two. These failures can generally be ignored but the SIGMA channel should be verified for configuration and function on the data logger.



9.2.5 Manual Poll

Manual polling may be required at times. If a data logger is deployed to a new site or new equipment is added to a data logger, the Scheduled Task Status will not poll until a manual poll is conducted. If a data logger is to be replaced or instrumentation to be taken offline permanently, a manual poll should be conducted just prior to disconnecting or shutting down to ensure all available data is collected.

To run a manual poll single click Manual Poll from the Utilities menu.

Site and Source Name – Select the site and source that you want to poll from by clicking the blue square to the left side of the name to highlight the row. Only one site and source can be selected at a time.

Data Type – Select the type of data you want to retrieve. To select more than one data type hold down the Control key while clicking on the data types needing to be polled.

Date Range – Enter in start and end date range of the data that is stored in the logger that you want to retrieve. The default is the current days date and time when you open the manual poll screen.

Average Interval – Only one average interval can be selected per poll.

To manual poll the selected types from the logger select the **Start Manual Poll button** on the left side of the Ribbon above the Main Navigation menu.

To abort the manual poll before it has finished retrieving the data select the **Cancel button** on the left side of the Ribbon above the Main Navigation menu.

The **Show Log Viewer** and **Scroll With Messages buttons** are selected by default so the log will appear. If you do not want to view the log you can deselect the buttons on the left side of the Ribbon above the Main Navigation menu.

To clear the results sent back from the logger, select the **Clear Results button** on the left side of the Ribbon above the main Navigation menu.

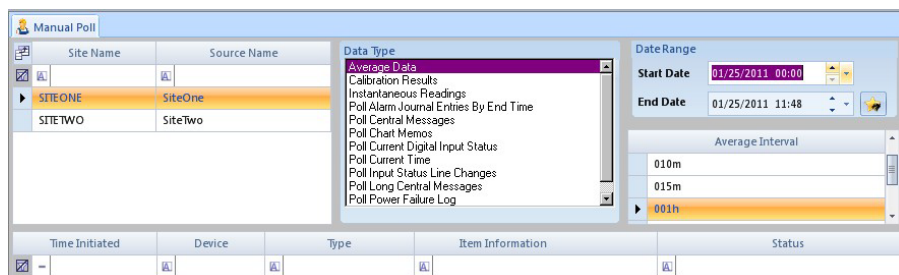
Time Initiated – The time the poll started to contact the logger.

Device – The logger or instrument the poll is connected to.

Type – The type of data the poll is asking for.

Item Information – This shows the command string being sent and received.

Status - Shows the result sent back from the logger, if it was good, successful, or failed with errors.



9.2.6 Task Scheduler

To setup the scheduler single click Task Scheduler from the Configuration Editors menu.

To add a new task, select the **Add** button on the left side of the Ribbon above the Main Navigation menu. A drop down list will open with jobs and tasks to select from, each are described below. You can also add a new task by using the wizard. To run the wizard, select the **Run Schedule Wizard** button in the middle of the Ribbon above the Main Navigation menu.

To open an existing task highlight it and its settings will open in the gray area at the bottom of that screen. To run that task immediately select the **Execute Scheduled Task Now** button on the Ribbon on the Main Navigation menu.

To delete an existing task highlight it and select the **Delete Scheduled Item** button in the middle of the Ribbon above the Main Navigation menu. It will not prompt you before a delete operation, but simply remove the entry.

Always save your changes.

Figure 9 shows the Task Scheduler at the time of authorship. Note that polling data is grouped by COM type and interval. This allows for higher frequency polling of high temporal resolution data without repeated attempts to poll lower temporal resolution data (Minute data is collected every 10 minutes, hourly and 5/15 minute data every hour).

Execute	Task Name	Task Type	Start Time	Repeat Interval	Task Description
<input checked="" type="checkbox"/>	Admin: Check parameter 1-minute average data purge	Purge Average Data Task	03/07/2011 12:00	1D	Purge data in the 1-minute time back for supporting parameters older than 4 months
<input checked="" type="checkbox"/>	APCPOLLING1 Admin Purge Journal Message Task	Purge Journal Messages Task	01/25/2011 00:00	1D	Purge journal messages more than one week old - recommendation to reduce database size from Agilent
<input checked="" type="checkbox"/>	APCPOLLING1 ADVP BAM	Advp Task	04/25/2014 08:00	1H	Hourly ADVP Processing - Delta BAM
<input checked="" type="checkbox"/>	APCPOLLING1 ADVP Exceedance Email Group	Group Task	01/08/2015 06:00	1H	Examines the NO2 and SO2 concentrations for potential exceedances and sends an email in such an event
<input checked="" type="checkbox"/>	APCPOLLING1 ADVP DEMP Range Processing Group	Group Task	03/08/2014 10:30	1H	Flags criteria data if the station temperature is outside a given range (°F flag)
<input checked="" type="checkbox"/>	APCPOLLING1 Daily Time Sync and Central Messages Poll	Group Task	04/05/2012 00:30	1D	Poll for central messages and time sync
<input checked="" type="checkbox"/>	APCPOLLING1 Delta Poll	Instrument Poll Task	05/08/2013 16:55	1H	Instrument Polling Task
<input checked="" type="checkbox"/>	APCPOLLING1 DPHV538 Local Backup Task	SQL Execution Task	07/22/2014 04:20	1D	Processes Specified SQL Statement
<input checked="" type="checkbox"/>	APCPOLLING1 Ebsim direct poll	Instrument Poll Task	04/20/2013 17:25	1H	Instrument Polling Task
<input checked="" type="checkbox"/>	APCPOLLING1 Hourly Telephone Polling	Group Task	04/02/2012 12:00	18M	Group to poll hourly average data (2h, 15m, 1h), calibration, and power failures: between 04:00 and 01:00
<input checked="" type="checkbox"/>	APCPOLLING1 IP Hourly/15m Polling	Group Task	03/26/2015 07:01	1H	IP Hourly Polling
<input checked="" type="checkbox"/>	APCPOLLING1 IP Minute Polling	Group Task	03/26/2015 07:02	10M	IP Minute Polling
<input checked="" type="checkbox"/>	APCPOLLING1 RealPort Hourly/15m Polling	Group Task	03/26/2015 07:01	1H	RealPort Hourly Polling
<input checked="" type="checkbox"/>	APCPOLLING1 RealPort Minute Polling	Group Task	03/26/2015 07:02	10M	RealPort Minute Polling

Figure 10. Current Scheduled Task List

9.2.6.1 Setting up the Task Scheduler Manually

When adding a new task it will put a new row at the bottom of the list at the top in the Scheduled Task Selection section. As you fill in the needed information in the **Task Schedule Details** section and the **Task Details** section, the fields will fill in on the new row in the **Scheduled Task Selection** section at the top.

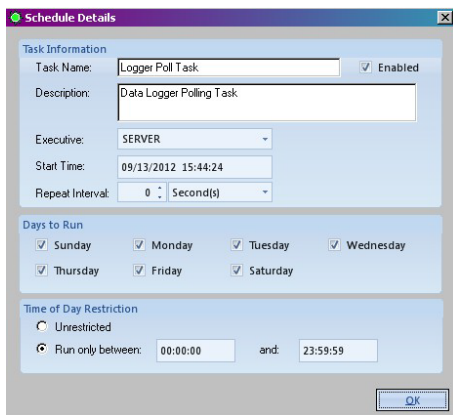
Task Schedule Details Section works the same for all tasks that are scheduled.

Executive – Click the down arrow and select the executive from the drop down list that you want to handle running the task.

Start Time – Use the radio buttons or type in the date and time you want the task to start running, or click the down arrow and click the date on the calendar then set the time. The default is the current date and time that you create the task.

Repeat Interval – Use the radio buttons or type in the number and click the down arrow and select how often the task is to run.

Advanced button – Click the Advance button to open the Schedule Details screen, which will allow the user to set a task to run at specific times or on specific days. The **Task Information section** should keep defaulted information, as this is duplicate information of the Task Schedule Details section from the previous page defining how the task is to run. The **Days to Run section** allows the user to select what days the task is to run on, or deselect the days the task should not run. The **Time of Day Restriction section** can be set to Unrestricted to run at the selected interval for the days selected throughout the whole twenty four hours each day, or it can be set to Run only between specific hours for the selected interval for the days selected.



Under Task Details section, the Basic Task Information section under the “General” tab and the “Advanced” tab are the same for all tasks as described below.

Task Details Section

General Tab

Basic Task Information section

Task Name – This field defaults to the name of the task that you selected from the list, which is what will show in the Task Name column in the Scheduled Task Selection section at the top unless given a different name by the user.

Task Enabled – Click to put a check mark in the box to enable this task to run in the scheduler, and will show in the Task Enabled column at the top.

Task Description – Enter in a short description of how you want to refer to this task. This description will be what shows in the Task Description column in the Scheduled Task Selection section at the top.

Advanced Tab

Retry Options section

Number of Retries - Defaults to 0. Use the radio buttons or type in the number of time you want the poll to try again upon getting errors. **NOTE:** All of the retries throughout the software, if set, are added up and used as the total retries when the automatic polling runs. The higher the retries are set to the longer it will take the poll to pass up a site that may not be communicating during the particular poll. It is recommended that this field remain set to 0.

Interval Between Retries - Use the radio buttons or type in the number and click the down arrow and select how often the time to wait between the retries should be.

Status Logging section

Log Status Messages as: - Click the down arrow and select from the drop down list the degree of message logging desired. Each option increases in the amount of information it provides about the task as it runs. Keep in mind the higher the level the larger the log will become and the more hard drive space it will take up.

Notifications section – To add a notification click the Add... Notification button at the bottom, and it will put a new line entry under Notification Type.

Notification Type – Click the down arrow at the end of the field and select from the drop down list the type of notification that is best for this task to be emailed to users.

Enabled – Click the box to put in a check to enable the notification.

Notification Description – Defines the notification type that has been selected.

The screenshot shows a 'Task Details' window with two tabs: 'General' and 'Advanced'. The 'General' tab is active. Under 'Retry Options', there is a 'Number of Retries' spinner set to 0 and an 'Interval between Retries' dropdown menu. Under 'Status Logging', there is a 'Log Status Messages as:' dropdown menu. Below these is a 'Notifications' section with a table. The table has columns for 'Notification Type', 'Enabled', and 'Notification Description'. There is one row in the table with a checkmark in the 'Enabled' column and a small icon in the 'Notification Description' column.

9.2.6.1.1 Adding a Logger Poll Task

Logger Poll Options section

Logger - Click the down arrow and select the logger from the drop down list that you want to retrieve data from.

Logger Command - Click the down arrow and select the type of data from the drop down list that you want to retrieve from the logger.

Average Interval - Click the down arrow and select the interval type for the data from the drop down list that you want to retrieve from the logger.

9.2.6.1.2 Adding a Scheduled Report Task

Report Task Options section

Report – Click the down arrow and select from the drop down list of reports which report you want this task to automatically run.

Configure Report Query button – Clicking this button will bring up a Query Designer screen. Click Ok at the bottom of the screen to save the settings. If no settings are selected on this screen, then the default selection for the report will be all of the sites and parameters that are enabled and qualify for the type of report selected.

Date Range Selection section

Either select a preconfigured range or use the Fixed Date Range radio and enter specific dates.

Parameter Selection section – Select the site and parameter that is to be included on this report.

Average Interval section – Select the type of data that is to be included on this report.

Query String section – Shows the string being used to create this report. If you use the Clear Selection button it will remove the string and it cannot be brought back without being manually typed in or the task deleted and recreated.

Query Option Switches section – Only available for appropriate reports.

Site Name	Parameter Name	Parameter Template
Site One	CO	CO
Site One	NO	NO
Site One	OZONE	OZONE
Site One	RAINFALL	RAINFALL
Site One	SIGTHETA	SIGTHETA
Site One	VWDR	VWDR
Site One	VWSP	VWSP

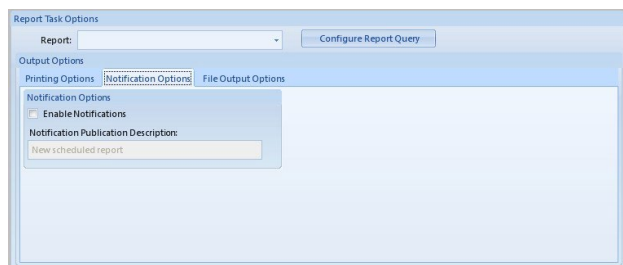
Output Options section

Printer Options tab – The TSP does not automatically print reports, this option should not be enabled.

Notification Options tab

Enable Notifications – Check the box to enable if you want this report to show in the Notification Subscriptions editor.

Notification Publication Description: - Enter in the name of the report the way you want it to show in the Notification Subscription editor. Be specific.



File Output Options tab – The TSP does not use this option and it should not be enabled.

9.2.6.1.3 Adding a Journal Message Purge Task

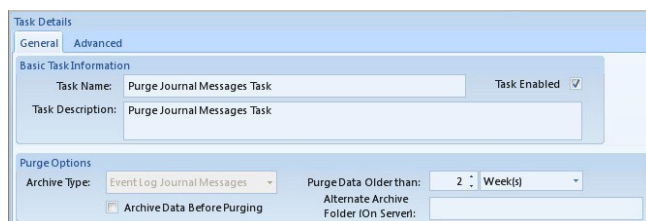
TSP purges journal messages every night at midnight, purging anything older than one week. Generally, journal messages are only useful in the near term.

Purge Options section

Archive Type – Should be grayed out unless Archive Data Before Purging is checked. There is no need to archive this data.

Purge Data Older Than: - TSP purges data older than 1 week.

Archive Data Before Purging – Leave unchecked.



9.2.6.1.4 Adding an Average Data Purge Task

Purging of data has to be done for more than twenty four hours. If it is set to purge less than twenty four hours the data will not purge.

The TSP purges diagnostic data after six weeks. Criteria pollutant and meteorological data are not purged.

Purge Options section

Archive Type – This field is defaulted to Average Data and cannot be changed.

Purge Data Older Than: - Use the radio buttons or type in the number and time frame you want the purge to go back to before purging the data. Default is three years.

Archive Data Before Purging – Click to check this box if you want to archive the data before purging it.

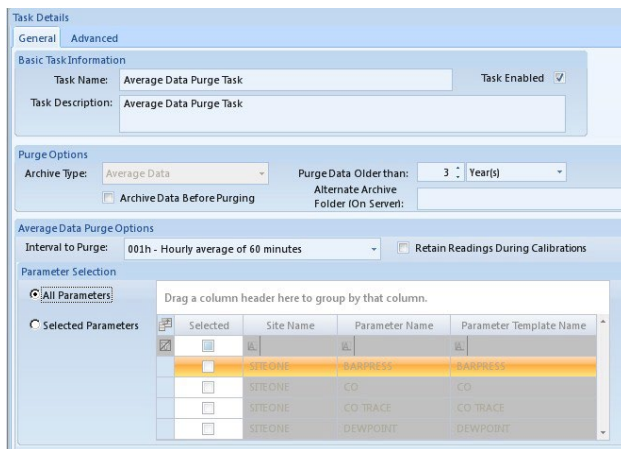
Alternate Archive Folder (On Server) – Enter in the path to the location of where the data files are to be archived. They will be archived in XML format.

Average Data Purge Options section

Interval to Purge – Click the down arrow and select the data type from the list that is to be purged.

Retain Readings During Calibration – Check the box if data marked with a C flag for calibration should not be deleted.

Parameter Selection section – Select between All Parameters or Selected Parameters which will allow you to pick which parameter to delete the data for.



9.2.6.1.5 Adding a New Task Group

Task Groups allow multiple tasks to be group together in one polling process instead of multiple individual tasks. Tasks can be define to run a groups in parallel, sequentially, or as sub-tasks of other task groups to allow mixing of parallel and sequential operations.

Add Sub Task button – To add a new sub task to the Task Group click this button and select the task from the drop down list.

Delete Selected Sub Task button – To remove a task from the Task Group select the task at the bottom under Sub Task and click the Delete Selected Sub Task button.

Group Options section

Execute Tasks In Parallel – Click to check this box if you want all sub-tasks to run at the same time and the execution order to be ignored.

Sub Tasks section

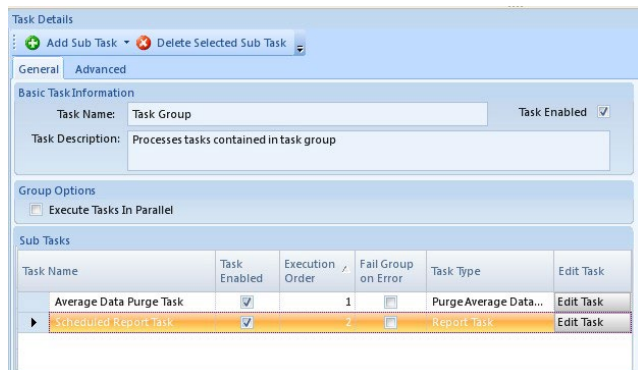
Task Name – Displays the name of the task that was selected from the Add Sub Task button drop down list.

Task Enabled – Click the check the box to enable the sub task is to run under the Group Task.

Execution Order – Enter in the number to set the order that each sub task is supposed to run. **Fail Group on Error** – Click to check this box if you want the whole Task Group to fail or cease to run, in the case of an error.

Task Type – Indicates that each of the sub tasks are part of one group task.

Edit Task – This is a button that if clicked will bring up another window with the same fields that are under Task Details on the main Task Scheduler screen.

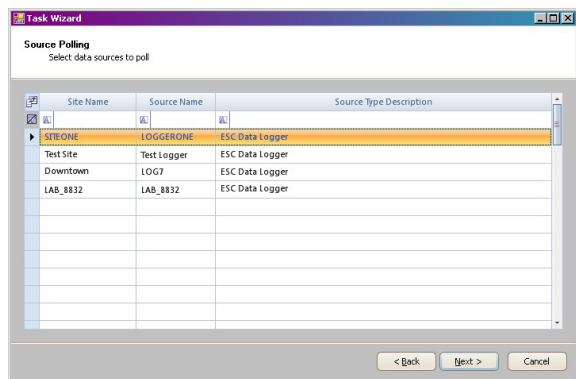


9.2.6.2 Setting up the Task Scheduler Using the Wizard

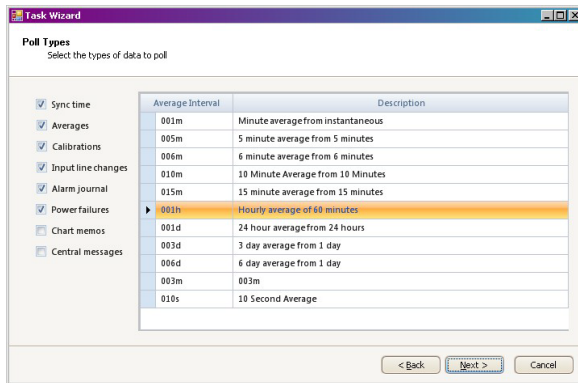
To create a task using the wizard, select the Run Schedule Wizard in the middle of the Ribbon above the Main Navigation menu. This will open a Task Wizard window asking you to create a new task. Follow the steps on each screen. The wizard can also be run by selecting Task Wizard from the Utilities menu and it will open the wizard in a separate window.

Click Next to begin the setup through the wizard.

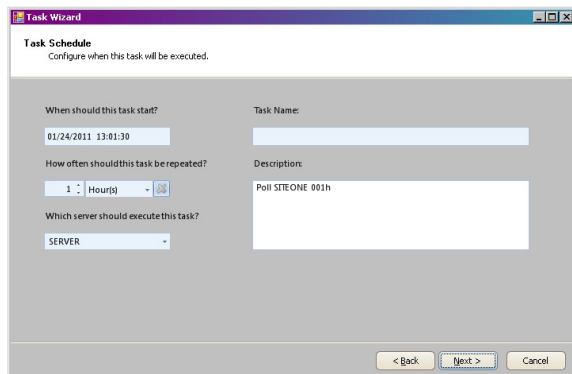
Select the site and logger that is to be polled. Use the Shift key or the Control key to select more than one site.



Select the type of the data that is to be polled. Use the Shift key or the Control key to select more than one site.



Enter in the date and time the task is to run, how often it is to run, and which Executive will be running the task.



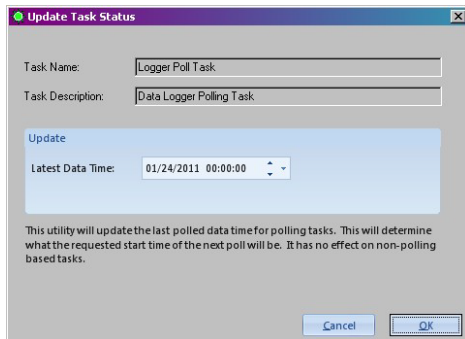
Click Next to create the task in the scheduler. After clicking finish the wizard will close and the task will now be in the Task Scheduler grid.

9.2.6.3 Executing a Scheduled Task Manually

To execute a task manually select the task by clicking in the blue square on the left side of the task to highlight the row under the Scheduled Task Selection. Then select the **Execute Scheduled Task Now** button of the right side of the Ribbon above the Main Navigation menu.

9.2.6.4 Editing the Range Time on a Polling Task

The starting time for which the server polls data from the data logger can be changed by selecting the polling task and click the Update Task Status button on the Ribbon. It will bring up an Update Task Status window where you can change the date and/or time, click OK then click “Save” before exiting the Task Scheduler.



9.2.7 Scheduled Task Status

To open the task statuses single click Scheduled Task Status from the Utilities menu. Scheduled Task Status gives the status of any task that is scheduled to run in the Task Scheduler such as polling, printing reports, filling in data gaps, etc.

Refresh Options section

Refresh Status Automatically – Click to check the box if you want the refresh of the statuses to run automatically.

Refresh Interval: __Seconds - Used the radio buttons to set how many seconds should pass before the automatic refresh runs. Default is 30 seconds.

Name – Gives the name of the Executive and the name of the tasks setup for that Executive to handle and the date and time the task started to run.

Type – Shows if the name is an executive or a task and the type of task.

Status – Gives the status of the task. Status colors indicate:

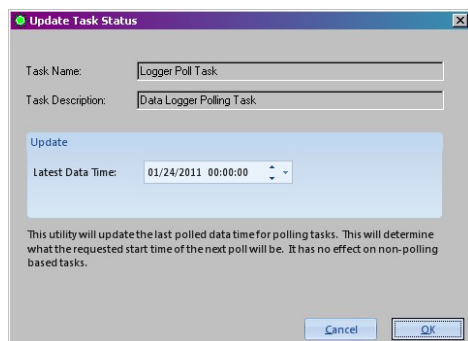
Green = Task completed successfully. **Yellow** = Task completed with warnings. **Orange** = Task is currently running. **Red** = Critical error was unhandled by the task processor. **Gray** = Task is Disabled. **Cream/Tan** = Task has Never Executed.

Last Start Time – Shows the date and time when the task last started.

Last End Time – Shows the date and time when the task last ended.

Last Successful Run – Shows the date and time when the task last ran successfully.

Latest Data Time – Shows either the most recent found data time or the data time given by the Update Task Status button.



Task Status Message – Shows the first error in the group, or why a task is disabled.

Name	Type	Status	Last Start Time	Last End Time	Next Run Time	Last Successful...	Latest Data Time	Task Status Message
[Admin Purge Journal Message Task] Start: 1/15/12 00:00:00, Repeat:0010	Purge Journal Messages Task	Success	7/12/15 00:00:01	7/12/15 00:00:27	7/13/15 00:00:00	7/12/15 00:00:01		
[ADVP BAP] Start: 4/15/14 08:00:00, Repeat:000H	Advp Task	Success	7/12/15 13:00:00	7/12/15 13:00:02	7/12/15 14:00:00	7/12/15 13:00:00		
[ADVP Exceedance Email Group] Start: 1/20/15 06:00:00, Repeat:001H	Group Task	Warning	7/12/15 13:00:00	7/12/15 13:00:03	7/12/15 14:00:00	7/12/15 13:00:00		ADVP Rule [NO2 Exceedance] [7/12/2015 12:00:00 PM] [3] sites were not processed and will be retried.
[ADVP TRMP Range Processing Group] Start: 3/20/14 10:10:00, Repeat:001H	Group Task	Warning	7/12/15 12:10:01	7/12/15 12:10:10	7/12/15 13:10:00	7/12/15 12:10:01		ADVP Rule [Temp Range - MC3] [7/12/2015 11:00:00 AM] [6] sites were not processed and will be retried.
[Daily Time Sync and Central Messages Poll] Start: 4/5/12 00:30:00, Repeat:001D	Group Task	Exception	7/12/15 00:30:00	7/12/15 00:40:34	7/13/15 00:30:00	7/10/15 00:30:00		Task [Device polling] Task [Logger [630HELI] polling tasks]. Task Runner returned error: Task [Poll [630HELI] Time Sync] - CSHELTC returned error [Source:CSHELTC, CommandType=DevicePoll,CurrentTime=8/6/12,TimeRange=9/12/2015 12:30:00 AM to 7/12/2015 12:30:00 AM] for Command [An execution occurred while processing the poll].
[Delta Poll] Start: 5/30/13 16:55:52, Repeat:001H	Instrument Poll Task	Success	7/12/15 12:55:52	7/12/15 12:57:01	7/12/15 13:55:52	7/12/15 12:55:52	7/12/15 13:00:00	
[DPHEV90 Local Backup Task] Start: 7/22/14 04:20:00, Repeat:001D	SQL Execution Task	Disabled	7/22/14 12:35:45	7/22/14 12:45:46				Timeout expired. The timeout period elapsed prior to completion of the operation or the server is not responding.
[Eban direct poll] Start: 6/13/13 17:25:05, Repeat:001H	Instrument Poll Task	Disabled	7/17/13 08:25:22	7/17/13 08:25:28		7/16/13 14:25:21	7/16/13 14:10:00	Attempt(s) to route the command to the database [Saguache Eban] were unsuccessful, Exception Code: COMPL_UNABLE_TO_CONNECT
[Hourly Telephone Polling] Start: 4/2/12 12:00:20, Repeat:030M	Group Task	Running	7/12/15 13:00:20		7/12/15 13:30:20	7/12/15 11:00:21		
[P Hourly (15m Polling)] Start: 3/14/15 07:01:00, Repeat:001H	Group Task	Warning	7/12/15 13:01:00	7/12/15 13:01:35	7/12/15 14:01:00	7/12/15 13:01:00		RULE_ID End time data not found for command [Source=RULE_ID, CommandType=PollAverage,Flags=56, AverageInterval=001h, TimeRange=7/12/2015 11:00:00 AM to 7/12/2015 12:00:00 PM]
[P Minute Polling] Start: 3/16/15 07:02:30, Repeat:010M	Group Task	Running	7/12/15 13:02:31		7/12/15 13:12:30	7/12/15 12:42:30		
[RealPort Hourly (15m Polling)] Start: 3/16/15 07:01:00, Repeat:001H	Group Task	Exception	7/12/15 13:01:00	7/12/15 13:01:50	7/12/15 14:01:00	7/10/15 03:01:01		Task [Device polling] Task [Polling on Serial Marine Street]. Task [Logger [MarineSt] polling tasks]. Task [Poll [MarineSt] 001h Averages]. Attempt(s) to route the command to the database [MarineSt] were unsuccessful, Exception code: COMPL_UNABLE_TO_CONNECT
[RealPort Minute Polling] Start: 3/16/15 07:02:30, Repeat:010M	Group Task	Running	7/12/15 13:02:30		7/12/15 13:12:30	7/10/15 03:02:30		
[Device polling]	Group Task	Running	7/12/15 13:02:30		7/12/15 13:02:30	7/10/15 03:02:31		
[Polling on Serial Aloup]	Group Task	Disabled	5/27/15 08:22:31	5/27/15 08:23:09		5/27/15 06:42:31		Task [Logger [Aloup_PO] polling tasks]. Task [Poll [Aloup_PO] 001m Averages]. Attempt(s) to route the command to the database [Aloup_PO] were unsuccessful, Exception code: COMPL_UNABLE_TO_CONNECT
[Polling on Serial Aspen Park]	Group Task	Running	7/12/15 13:02:30		7/12/15 13:02:30	7/12/15 12:52:32		
[Polling on Serial Colorado National Monument]	Group Task	Running	7/12/15 13:02:30		7/12/15 13:02:30	7/12/15 12:52:32		
[Polling on Serial Colorado College]	Group Task	Success	7/12/15 13:02:30	7/12/15 13:02:47	7/12/15 13:02:30	7/12/15 13:02:30		
[Polling on Serial Greeley TRM]	Group Task	Success	7/12/15 13:02:30	7/12/15 13:02:43	7/12/15 13:02:30	7/12/15 13:02:30		
[Polling on Serial Longmont]	Group Task	Success	7/12/15 13:02:30	7/12/15 13:02:42	7/12/15 13:02:30	7/12/15 13:02:30		
[Polling on Serial Marine Street]	Group Task	Exception	7/12/15 13:02:30	7/12/15 13:02:49	7/12/15 13:02:30	7/10/15 03:02:32		Task [Logger [MarineSt] polling tasks]. Task [Poll [MarineSt] 001m Averages]. Attempt(s) to route the command to the database [MarineSt] were unsuccessful, Exception code: COMPL_UNABLE_TO_CONNECT
[Polling on Serial Powell]	Group Task	Success	7/12/15 13:02:30	7/12/15 13:02:31	7/12/15 13:02:30	7/12/15 13:02:30		
[Polling on Serial South Boulder Creek]	Group Task	Success	7/12/15 13:02:30	7/12/15 13:02:40	7/12/15 13:02:30	7/12/15 13:02:30		
[Polling on Serial Welch]	Group Task	Success	7/12/15 13:02:30	7/12/15 13:02:51	7/12/15 13:02:30	7/12/15 13:02:30		

To view the Journal Message Log for one specific task, without having to run the complete log from the Reports menu, select the **View Log Messages** button on the Ribbon above the Main Navigation menu. This will bring up another window that looks similar to the Log Viewer.

Time	Event Type	Message
05/14/2012 11:04:34.470	Communication	<<< Response [SiteOne/Logger (172.16.1.160-9881)]: @01a5601001M13509400 1508/5602001M1350...
05/14/2012 11:04:34.500	Communication	>>> Requesting [SiteOne/Logger (172.16.1.160-9881)]: @01a bb\$
05/14/2012 11:04:34.923	Communication	<<< Response [SiteOne/Logger (172.16.1.160-9881)]: @01a5601001M135091400 1508/5602001M1350...
05/14/2012 11:04:34.953	Communication	>>> Requesting [SiteOne/Logger (172.16.1.160-9881)]: @01a bb\$
05/14/2012 11:04:35.423	Communication	<<< Response [SiteOne/Logger (172.16.1.160-9881)]: @01a5601001M135092400 1508/5602001M1350...
05/14/2012 11:04:35.470	Communication	>>> Requesting [SiteOne/Logger (172.16.1.160-9881)]: @01a bb\$
05/14/2012 11:04:35.920	Communication	<<< Response [SiteOne/Logger (172.16.1.160-9881)]: @01a5601001M135093400 1508/5602001M1350...
05/14/2012 11:04:35.920	Communication	>>> Requesting [SiteOne/Logger (172.16.1.160-9881)]: @01a bb\$
05/14/2012 11:04:36.390	Communication	<<< Response [SiteOne/Logger (172.16.1.160-9881)]: @01a5601001M135094400 1508/5602001M1350...
05/14/2012 11:04:36.437	Communication	>>> Requesting [SiteOne/Logger (172.16.1.160-9881)]: @01a bb\$
05/14/2012 11:04:36.860	Communication	<<< Response [SiteOne/Logger (172.16.1.160-9881)]: @01a5601001M135095400 1508/5602001M1350...
05/14/2012 11:04:41.853	Information	Finished task: 1Minute
05/14/2012 11:04:42.117	Information	Starting task: Cal
05/14/2012 11:04:42.133	Communication	>>> Requesting [SiteOne/Logger (172.16.1.160-9881)]: @0146ALL ALL 00135051500135100442[V]Y...
05/14/2012 11:04:42.210	Communication	<<< Response [SiteOne/Logger (172.16.1.160-9881)]: @01a46COCAL ZERO 05135050001.192815781...
05/14/2012 11:04:42.273	Information	Finished task: Cal

9.2.7.1 Executing a Scheduled Task Manually

To execute a task manually select the task by clicking in the tan square on the left side of the task to highlight the row. Then select the **Execute Scheduled Task Now** button on the left side of the Ribbon above the Main Navigation menu. To see the task take place open the Log Viewer before executing the scheduled task manually.

9.2.8 Data Editing

Raw data cannot be altered though it can be purged. In some cases, like zero adjustment, values may need to be changed. They can be set back to the original value at any time. Most often, data editing includes adding or removing flags from data, annotating data, or simply invalidating data so that it is not reported to the public or the EPA.

9.2.8.1 Query Usage for All Data Editors

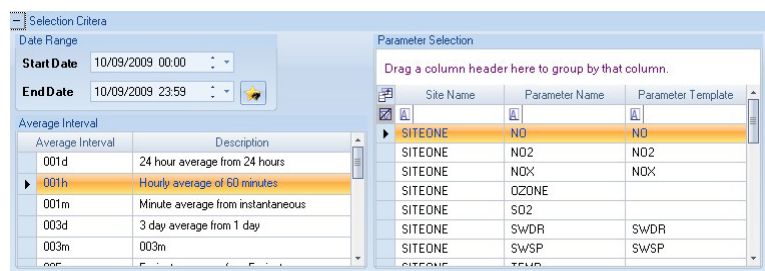
Date Ranges – Enter start and end dates manually or click the star button for preconfigured ranges.

Site and Parameter Selection – Select one or more sites and parameters to be shown on the report. When right clicking on the selection it will bring up two options of Select All and Clear All Selections.

Average Interval selection – You can only select one interval per generated report.

If there is no data to display for the request you made it will give back information below the query in the Report Errors section giving the time you tried to run the report, and the error level of what type of error it is giving back to you, and what the error message is.

Keep in mind the more data that you try to retrieve in any of the reports, the longer it will take for the query to gather the data. If you realize that you selected too large of a range of data or the wrong date or time frame, you may close that tab and start again.



9.2.8.2 Average Data Editor

To open the data editor single click the Average Data Editor from the Data Editors menu. After making the query selection, to open the editor select the **Retrieve Data button** on the left side on the Ribbon above the Main Navigation menu. This will bring up the data below the query.

To retrieve the data click the Retrieve Data button on the left side of the buttons on the button bar above the Main Navigation menu. The results will be brought up at the bottom under the query section. When editing fields in the data editor, make sure you save your changes prior to initiating a new query or exiting the Average Data Editor.

Site – Shows the site(s) that data has been retrieved for.

Parameter – Shows the parameter(s) the data has been retrieved for.

Average interval – Shows the interval type of data that was retrieved.

Date – Shows the date the data was collected on by the logger.

Value – The data value that was retrieved from the database. To change the value in a cell, double click the cell, or right click the cell to get a pop-up menu. If the data is bold it means that it has been edited and doesn't match the raw data. If the data is in italics it means it has an annotation. If you hover over the data value it will show the annotation. This column is only shown with the Linear Data display.

Raw Value - This column is only shown with the Linear Data display, and cannot be edited in any manner.

AQS Null Code - This column is automatically shown with the Linear Data display, and shows any null code that is attached to the data. Click in the cell in this column that you want to add a null code and it will bring up a Set AQS Null Code box where you can click the down arrow and select a null code from the drop down list. Click OK to apply the code. The Set AQS Null Code box can also be accessed by right clicking on the cell. To see the null code on the Cross-Tab Data or the Matrix Data displays, while having one of these displays open click the Display Null Code button on the Ribbon.

Flags - This column is only shown with the Linear Data display, and shows any flag(s) attached to the data. Click in the cell, in the column that you want to add a flag and it will bring up a Set Data Flags box where you can check the box beside of the flag(s) needed. Click OK to apply the flag(s). The Set Data Flags box can also be accessed by right clicking on the cell.

Qualifier Codes - This column is only shown with the Linear Data display. Click in the cell in this column that you want to add a qualifier code and it will bring up a Set Qualifier Code(s) box where you can check the box beside of the code(s) needed. Click OK to apply the code(s). The Set Qualifier Code(s) box can also be accessed by right clicking on the cell.

AQS Method Code - This column is only shown with the Linear Data display, and shows the method code that is attached to the data. Double click the cell to type in a method code. Click out of the cell to apply the code. The Set AQS Method Code box can also be accessed by right clicking on the cell as well.

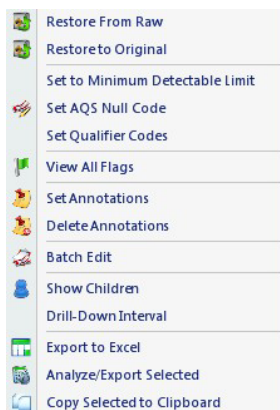
Data Grade - This column is only shown with the Linear Data display, and used only by the ADVP. Data with more than one flag will be displayed as the highest priority flag color, but a cross-hatching pattern is used to show that more than one flag is present.

To export the retrieved data to Excel click the **Export to Excel button** on the left side of the buttons on the button bar above the Main Navigation menu. In the Save As dialog, enter a location and name and click Save.

There are six different ways to display the data. Each display option will add or remove columns depending on the choice you make. The default is the **Linear Data** display. It is the only one that will show the Value (which is the validated data), Raw Value, AQS Null Code, Flags, and Qualifier Codes columns on the same display.

Site	Parameter	Average Interval	Date	Value	Raw Value	AQS Null Code	Flags	Qualifier Codes	Data Grade	AQS Method Code
<input checked="" type="checkbox"/>										
SITEONE	OZONE	001h	07/13/2010 14:00	0.312	1.311558		<D			123
SITEONE	OZONE	001h	07/13/2010 15:00	0.089	0.088792875					123
SITEONE	OZONE	001h	07/13/2010 16:00	0.720	0.720145344					123
SITEONE	OZONE	001h	07/13/2010 17:00	0.251	0.251458466					123
SITEONE	OZONE	001h	07/13/2010 18:00	0.014	0.014327356					123
SITEONE	OZONE	001h	07/13/2010 19:00	0.136	0.135904088					123
SITEONE	OZONE	001h	07/13/2010 20:00	0.396	0.395765155					123
SITEONE	OZONE	001h	07/13/2010 21:00	0.546	0.546373963					123

To edit data using the linear, Cross-Tab, and Matrix displays, click on the cell in the Value column then right click on the same cell. This will open a context menu. This menu can only be used on the Value column, as the data in the Raw Value column cannot be edited.

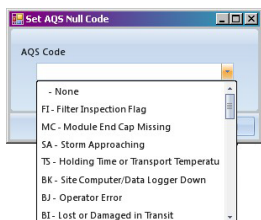


Restore From Raw – This option will remain grayed out unless the validated value has been changed. If data has been changed and you need to put it back to the state it was when polled from the logger you can select this option. Save the changes when the process is finished.

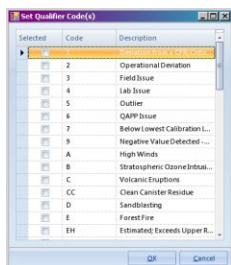
Restore to Original - If data has been changed and raw data doesn't exist, this option will allow you to put the value back to the state it was before the change was made. Save the changes when the process is finished.

Set to Minimum Detectable Limit – The minimum detectable limit has to be set in the Site/Parameter setup screen for the parameter that you are editing. Select this option to change the value to the limit provided in the setup screen.

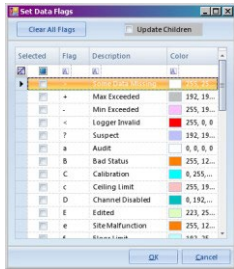
Set AQS Null Code – This option opens a Set AQS Null Code box where you can click the down arrow and it will drop down a list of null codes to select from.



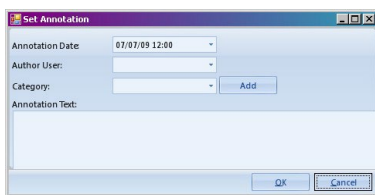
Set Qualifier Codes – This option opens a Set Qualifiers Code(s) box where you can select the code and description that best fits the data by checking the box beside of the desired code.



View All Flags – This option opens a Set Data Flags box where you can manually assign a flag to the data by checking the box beside of the desired flag.



Set Annotations – This option opens a Set Annotation box where the date defaults to the current date and time. Click the down arrow and select from the drop down list the Author User and the Category. If the category you need is not listed you can add it by selecting the Add button and it will open a Set Annotation category box where you can add it. After putting an annotation on the data it will change the font of the value to italic.



Delete Annotations – After selecting data that has an annotation attached to it, this option allows you to remove the annotation from the data. To disable the ability to delete any annotation that has been added to the data even when the data has been restored to the original data, close the Average Data Editor. Enter the below script into the top section of the SQL Execution Tool which is located under the Utilities menu, and select the Execute SQL button on the left end of the Ribbon at the top. It will give the results in the bottom section of the tool. Once the script has finished, close the SQL Execution Tool screen and open the Average Data Editor and the delete annotation option will be grayed out.

```
update dbo.UtilitySetting setSettingValue=0 where SettingKey='AnnotationDeletesAreAllowed'
```

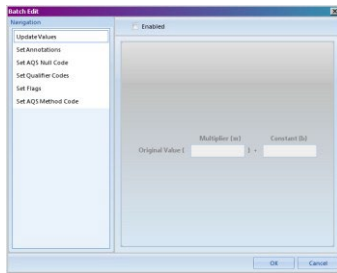
To re-enable the ability to delete annotations follow the same steps as listed above with this script:

```
update dbo.UtilitySetting setSettingValue=1 where SettingKey='AnnotationDeletesAreAllowed'
```

Batch Edit – This option will remain grayed out unless more than one cell is selected at a time. It will open a Batch Edit box that will give you five options to select from for editing the data. Functions are all disabled by default and require clicking Enabled to employ.

Update Values gives the linear correction formula and can also be used to batch fill in blank fields with a duplicate value. The cell for the value is the original value in the formula, and if blank is viewed by the formula as a zero. Zero multiplied by the value entered into the Multiplier field will be zero, and then it is added to the Constant field, so the value put in the cells will be the value that is entered into the Constant field of the formula. Clicking enabled in this function without entering a formula will set all affected values to zero.

Set AQS Method Codes allows you to attach the same method code to a large amount of data at once. Set Annotations, Set AQS Code, Set Qualifier Codes, and Set Flags work in the same manner as mentioned above for all values selected.

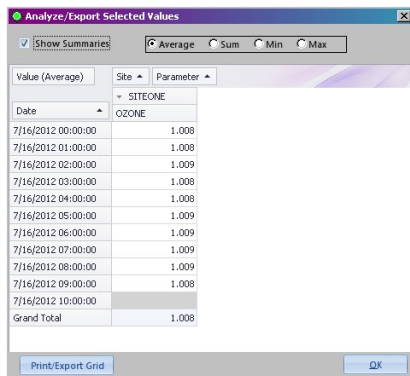


Show Children – Select this to show child parameters, currently used to show diagnostic data.

Drill-Down Interval – Brings up a new Average Data Editor tab with the base averaging interval.

Export to Excel – This creates a file that can be opened in Excel.

Analyze/Export Selected – If selected, a new screen will open where the data can be changed from Average to Sum, to Min, to Max, and can be exported to a document where it can be saved to a file or printed.



Copy Selected To Clipboard – This allows the highlighted values to be copied and pasted into another form such as a Word document or Excel, etc.

Cross-Tab Data – This display gives a Date column and a column for each parameter for each site that you selected in the criteria. This display only shows the validated data. You also have the ability to right click on the data cell and get the same options on the pop-up menu as mentioned above, but you can only see the results of any changes made with those menu options by going back to the Linear Data display. The order of the columns can be changed by dragging the column by the column heading and dropping it in the order that you want to see displayed.

Date	SITEONE OZONE 001h Final Value
06/21/2007 00:00	65.0
06/21/2007 01:00	64.0
06/21/2007 02:00	66.0
06/21/2007 03:00	70.0
06/21/2007 04:00	71.0
06/21/2007 05:00	70.0
06/21/2007 06:00	66.0
06/21/2007 07:00	66.0
06/21/2007 08:00	64.0
06/21/2007 09:00	64.0
06/21/2007 10:00	62.0
06/21/2007 11:00	65.0

Clicking the Display Null Code button on the Ribbon while in the Cross-Tab editor will show a Null Code column beside of each value column.

Date	SITEONE OZONE 001h FinalValue	SITEONE OZONE 001h AQ5 Null Code
07/24/2011 00:00	0.398	BJ
07/24/2011 01:00	0.399	
07/24/2011 02:00	0.398	
07/24/2011 03:00	0.399	
07/24/2011 04:00	0.399	
07/24/2011 05:00	0.399	
07/24/2011 06:00	0.398	
07/24/2011 07:00	0.399	
07/24/2011 08:00	0.399	
07/24/2011 09:00	0.399	
07/24/2011 10:00	0.398	
07/24/2011 11:00	0.398	
07/24/2011 12:00	0.399	
07/24/2011 13:00	0.400	
07/24/2011 14:00	0.399	
07/24/2011 15:00	0.398	

Matrix Data – This display gives a Site, Parameter, and Interval columns. To see the data values for each day and hour click the plus sign on the left side of the site name to expand the matrix grid.

Site	Parameter	Interval												
SITEONE OZONE 001h														
DateOnly	00	01	02	03	04	05	06	07	08	09	10	11		
06/21/2007	65.0	64.0	66.0	70.0	71.0	70.0	66.0	66.0	64.0	64.0	62.0	65.0		
06/22/2007	79.0	81.0	87.0	83.0	83.0	83.0	79.0	76.0	74.0	69.0	71.0	72.0		
06/23/2007	73.0	68.0	69.0	65.0	64.0	64.0	64.0	62.0	62.0	58.0	57.0	58.0		
06/24/2007	69.0	74.0	57.0	56.0	59.0	69.0	73.0	71.0	70.0	65.0	62.0	63.0		
06/25/2007	64.0	66.0	69.0	68.0	68.0	68.0	68.0	67.0	64.0	60.0	56.0	54.0		
06/26/2007	60.0	60.0	56.0	56.0	60.0	63.0	62.0	60.0	57.0	53.0	44.0	41.0		
06/27/2007	63.0	60.0	60.0	60.0	59.0	57.0	57.0	56.0	55.0	51.0	45.0	45.0		
06/28/2007	61.0	63.0	63.0	62.0	56.0	59.0	57.0	53.0	50.0	49.0	50.0	48.0		
06/29/2007	63.0	62.0	56.0	58.0	58.0	55.0	53.0	57.0	55.0	56.0	55.0	52.0		

Clicking the Display Null Code button on the Ribbon while in the Matrix editor will show a Null Code column beside of each value column.

Site	Parameter	Interval																
SITEONE OZONE 001h																		
DateOnly	00	00_NullCode	01	01_NullCode	02	02_NullCode	03	03_NullCode	04	04_NullCode	05	05_NullCode	06	06_NullCode	07	07_NullCode	08	08_NullCode
07/24/2011	0.398	BJ	0.399		0.398		0.399		0.399		0.399		0.398		0.399		0.399	
07/25/2011	0.399		0.400		0.399		0.399		0.398		0.398		0.400		0.399		0.398	

Time Series Graph – This display gives a line graph where the scale is displayed on the Y axis and the date and time is displayed on the X axis. The sites, parameters and interval are displayed over to the right side with a color chart when the Show Legend box is checked at the bottom left below the graph. When a single parameter is selected the history and statistics settings are activated. The graph shown below is with one parameter selected.

While still showing the history, the Lookback Count and Gap fields can be set and the graph will give the original data that was queried as well as the selected historical interval. To retrieve this new setting for the graph click the Refresh button above the graph.

To have the statistics displayed along with the original queried data, select Show Statistics above the graph and fill in the Lookback Count and Gap fields, then click the Refresh button and the graph will show the original data along with the minimum, maximum, average, and geometric mean of the original data on one parameter at a time.

Use Dynamic Scaling simply rescales the graph to show the full scale of the data that you have retrieved.

Display Raw Reading when selected shows the raw data on the graph, and when deselected shows the validated data.

The time series graph can also be retrieved in a report style by using the **Average Data Graph Report** under the Reports menu.

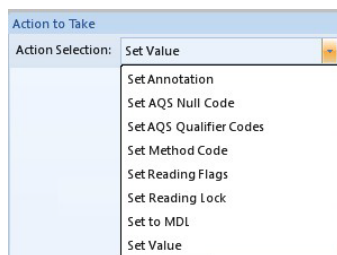
Scatter Plot – Displays values for two variables for a set of data. The data is displayed as a collection of points, each having the value of one variable determining the position on the horizontal axis and the value of the other variable determining the position on the vertical axis. Only two parameters can be displayed on this graph at a time. To change the axis parameters click the down arrow on the right side of each parameter at the top of the graph and select the other parameter in the list and click Refresh.

Histogram – A bar graph of a frequency distribution in which the widths of the bars are proportional to the classes into which the variable has been divided and the heights of the bars are proportional to the class frequencies. Click Override to ignore settings made in the Site/Parameter configuration.

9.2.8.3 Batch Reading Updater

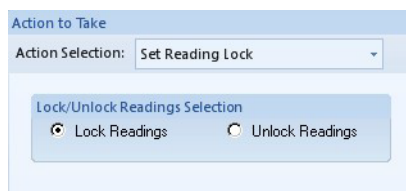
The Batch Reading Updater is a blind edit that mimics the function of the Batch Edit in the Average Data Editor, but is faster since data is not retrieved or displayed. To open the batch updater single click the Batch Reading Updater from the Data Editors menu. Make the query selection for which the edits will be applied, then setup the required information under the **Action to Take section**.

Action Selection: - When the Batch Reading Updater screen is opened this field defaults to Set Value. Click the down arrow and select from the drop down list the action that is to be taken on the select data query.



The only function unique to this Updater not found in the Batch Editor described above is the Set Reading Lock action.

Set Reading Lock – Allows the ability to lock or unlock data against edits for the query selection once the Apply Action button has been selected.



9.2.8.4 Calibration Data Editor

To open the data editor single click the Calibration Data Editor from the Data Editors menu.

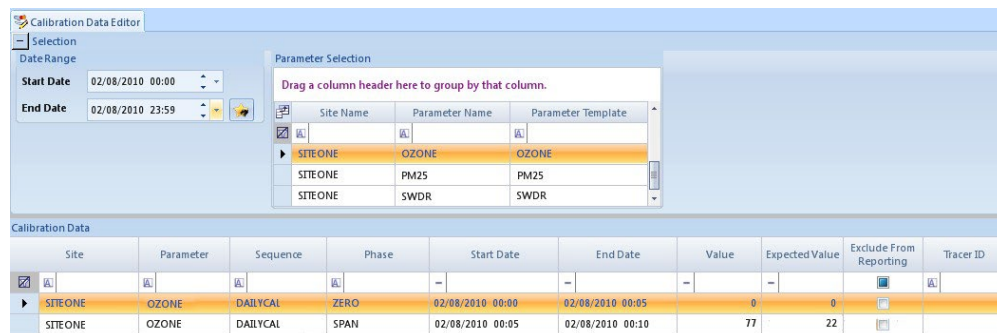
To bring up previously entered or polled data, make the query selection and select the **Retrieve Data button** on the left side on the Ribbon above the Main Navigation menu. This will bring up the data below the query. From the selection that is made the Site, Parameter, Sequence, Phase, Start Date and End Date will automatically populate.

Value – Click in the field and enter in the value that was the result of the calibration.

Expected Value – This field will default to zero. If the expected value is not zero click in the field and replace the value with the correct expected value.

Exclude From Reporting – Click the check the box if the sequence is not included on the calibration report.

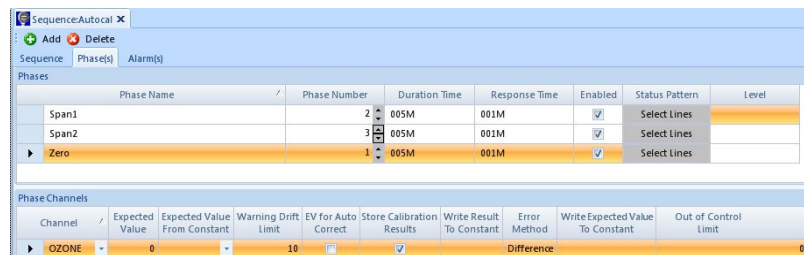
Tracer ID – If a tracer code is used in the logger, enter in the code that is between 0000 and 9999.



9.2.8.5 Calibration Adjust Tool

Before the Cal Adjust Tool can function the level of the phase has to be set in the calibration setup in the Data Source Details screen.

Level – Applies to those who have the Calibration Adjust Tool to identify the calibration levels, such as zero, span, or precision, regardless of how they are named. This field is also used to allow the Precision phase of a cal to be identified and reported on the AQS report when the Cal Precision Data Records box is selected on the report query. Click the down arrow and select from the dropdown list, ZERO, SPAN, PREC, 20%, 40%, 60%, or 80%. Level is also discussed in the calibration setup in Section 9.2.1.3.4.



To open the adjustment tool single click Calibration Adjust Tool from the Data Editors menu.

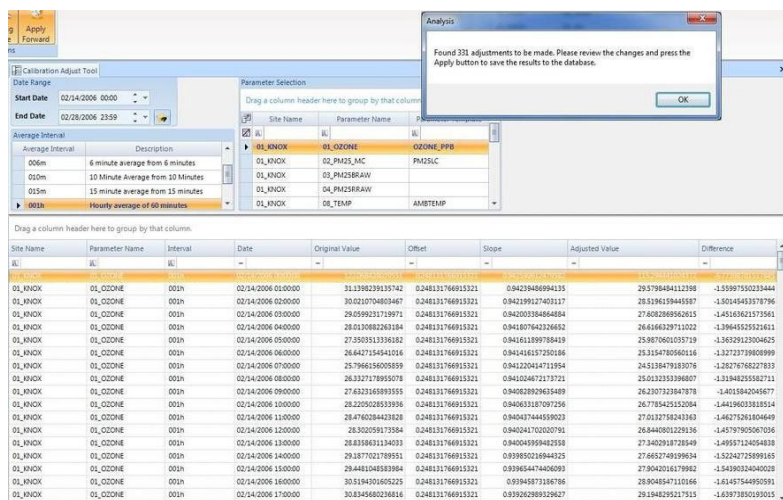
To see if a calibration needs to be adjusted select the parameter and average interval affected by the calibration and the date range the calibration ran, then select the **Analyze button** on the left side of the Ribbon above the Main Navigation menu.

The Adjust for Span button is deselected by default so the adjustment will only do a zero correction. TSP does not adjust for spans, and only adjusts for zeros if well merited.

If the **Apply Forward button** is selected the calibration corrections are applied using the calibration results going forward in time. If Apply Forward is deselected the corrections are applied going backwards from each calibration. This button is selected by default and is the method used by TSP.

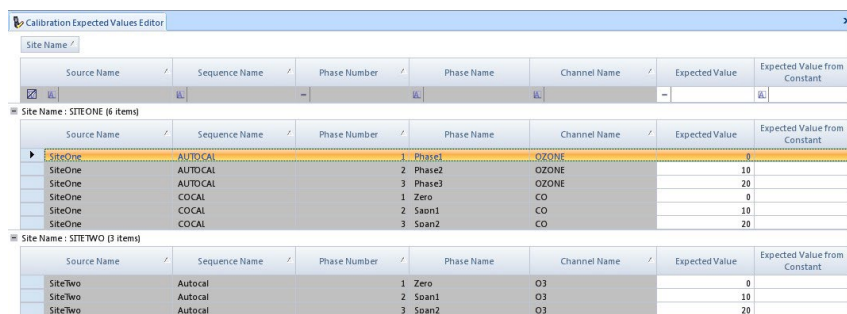
Once options are chosen, click the Analyze button to view the data. If the data is correct select the **Apply button** on the left side of the Ribbon above the Main Navigation menu to make the changes. Any data that is changed will be

marked with the z flag to show the calibration was adjusted, and is locked from further adjustment. If the data needs to be returned to its original form, a batch edit can be performed in the Average Data Editor.



9.2.8.6 Cal Expected Values

To open the editor single click Cal Expected Values from the Configuration Editors menu. The editor will give the source name, sequence name, phase name and channel name, all of which cannot be edited. The expected value can be change by double clicking in the field to highlight the existing value where you can then type in the new value. Or if the value comes from a constant, click the down arrow in that field and select which constant is to be used. Click the Save button after changing each expected value, and a prompt will appear asking if you want to download to the logger, when using an 8816 or 8832.



9.2.9 Purging Data

9.2.9.1 Purge Average Data

To delete or archive average data single click the Purge Average Data under Archive/Purge Data from the Utilities menu. After making the query selection, to archive or delete data select the **Process Data Archive/Purge** button on the left side on the Ribbon above the Main Navigation menu. Data that is being purged has to be more than 24 hours. Selecting 24 hours or less will not purge.

Purge / Archive Date Criteria section

Data Older Than –Use the radio buttons and down arrow to select the time frame before which data will be archived or purged. Default is 3 years.

Specific Date Range – Use the radio buttons or type in the date and time frame of data that you want to archive or delete. More than 24 consecutive hours must be selected, and the last day will not be included in the files that are archived. For example, if you select to archive the first five days in a month, the date range entered in would need to start with the first and end with the fifth of that month. The days archived would be the first through the fourth, and the fifth would be left out, and a file for each of the four days would be created. If only one day is selected nothing will happen.

Action to Take section

Archive Data – Creates a zipped file in the destination location provided with the name ReadingArchiveConfig, along with the type of data that was chosen from the query, then the year, month, and day.xml.zip. Within the zipped file will be an XML file with the same name. This will allow you to import the xml file back into the database in the case the data is purged out of the database.

Archive and Purge Data – An archive is created as discussed above. The Purge will delete the data from the database except for the ending date selected.

Purge Data –Deletes the data from the database except for the ending date selected.

Archive File Location section - Choose Local since Server is the SQL Server under GOIT control and access may be limited. Click the Browse button and enter a location. This option works in conjunction with the Archive Data and Archive and Purge Data options only.

Average Data Selection section

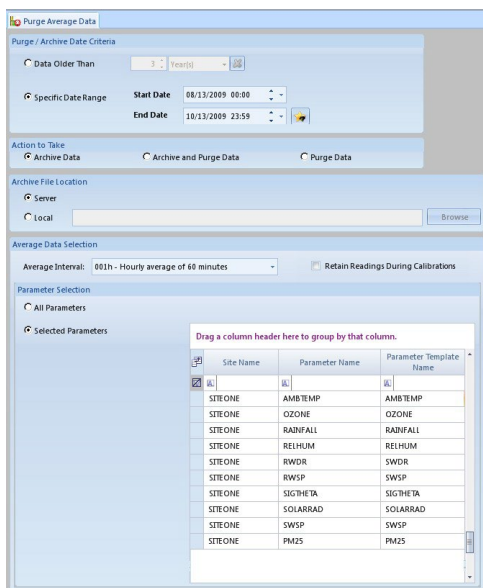
Average Interval – Click the down arrow and select the data type from the drop down list of the data that you want to archive or delete.

Retain Readings During Calibrations – Check this box if data marked with a C flag for calibration should not be deleted for the time frame selected.

Parameter Selection section

All Parameters – All sites and all of their parameters will be selected by the list being grayed out so that you cannot select or deselect from the list.

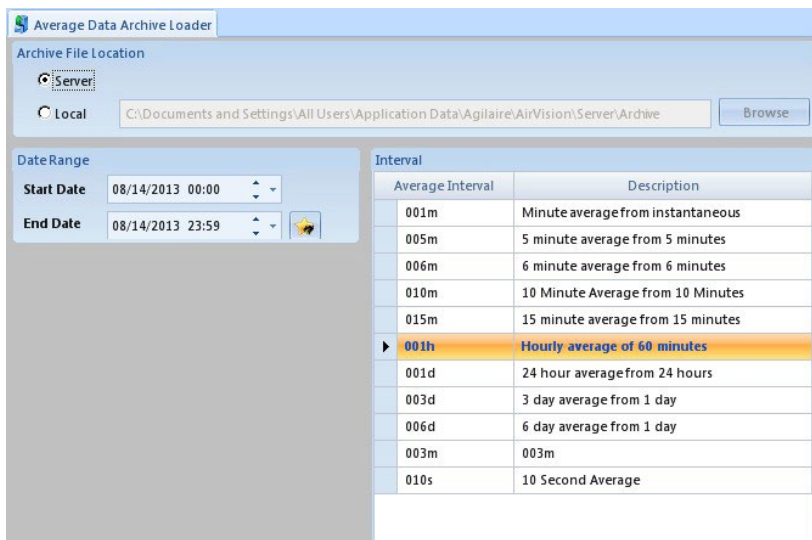
Selected Parameters – The list will come into focus and you can pick and choose the sites and parameters that you want to delete or archive data for.



The TSP purges diagnostic data after six weeks but does not routinely purge any other data. The diagnostic data purge is achieved as an automated task in the Task Scheduler.

9.2.9.2 Average Data Archive Loader

To restore the data to the database, expand Table Import/Export and select and Average Data Archive Loader. Select the location of where the archive file(s) were stored, then select the date range and type of data to restore. Select the **Load Archive button** on the Ribbon at the top to reload the data to the database



9.2.9.3 Purge Calibration Data

To delete or archive calibration data single click the Purge Calibration Data under Archive/Purge Data from the Utilities menu. After making the query selection, to archive or delete data select the **Process Data Archive/Purge button** on the left side on the Ribbon above the Main Navigation menu. The options therein are the same as discussed in the Purge Average Data section above.

9.2.9.4 Purge Journal Messages

To open the Purge Journal Messages single click Purge Journal Messages under Archive/Purge Data from the Utilities menu. The Purge Journal Messages purges the messages collected in the message logs in the Internal Reports under Reports.

To purge or archive journal messages select Data Older Than or select and enter in a Specific Date Range. Choose to archive the data, purge the data, or both. Then select if the process is to take place on the server or the local pc and browse to the location. When finished setting up the query select the **Process Data Archive/Purge button** on the left side of the Ribbon above the Main Navigation menu.

Journal Messages are routinely purged once older than one week by a scheduled task every night at midnight. Options in the Purge Journal Messages tool are the same as the Purge Averages tool discussed above except parameter selection is not required.

9.2.10 Flags Editor

To edit a flag setting single click the Flags Editor from the Configuration Editors menu.

To add a new flag select the **Add New button** on the left side of the Ribbon above the Main Navigation menu and it will clear the fields on the right side of the screen.

To delete a flag select the **Delete Flag button** on the left side of the Ribbon above the Main Navigation menu. It will prompt you if you are sure you want to delete the selected flag. Select Yes to continue deleting the flag or No to stop the deletion and retain the flag.

Always save your changes.

Flag – Enter in the flag that you want to add to the flag column

Description – Explains the use of the flag.

Priority – This field allows you to change the order of priority of the flags. The default settings for the priority flags are not currently set to the priority of what the logger uses.

For quick reference the logger priority for the flags are:

<, P, D, T, F, B, C, M, O, U, A, +, -, R, H, L, h, l, J, j, V, W, X, Y, Z, f, c

Priority of status flags are:

I, ?, *, >, =, m, ^, v, E, d, 9, a, z, Q,

User Defined flags are last in priority. If you want to use a flag for a user defined that hasn't already been used by the logger, these are your options:

K, N, S, b, e, g, i, k, n, o, q, r, s, u, w, x, y, 1, 2, 3, 4, 5, 6, 7, 8, 0, !, @, #, \$, %, &

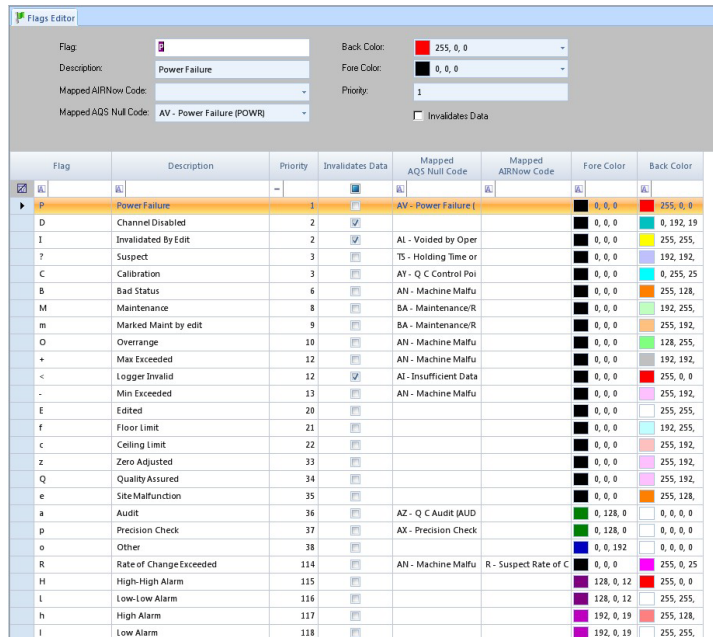
Invalidates Data – If the purpose of the flag is to invalidate data then check this box.

Mapped AQS Null Code – Data that is flagged as invalid is required to be replaced with a null code in the AQS report. Mapping the logger flag to a null code will automatically cause the null code to be placed in the report instead of the invalid data. Click the down arrow and select the null code from the drop down list.

Mapped AIRNow Code – If the logger flag is to be considered in AIRNow, but cannot be displayed on the report as itself, it can be mapped to an AIRNow flag that is allowed to be displayed on the report. Click the down arrow and select the AIRNow flag from the drop down list.

Fore Color – This is the color of the font that shows in the cells in the editors.

Back Color – This is the color of the cell background in the editors.



9.2.11 Log Viewer

Log entries are generated by the SQL Server, so they will be time stamped accordingly. During daylight savings time the log entries will be offset from the action by one hour. To open the Log Viewer single click Log Viewer from the Utilities menu.

Options section

Refresh button – Refreshes the log messages in the viewer. Depending on the volume of messages, data access delay (e.g. slow network, etc), you may not immediately see anything new.

Auto-refresh every -(s) – Click to check the box if you want the refresh of the log to run automatically.

Show all messages – Click to check the box to have the log to show all of the messages it has collected.

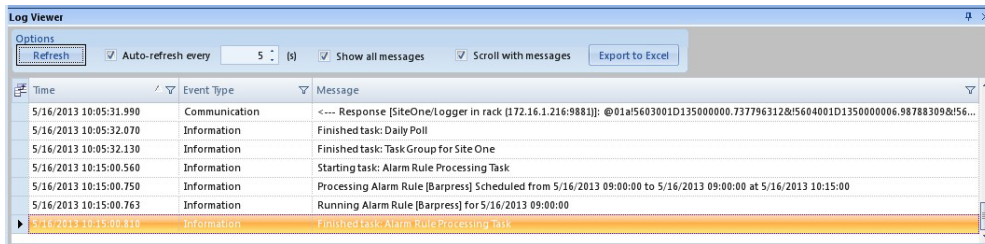
Scroll with messages – Click to check the box if you want the scrolling to automatically stay with the most recent entry.

Export to Excel button – Click this button to bring up a Save window to select a location and give a name to the Excel file.

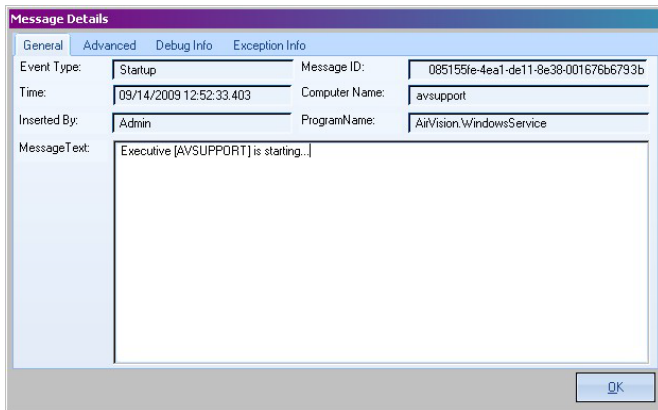
Time – The time of communication.

Event Type – The different types are Communication, Information, Warning, Startup, Shutdown, and Exception.

Message – The request or string being sent to the logger, and the response from the logger sent back. Hover the mouse over the field and it will bring up the full message, but only for a few seconds.



To see a more in depth look at the message you can highlight the row, then double click the highlighted row to open a Message Details box that gives some of the duplicate information along with fields such as who inserted the message, the computer name, and the program name, as well as a more extensive look at the message that was entered. When finished click the “OK” button at the bottom right to close the window.



9.2.12 Reports

9.2.12.1 Query usage for all reports

Date Ranges – Enter start and end dates manually or click the star button for preconfigured ranges.

Site and Parameter Selection – Select one or more sites and parameters to be shown on the report. When right clicking on the selection it will bring up two options of Select All and Clear All Selections.

Average Interval selection – You can only select one interval per generated report.

If there is no data to display for the request you made it will give back information below the query in the Report Errors section giving the time you tried to run the report, and the error level of what type of error it is giving back to you, and what the error message is.

Keep in mind the more data that you try to retrieve in any of the reports, the longer it will take for the query to gather the data. If you realize that you selected too large of a range of data or the wrong date or time frame, you may close that tab and start again.

Below is a non-comprehensive list of reports available in AirVision and their use. For specifics about a report refer to the AirVision manual.

8 Hour Rolling Average – A forward looking 8-hour average useful for ozone standard compliance.

AirNOW AQCSV Report – Generates a text string useful for data transfer to AirNOW.

Annotations Report – Assembles a list of annotations on data.

There are a group of AQI reports that the TSP does not currently use but they should be examined for further use. Indeed AirVision can even handle a voice recording as a report.

AQS 3.0 XML Report (future use, at present use AQS XML Report) – This report is very useful for transmitting data through the EPA Node. While an AirVision plug-in exists that attempts to do this it is riddled with problems and is difficult to use. Instead the AQS 3.0 XML Report can be used and then ingested by the node.

AQS Text Report – Like the XML version, this report can move data through the node to the EPA. However the text version will soon be deprecated by the EPA and this report is largely for data validation. Its pipe-delimited format is much more reader-friendly to people, and errors are more easily found.

Audit Trail Report – Changes made to the validated data set such as edits, flagging, and annotations can be found in this report. While not commonly used by GMM, the QA group may request similar information.

Average Data Graph Report – A visual representation of the requested data. While useful for printing, controlling the report is limited. If graphs are needed with more manipulation capabilities, either the Statistical Reports or the Average Data Editor should be used.

Basic Data Export – This report provides a quick and simple way to export validated data to external parties or to analyze further in an external program like Excel. The product of this report is a column-oriented list with time as rows and selected parameters as columns. It can be exported to excel or CSV. This report does NOT include invalid data.

Calibration Reports – While AirVision provides six reports, only one covers an aspect not readily available in ZSPTracking, USEPA Cal Zero Drift. This report provides the 24-hour and 14-day zero drift to determine compliance with new zero drift guidance put forth by EPA.

Configuration Reports – A variety of summary reports are available to show configuration for sites, calibrations, loggers, channels, and more. Figure 10 and Figure 11 show an example of a channel and calibration configuration report respectively.

Daily Parameter and Summary Reports – Functionally there is little difference between these two reports. They both show average validated data with some summary statistics. The former lines hours of the day across the top and the latter places time down the left side. The latter also offers more show options, including calibrations and flag descriptions.

Data With Flags Report – This report is akin to the Basic Data Export except that it includes flagged data and provides the option to include descriptions of those flags.

Internal Reports are largely diagnostic in nature and only need be generated at the behest of Agilaire. Table Size Information, however, can provide valuable information on how large the database is becoming, and whether action should be taken to shrink certain tables, particularly on the 8872s.

LogBook Report – Starting with the 8872 data logger, messages to central can be longer than the restricted fields on the 8832 and 8816. When a message to central is entered on an 8872 it is stored in two locations. It can be viewed in the Central Messages Report (below) in a version truncated to the 8832/8816 size restriction, and it can be viewed in this report un-truncated.

Logger Reports:

Central Messages Report – This report, as mentioned above in LogBook Report, displays central messages sent from the data loggers. It is printed every month as part of the monthly data validation review. It is also frequently referenced to determine correlation between action and response, such as a calibration with a change in slope.

Power Failure Report – This report is also printed each month and included in the monthly data validation exercise. It displays all power failures at selected sites for the selected period and includes the duration of the power outage. The duration is important especially when longer than fifteen minutes as that may invalidate an hour of data.

Met Reports – While perceived as useful in the future by TSP, these reports are largely unconfigured. Investigation into their utility is ongoing, particularly for the Wind/Pollution Rose and Joint Frequency Dist reports.

Monthly Report – This report shows a cross-tab style display of one month of data (though that depends on selecting an entire month in the Date Range options). It is printed every month as part of the monthly data validation exercise and serves as the bulk of the hard-copy record retention.

Statistical Reports:

Concentration Distribution – Creates a bin report useful for creating a histogram and includes some summary statistics.

Data Analysis – An interactive report, this report mimics the Cross-Tab functionality in Excel. While useful for data analysis, its utility is outside the scope of this SOP. It is useful for answering “for” questions.

Data Recovery – This report is useful in determining whether the 75% valid reading guidance is met for a parameter at a site for any selected Date Range.

Frequency Distribution – Similar to Concentration Distribution.

Maximum Hourly Values – This report presents the parameter in question in a ranked list and includes the date and interval of the rank as well as the concentration.

Statistical Report – This report generates summary statistics against the history of the parameter over ten days.

9.2.13 Favorites Editor

To set up a favorite single click the Favorites Editor from the Configuration Editors menu. As favorites are added they will appear in the **Selected Favorite section** on the left of the setup screen.

To add a favorite select the Add Favorite button on the left of the ribbon at the top above the Main Navigation menu. It will clear the fields on the right side of the Selected Favorite column.

To change an existing favorite, highlight it. The settings for the favorite will open on the right side of the screen. Make needed changes to the details section or the query section.

To delete a favorite, highlight it. Select the **Delete Favorite button** on the left of the ribbon at the top above the Main Navigation menu. It will delete the selected favorite without prompting.

Always save your changes.

To create a favorite from any other editor or report, complete the desired query, and select **Favorites** from the top menu above the Ribbon. The Ribbon will change to show the Favorites buttons. Select the **Save as Favorite button** on the left side of the Ribbon. It will bring up Add a Favorite box with the setup fields for the Favorite Detail section

explained below. To make changes to a favorite created from an editor or report, simply open the favorite in the Favorites Editor to make adjustments.

Favorite Detail tab

Favorite Details section

Menu Item – Click the down arrow and select a menu from the drop down list.

Favorite Name – Enter in the name that you choose to call the menu for your own reference, or you can accept the default that it gives.

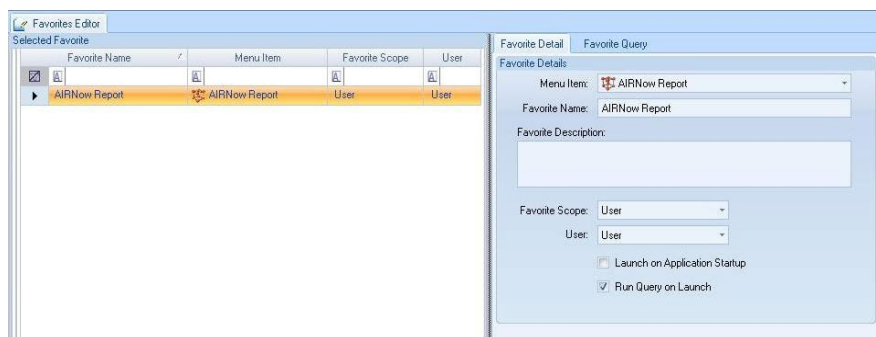
Favorite Description – Enter in the description of the name you have chosen to call the menu selection, or it can be left blank.

Favorite Scope – Click the down arrow and select from the drop down list if this favorite is to be used by a specific user or all users.

User – Click the down arrow and select from the drop down list which user this setting is to be applied to.

Launch on Application Startup – Click to check the box to launch the favorite when you open the client.

Run Launch on Query – Click to check the box to execute the query that has been set up under the Favorite Query tab when this Favorite is selected.



Favorite Query tab

Date Range Selection

Current Day, Month, Quarter, Week, and Year – Does not use the date and look back fields and simply uses the current date range that is selected.

Fixed Date Range – Use the radio buttons or type in the Start and End Date fields the date range this report is include data.

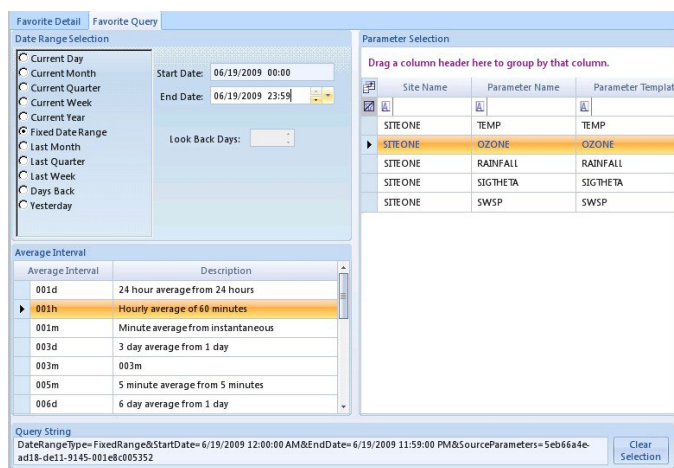
Last Month, Quarter, and Week – Does not use the date and look back fields and simply uses the previous date range that is selected from the current date.

Days Back – Use the radio buttons or type in the Look Back Days field the number of days you want to the report to go back to and get data from.

Parameter Selection section – Select the site and parameter that is to be included on this report.

Average Interval section – Select the type of data that is to be included on this report.

Query String section – Shows the string being used to create this report. If you use the Clear Selection button it will remove the string and it cannot be brought back without being manually typed in or the task deleted and recreated



Once you have save the menu as a favorite, you can test it by clicking the Test button on the Ribbon at the top.

My Favorites Editor

The My Favorites Editor can be accessed from the Configuration Editors or from the Favorites Tab above the Ribbon at the top. My Favorites will allow the user that is logged into the software to edit that user’s own favorites. It works in the same manner as the basic Favorites Editor with the exception the Favorite Scope field and the User field, which are not accessible as they are specific to the user logged in.

9.2.14 Server Restart

To manually restart the service single click Server Restart from the Utilities menu. Highlight the executive (APCPolling1 or APCPolling2, there shouldn’t be other options) to select it. Select the **Restart Executive Service button** on the left side of the buttons on the button bar above the Main Navigation menu. It will ask if you are sure you want to restart the selected executive service.

9.2.15 AQS Import Tools

9.2.15.1 AQS Text Import Tool

This tool is important when importing data from external entities into APCPolling2. Data is submitted by entities in AQS Text format specifically so that this tool can be used to ingest and store the data. It is important to note that the external entity site **MUST** be configured before it can be imported, or AirVision will not know where to store the data.

To run the Text Import Tool single click the AQS Text Import Tool from the Utilities menu.

Select the Browse button at the end of the Location of AQS Text File to Import field. This will bring up a Select Import File box where you can browse to the location of the AQS file. Select the **Process Import button** on the left side of the Ribbon above the Main Navigation menu.

The data is imported by matching the EPA codes in the file with the EPA codes set in the sites and parameters to import the data to the correct location in the database. The text import can import hourly data, 24 hour data records for particulate data, and PARS pipe delimited records, but it cannot import 5 minute SO2 data.

9.2.15.2 AQS XML Import Tool

Since XML is inherently bloated, this tool is not currently used. TSP believes requiring external entities to generate XML to be unnecessary and more difficult than the AQS Text method above. However, if data is extracted from AQS in XML this tool may be used.

To run the XML Import Tool single click the AQS XML Import Tool from the Utilities menu.

Select the Browse button at the end of the Location of AQS XML File to Import field. This will bring up a Select Import File box where you can browse to the location of the AQS XML file. Select the **Process Import button** on the left side of the Ribbon above the Main Navigation menu.

The data is imported by matching the EPA codes in the file with the EPA codes set in the sites and parameters to import the data to the correct location in the database. The XML import can only import hourly data records.

9.2.16 Database Export

This tool will be part of the database truncation method under development. The data will be exported at some interval from the live AVData database and imported into the historical AVData database thereby reducing the demands on the live server.

To run the Database Export, expand Table Import/Export under the Utilities menu and single click the Database Export menu.

In the Export Options section select the date range of data that is to be exported along with the configuration. Select the Browse button at the end of the Location of File to Export field. This will bring up an Export File Location box where you can browse to the location of the zipped XML files. Select the **Process Export button** on the left side on the Ribbon above the Main Navigation menu. The configuration is exported to a zipped file that holds the XML files.

9.2.17 Security

To open the security editors click the plus sign beside Security from the Configuration Editors menu to expand the options which are Group Permissions, Groups Editor, My User Settings, and User Editor. The default database has been setup with an administrative login called Admin. To open any of the security editors, single click the editor under the Security menu.

The highest level of security has been retained to the Admin login, changes to anyone else's security settings must be done under that login.

TSP has organized the following groups:

Data Management – Allows access to data and reports, editing of data, and changes to network configuration.

Data Validation – Allows access to data and reports, and editing of data.

Link To Logger – Allows access to some reports, and the Link to Logger utility (to run manual QC checks).

Meteorological Emails – Allows access to some data and serves as a group for mass emails.
UserAdmin – The default Admin account.

9.2.17.1 User Editor

To add a new user, select the **Add User button** on the left side of the Ribbon above the Main Navigation menu. It will put blank fields on the right side of the screen. As users are added they will appear in the **Users column** on the left of the setup screen.

To open an existing user highlight it. Existing user names cannot be changed. If needed, the user will have to be deleted and re-entered in with the new user name and password.

To delete an existing user select the user name from the list in the Users column that you want to remove. Select the **Delete User button** on the left side of the Ribbon above the Main Navigation menu. It will not prompt you to make sure you want to delete. Once the delete button is selected the user is immediately removed from the list.

Always save your changes.

User Details section

Account

User Name – Enter in a name that represents the user.

Email – Enter in the users email address.

Enabled – This allows users to be disabled without deleting them all together.

Set User Password button – Click the password button to open a smaller box that will have a field to enter in the password and another field to confirm the password you just entered.

Name – TSP uses First name Last name convention for the Account name. If more information is required, us this field.

Contact Addresses

Add... Contact Address button – This button allows you to add multiple emails for the same user account.

Type – Default is Email, but could be changed to text.

Label – Specify the purpose of the email. Labels cannot repeat for a given user even if the email address is different.

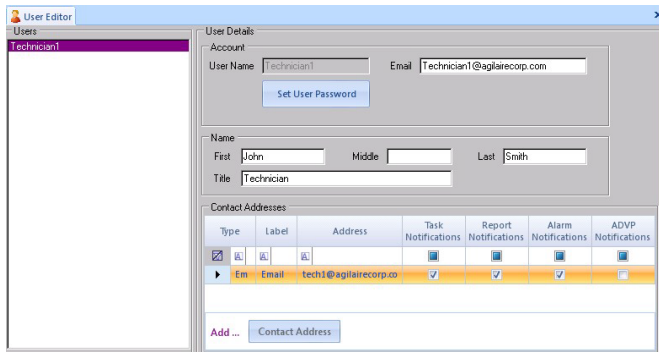
Address – Enter in an email address.

Tasks Notifications – Allows this email address to be used for task notifications.

Report Notifications – Allows this email address to be used for reports.

Alarm Notifications – Not currently used.

ADVP Notifications – Allows this email address to be used for ADVP notifications.



9.2.17.2 My User Info

To open the current user’s setting single click My User Info under Security and it will open their setting on the right side. The User Name is grayed out by default as it cannot be changed by the user that is not the administrator. However the user can change their email address, their first, middle, or last name, and their title, or any of the additional emails and notification options.

Always save your changes.

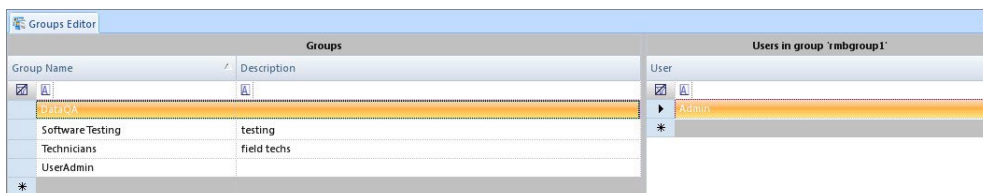
9.2.17.3 Groups Editor

Permissions are controlled by groups, not by users. A user must be assigned to a group to get any permission. Users can be members of multiple groups.

To add a new group, select the **Add Group button** on the left side of the Ribbon above the Main Navigation menu. Click the blank asterisks row under the Users in group section and click the down arrow and select a user. Repeat for all users to be assigned. To open an existing group, highlight it on the left. It will open the users in that group under the Users in group section.

To delete an existing group highlight it and select the **Delete Group button** on the left side of the Ribbon above the Main Navigation menu. It will not prompt you to make sure you want to delete. Once the delete button is selected the group is immediately removed from the list. To delete one user from a group, select the group you want to delete from under the Group column on the left side of the screen, then select the user you want to delete from under the Users in group column on the right side of the screen, and press the delete key on the keyboard. A message will appear prompting if you are sure you want to delete the row that has been selected. If the user is deleted click the Save button before proceeding to any other step. Do not delete more than one user at a time before clicking Save, or it will generate errors.

Always save your changes.



9.2.17.4 Group Permissions

After adding a group(s) you have to add permissions for each group.

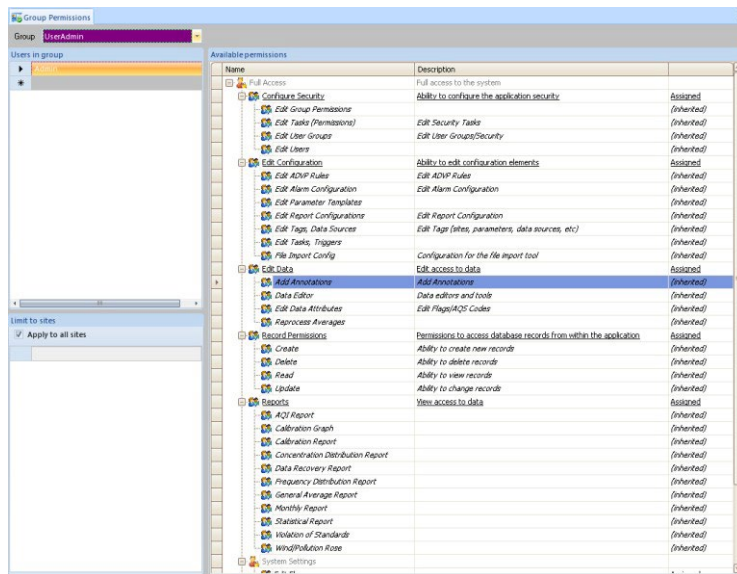
To add a new group permission click the down arrow at the top in the Group field and select the group from the drop down list that needs permissions set up. Select one of the users in the list under the Users in group section (it does not matter which since the entire group is being changed). Select the permission to assign on the right side under the Available permissions section. Select the **Add Permission button** on the left side of the Ribbon above the Main Navigation menu. Once a permission has been added to a user the text will darken in and the word Assigned will be placed in the right column beside of the permission. If the permissions you have added pertain to all of the sites simply click the box beside of Apply to all sites under the Limit to sites section. If it pertains to certain sites uncheck the box for all site and click the down arrow and select a site per each row. Keep repeating the steps until you have selected all of the permission you want the user to have and for the needed sites. Repeat these steps with each user until finished.

To open an existing group permission click the down arrow in the Group field at the top and select the group from the drop down list. Select the user under the Users in group section and it will show the permissions setup for that user on the right side under the Available permissions section. As you select a site and parameter the fields in the other four sections will change to reveal the setting for that parameter. Permission may be removed by selecting the **Remove Permission button** on the left side of the Ribbon above the Main Navigation menu.

Always save your changes.

Child permissions can added or delete in the same manner as described above.

When permissions are added to a group, all users in that group get the same permissions. Different permissions cannot be given to different users under the same group. If a user needs to have different permissions that the rest of the users in a particular group; that user will need to be added to another group or removed from the existing group and added to a different group, or possibly put in a group by themselves.



9.2.18 Math Editors

The TSP does not currently use this approach. Instead, channels that require mathematical manipulation are all done in real-time on the data logger. In the event this approach is required in the future, refer to the AirVision user manual.

9.2.19 Sync

While the Sync setup in AirVision is designed to automatically sync with AVTrend on 8872s in the field, this approach is not used by the TSP. To gather data from 8872s the TSP uses the 8832 emulation approach described in Section 9.2.1.3.1.

The TSP uses the Sync module in AirVision to configure 8872s before they are deployed to the field. Firewall restrictions from GOIT do not allow databases to be synced outside the network, such that 8872s cannot be reconfigured once in the field.

Important: The polling computer must have Microsoft Sync Framework loaded. Only the Synchronization Tools and the Database Providers need to be installed, which can be downloaded from Microsoft’s web site. Be sure to install the 64 bit version unless GOIT moves to a 32 bit version of SQL Server. The versions of AirVision and AV-Trend must be the same.

Important: For the 8872, TCP/IP protocol must be enabled using the SQL Configuration Tool, SQL Server must be configured to allow Remote Connections, the “sa” account must be enabled under Security and the correct password must be set in the connection string, and the firewall should allow ports 1433 and 1434 to be open on the 8872 and router. The GOIT network does not block 1433 or 1434 within the network.

Always save your changes.

9.2.19.1 Sync Connection Editor

To setup the connection editor single click the Sync Connection Editor under Sync from the Configuration Editors menu.

To add a new connection entry click the blue button at the bottom left with the asterisks and it will highlight the row. The row has three fields that are to be completed at the bottom of the screen. Once the settings are saved the connection entry will appear at the top.

Connection Properties section

Connection Name – Type a name to describe the connection string.

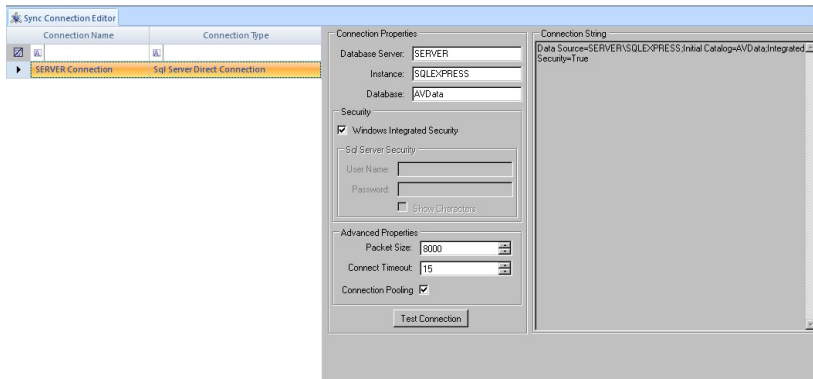
Connection Type – Click the down arrow and select Sql Server Direct Connection.

Database Server – Either APCPolling1 or APCPolling2.

Instance – This field will likely automatically fill in, but if not, it should be the type of SQL that is installed.

Database –AVData or AVData_External.

Security section – The Database Server Name or IP Address field should be filled in with the name of the remote server or the IP address where SQL is installed at the site. Normally a static IP address will be assigned to the 8872 when connected to the GOIT network, use this address. Uncheck the Windows Security box and enter in the “sa” user name and password for SQL. Click the Test Connection button to see if the database can be seen by the central.



9.2.19.2 Sync Contract Editor

To set up the contract editor single click the Sync Contract Editor under Sync from the Configuration Editors menu.

To add a new contract, select the **New button** on the left side of the Ribbon above the Main Navigation menu. It will add a new row in the Selected Sync Contract section at the top.

Selected Sync Editor Section

Contract Name – Type in a name to describe the contract for the site.

Sync Direction – Click the down arrow and select Upload then Download.

Sync Scope – Click the down arrow and the selected configuration will be transferred, not data. Download is transferring from the site to the central. Upload is transferring from central to the site. Note this is the reverse of the Logger Download discussed in Section 9.2.4.

Remote Sync Connection – Click the down arrow and select the connection that was created in the Sync Connection Editor.

Reading Look Back Day Limit – Since this is configuration only, leave at 0.

Most Recent Contract Modification – This field will automatically fill in with the current date and time once the entry has been saved.

Contract Needs Provisioning – This field will automatically fill in once the entry has been saved. If the remote database gets replaced with a blank database, AirVision will not automatically re-provision. A new provision will need to be performed as it was originally in order for it to recreate the configuration and tables. This is also necessary if syncing the databases fails.

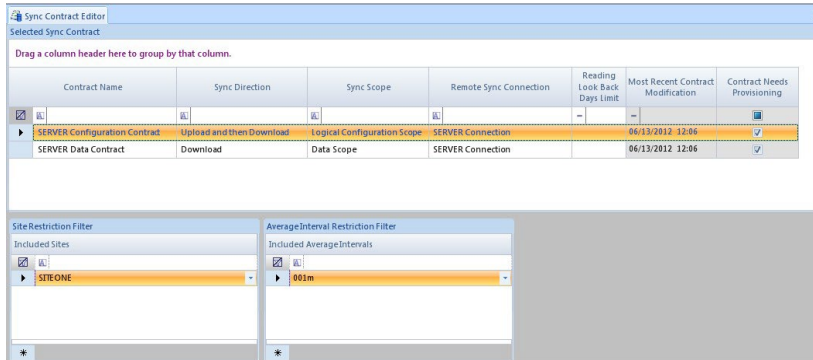
Site Restriction Filter section

Included Sites - Click the blue button at the bottom left with the asterisks and it will highlight the field. At the right end of the field click the down arrow and select which site the contract is for, then click in the white area of the section to the right, or press Enter on the keyboard to propagate the entry up to the bottom of the list.

Average Interval Restriction Filter section

Included Average Intervals - Click the blue button at the bottom left with the asterisks and it will highlight the field. At the right end of the field click the down arrow and select from the drop down list the data interval type(s)

that is to be transferred, then click in the white area of the section to the left, or press Enter on the keyboard to propagate the entry up to the bottom of the list.

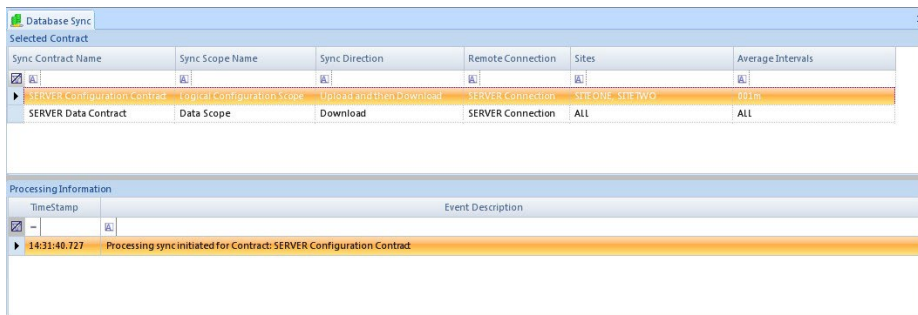


9.2.19.3 Database Sync

To set up the database sync single click Database Sync under Sync from the Utilities menu.

Under the **Selected Contract** section select the contract that is to be used. It will show in each column the information that was created in the previous sync setup screens.

Select the **Execute Contract Sync** button on the left side of the Ribbon above the Main Navigation menu, and it will process the information then give the **Time Stamp** and **Event Description** under the **Processing Information** section.



9.2.19.4 Sync Configuration Wizard

To set up the Sync using the wizard, single click Sync Configuration Wizard under Sync from the Configuration Editors menu. The wizard will open in a new window, click Next to continue.

Select Remote Node and click next.

Select Create a new Sync Connection if this is the first connection to be created. An existing sync connection can also be used if the original sync failed. Click next.

The Database Server Name or IP Address field should be filled in with the IP address of the 8872. Once this is done it will fill the name in the Connection Name field at the bottom. Uncheck the Windows Security box and enter in the “sa” user name and password for SQL. Click the Test Connection button to see if the database can be seen by the wizard. If it has a successful connection click Next to continue.

The Sync Contract Names will automatically fill in with the Name that was provided in the previous screen, but can be changed in these two fields if needed. Click Next to continue.

In the Site Restriction Filter section select the site to be configured on the 8872. In the Interval Restriction Filter select all data interval types. Click Next to continue.

Click Next to continue and save the connection.

If you choose to launch the Sync Database screen, check the box at the bottom of the Completing the wizard screen and click Finish.

9.2.20 Instrument Polling Setup

9.2.20.1 Data Source Details Screen

To add a new instrument open Data source Details and highlight the Site name in the tree menu, then select the **Add button** on the right side of the Ribbon above the Main Navigation menu, and select Instrument. A new Instrument tab will open on the right side of the screen which has multiple fields.

To open an existing instrument, click the plus sign beside of the System and Site in the tree menu to expand each. Double-click the instrument name to bring up the Instrument Name tab.

Always save your changes.

Source tab

Source Information section

Site – Defaults to the name of the site the instrument is being created for and is grayed out to indicate that it cannot be changed.

Source Name – Enter in a name that identifies the instrument.

Enabled – Click to check the box if this instrument is to be used.

Description – Enter in a description for the instrument. This is not a required field and can be left blank.

Retry Attempts – The number of times communication will be attempted in the case of communication issues. The default is 3.

Instrument Details section

Instrument Type – Click the down arrow and select an instrument name from the drop down list.

Instrument Identifier – Enter in the identifier number for the instrument.

Instrument Password – Enter in the password for the instrument if it requires one for communication.

Communication tab

Communication Routes

See Section 9.2.1.3.1.

9.2.20.2 Flag Mapping Editor

To set up the flag mapping single click the Flag Mapping Editor from the Configuration Editors menu.

To add a new flag, select the **Add button** on the left side of the Ribbon above the Main Navigation menu. It will put a blank row at the bottom of the list.

To view an existing flag highlight it in the Flag Map Name column and it will show the settings in the bottom portion of the screen.

Always save your changes.

Flag Mappings section

Flag Map Name column – Type in the name chosen for the flag.

Mapping Type - Click the down arrow and select from the drop down list the type of mapping. Choose from Binary, DecBinary, Hex, and String.

Description – Type in the reference that describes the use of the flag.

Flags section

Incoming Bit Number – Type in the number of bits if any, type in 0 if none.

Map to Reading Flag – Click the down arrow and select the flag from the drop down list.

Inhibit Flag – Check this box if this flag is to be an inhibitor.

Test Absence Of Flag – Check this box if the absence of the flag is to be tested.

Annotation Text – Type in an annotation if one is needed as a description.

9.2.20.3 Manual Instrument Poll

To run a manual instrument poll single click Manual Instrument Poll from the Utilities menu. These fields allow you to select what data you want to retrieve.

Site and Source Name – Select the site and source that you want to poll from. If using modems you can queue up what you want to poll by holding down the control key and selecting the sites you want to poll, but if using TCP it will connect and collect the data quicker than the task can be queued.

Poll Type – Select the type of data you want to retrieve. To select more than one type hold down the Control key while clicking on the poll types needing to be polled.

Date Range – Enter in start and end date range of the data that you want to retrieve. The default is the current days date and time when you open the manual poll screen.

To manual poll the selected types from the instrument select the **Start Manual Poll button** on the left side of the Ribbon above the Main Navigation menu.

To abort the manual poll before it has finished retrieving the data select the **Cancel button** on the left side of the Ribbon above the Main Navigation menu. The **Show Log Viewer** and **Scroll With Messages buttons** are selected by default so the log will appear to show the results of the download.

To clear the results sent back from the instrument from the screen select the **Clear Results button** on the left side of the Ribbon above the main Navigation menu.

Time Initiated – The time the poll started to contact the instrument.

Device – The instrument the poll is connected to.

Type – The type of data the poll is asking for.

Item Information – This shows the command string being sent and received.

Status - Shows the result sent back from the instrument, if it was good, successful, or failed with errors.

9.2.21 ADVP Editor

Automatic Data Validation Processor allows the designation of an unlimited number of logical rules to be applied to the data and, as a result of those rules, data can be flagged, graded, annotated, coded, and/or have an e-mail generated to designated users.

The ADVP's purpose is to automate the traditionally manual validation process by allowing the user to define simple or complex logical rules, and what to do when the data falls outside of those rule definitions.

Each ADVP rule consists of two main components: a trigger, and a resultant action. If the conditions of the trigger are met for a given data point, the action is taken. If not, nothing happens, and the next rule is evaluated.

A trigger consist of a number of conditions linked by logical combination (AND, OR).

To set up the ADVP editor single click the ADVP Editor from the Configuration Editors menu.

To set up a new rule select the **New Rule button** on the left side of the Ribbon above the Main Navigation menu. It will put blank fields in each section on the right side of the screen. As rules are added they will appear in the **Rule Name column** on the left of the setup screen.

To delete an existing rule highlight the rule name in the Rule Name column under Rule List that you want to remove. Select the **Delete Rule button** on the right side of the Ribbon above the Main Navigation menu. It will not prompt you to make sure you want to delete. Once the delete button is selected the rule is immediately removed from the list.

Always save your changes.

Rule Information section

Rule Details section

Rule Name – Enter in the name you want to call the rule, then save it to create the entity before adding logic.

Enabled – Check this box to allow the rule to process.

Description – Enter text describing the rule or the purpose of the rule, not required.

Average Interval field – Select the type of data against which to evaluate the rule.

Max Lookback Intervals – Enter the number of intervals to evaluate moving backward in time. On reaching the maximum if no conditions are met the rule is ignored.

Save your changes before moving on.

Actions section

Site – Select the site name from the drop down list if the condition is to be site specific.

Parameter Template – Select the parameter template from the drop down list to evaluate the rule against. Note that this is the primary connection between the rule and the data point itself. You cannot select a specific channel or parameter, only a Parameter Template.

Apply Null Code – Select the null code that properly identifies the data from the drop down list if one is needed for the condition.

Clear Null Code – Select the null code that you want cleared from the data from the drop down list if one needs to be cleared for the condition.

Add Annotation Text – Enter in any additional information pertaining to the data that needs to be annotated.

Assign Value – This will overwrite the data point with a specific value.

Assign Data Grade – Use the radio buttons to increase or decrease the value. A data grade is the level of confidence that you have in the data being good.

Apply Flag – Select the flag that is to be applied to the data in a condition from the drop down list.

Clear Flag – Select the flag that you want cleared from the data in a condition from the drop down list.

Subject – Enter in a subject for the email if sending an email.

Tag Email Urgent – Check this box to enable the urgent tag on the email.

Email Message – The message you would like attached to the email.

Conditions Triggering Rule section – The trigger is the "IF" side of the rule.

Condition List section

Condition Number – This shows the order of evaluation. To delete a condition number, highlight the row and press the delete key. It will open a message asking if you are sure you want to delete.

Logical Operator to Next – Select between the options of **AND** and **OR**, or it can be left blank to indicate there is only one condition.

Add Condition button – When this button is clicked it automatically inserts a new entry row in the Condition List.

Delete Condition button - When this button is clicked it automatically delete the entry row that is selected in the Condition List.

Condition Details section

Condition Number – Enter the number of the condition being configured.

Comparison Type section – When each subsection changes its options it causes other fields to change, fields to be added, or fields to be taken away depending on the selection made from each of the drop down lists.

Characteristic – Select from the drop down list which characteristic to leverage against the data. This is a required field. The characteristic options are Annotation Text, Flag, Value, and Variance.

Relationship – Select from the drop down list the relationship of the condition being configured. This is a required field. The relationship options will change depending on which characteristic is chosen.

When **Annotation Text characteristic** or the **Flag characteristic** is chosen the relationship options are **Contains** and **Doesn't Contain**.

When **Variance characteristic** is chosen the relationship options are **Equal To, Greater Than, and Less Than**.

When **Value characteristic** is chosen the relationship options are **Differs >, Differs <, Equal To, Greater Than, and Less Than**. If Differs > or Differs < is chosen it will bring up a Percent field.

Percent – Use the radio button or click and type in the percent that the Differs great than or less than is to use.

Compare section – The site and parameter lists will remain the same no matter what the characteristic and relationship fields are set to.

Site – Select the site from the drop down list is if it is being compared to another site, or multiple parameters being compared at a particular site.

Parameter Template – Select the parameter from the drop down list that is to be compared. Note that the Parameter Template is the only link to the data itself. Channel numbers or parameters cannot be referenced. This is a required field.

To section – Dependent on the Characteristic chosen.

When **Annotation Text** is selected for the Characteristic, and either Contains or Doesn't Contain is selected for the Relationship under the Comparison Type section, the To section changes to **Annotation Comparison Type**.

Annotation Text – Type in the text that is to be attached to the comparison condition.

When **Flag** is selected for the Characteristic and either Contains or Doesn't Contain is selected for Relationship under the Comparison Type section, the To section changes to **Flag Comparison Type**.

Flag – Click the down arrow and select the flag from the drop down list that applies to the comparison condition.

When **Variance** is selected for the Characteristic, and either Equal To, Greater Than, or Less Than is selected for the Relationship under the Comparison Type section, the To section changes to **Variance Comparison Type**.

Percentage – Use the radio buttons or click and type in the percentage that is to be used in the comparison condition.

When **Value** is selected for the Characteristic, and either Differs >, Differs <, Equal To, Greater Than or Less Than is selected for the Relationship under the Comparison Type section, the To section changes to **Value Comparison Type**.

Fixed Value – When this option is selected it turns on the Fixed Value field.

Fixed Value field – Enter in a set value that you want used in the comparison condition.

Historical Average – Does not bring up any additional fields, but instead uses historical values.

Historical Composite – When this option is selected it turns the Historical Composite Years and +/- Days fields.

Historical Composite Years field – Enter the number of years of historical data to be used in the comparison condition.

+/- Days field – Enter the number of days for the width of the composite.

Parameter Value – When this option is selected it turns the Parameter Template and Site fields.

Parameter Template – Select a parameter from the drop down list that is to be used in the comparison condition.

[Site] field – Select the site from the drop down list if the comparison condition is site specific.

Relation to Next Condition – When setting up a multi-condition rule click the down arrow and select **AND** or **OR** from the drop down list, or the field can be left blank if it is a single condition.

9.2.21.1 Task Scheduler

To add a new ADVP task, from within the Task Scheduler option (within the Configuration Editor dropdown) select the **Add button** on the left side of the Ribbon above the Main Navigation menu. A drop down list will open with jobs and tasks to select from; select ADVP Processing Task.

Always save your changes.

When adding a new task it will put a new row at the bottom of the list at the top in the Scheduled Task Selection section. As you fill in the needed information in the **Task Schedule Details section** and the **Task Details section**, the fields will fill in on the new row in the **Scheduled Task Selection section**.

Task Schedule Details Section works the same for all tasks that are scheduled.

Executive – APCPolling1 or APCPolling2.

Start Time – Enter the date and time you want the task to start running. The default is the current date and time that you create the task.

Repeat Interval – Enter an interval as a quantity and a timeframe.

Task Details Section

General Tab

Basic Task Information section

Task Name – This field defaults to the name of the task that you selected from the list, which is what will show in the Task Name column in the Scheduled Task Selection section at the top unless given a different name by the user.

Task Enabled – Check this box to enable the task. This allows for tasks to be paused without deleting the task.

Task Description – Enter in a short description. This description is what shows in the Task Description column in the Scheduled Task Selection section at the top.

ADVP Processing Options section

ADVP Rule to Process – Select which ADVP rule to run.

Advanced Tab

Retry Options section

Number of Retries - Defaults to 0. **NOTE:** All of the retries throughout the software if set are added up and used as the total retries when the automatic polling runs. The higher the retries are set to the longer it will take the poll to pass up a site that may not be communicating during the particular poll.

Interval Between Retries - Enter the interval in quantity and timeframe.

Status Logging section

Log Status Messages as: - Click the down arrow and select from the drop down list the degree of message logging desired. Each option increases in the amount of information it provides about the task as it runs. Keep in mind the higher the level the larger the log will become and the more hard drive space it will take up.

Notifications section – To add a notification click the Add... Notification button at the bottom and it will put a new line entry under Notification Type.

Notification Type – Select the type of notification.

Enabled – Allows the notification to be paused. Check the box to enable the notification.

Notification Description – Defines the notification type that has been selected.

9.3 Exporting of Data to CDPHE Website and AirNow

While the technical mechanisms by which data is consumed by outside customers is outside the scope of this SOP, the data provided to such streams is controllable via switches within AirVision.

In the Site/Parameter screen (Section 9.2.1.2) open the parameter for the data stream in question by exploding the site and double-clicking the parameter. On this screen there are three check boxes, Enabled, Enable AIRNow Reporting, and Filter From Web Site. Selecting enabled allows the parameter to be used by AirVision. Selecting Enable AIRNow Reporting allows the parameter to be delivered to AIRNow. Selecting Filter From Web Site prevents the parameter from being displayed on www.colorado.gov/airquality.

9.4 Clearing AVTrend Locked Caches

If data in channels in the Site Node Logger toolbox are not being routinely updated, noted by a stagnant timestamp, the caches may need to be cleared.

Stop the AirVision Server service (Section 9.1, use stop instead of start). Go to this folder:

C:\ProgramData\Agilaire\AirVision\Server\SiteNodeLogger\Data

In each of these three folders, Average, Ext1Average, Ext2Average, delete all data within the folders. Do not delete the folders themselves.

Restart the AirVision Server service.

If this does not cause timestamps in the Site Node Logger toolbox to refresh regularly, a complete computer restart may be required.

10 HANDLING AND PRESERVATION

See Section 15.1.1 for a synoptic view of data availability. See the Data Validation appendix of this QAPP for a discussion of data handling from the TSP to the EPA.

11 SAMPLE PRESERVATION AND ANALYSIS

No discrete samples are collected by the data loggers or Central except for resultant data from analysis. Data is preserved as discussed in Section 10.

12 TROUBLESHOOTING

12.1 Environmental Factors

Environmental conditions can play a role in the operational characteristics of data loggers but such extremes are seldom seen within an air monitoring station. If an environmental factor is affecting a data logger the probability is that the condition will be already known since analyzers in the shelter are far more sensitive to such factors.

12.2 General Factors

Power to the site is another factor that can contribute to data loss. Incoming power needs to be stable and have a good waveform.

13 DATA ACQUISITION, CALCULATIONS, AND DATA REDUCTION

Originally, ink-pen strip chart recorders were used by the APCD as a primary record of data from air monitoring instruments. Hourly averages were then hand-interpreted from these charts. Today, due to advances in data storage and retrieval systems, these ink-pen strip chart recorders are no longer in use. Instead, all data are now collected, stored, and retrieved digitally from data loggers. The terms data logger and onsite data acquisition system are used interchangeably throughout this SOP.

13.1 Data Acquisition

The APCD/TSP data acquisition system (DAS) is comprised of three components: an onsite primary data acquisition system that collects data from all continuous monitoring equipment, an onsite secondary data acquisition system, or back-up system that collects data from the continuous monitoring equipment, and a centralized central polling system that routinely collects data from the primary data acquisition system and stores it in a SQL database for processing and validation. The on-site data logger and Central have been thoroughly discussed above.

13.1.1 Secondary Onsite Data Acquisition Systems

The APCD uses two different data acquisition systems to provide backup data in case of failure of the primary systems. The backup data acquisitions systems are the analyzer based on-board data acquisition systems that are

unique to each manufacturer. In the event an on-board data acquisition system is not available (as with the 48C), a digital strip chart recorder is used. Internal data logging is available on the newer Thermo and Teledyne Air Pollution Instrumentation (TAPI) analyzers. A description of these secondary data acquisition systems are as follows.

Monarch Instruments DataChart DC1250 2 Channel Paperless Recorder

The Monarch DC1250 DataChart is a 2 channel paperless digital data recorder data capture rates up to 100 samples per second. Data in the air monitoring network is captured over two 0-1V DC analog input channels. Internal data buffer is 24K RAM, which enables the memory card to be removed without loss of data. A maximum sample storage rate of 100 samples per second can be set for both channels allowing for capture of short duration process signals anomalies. CompactFlash™ cards up to 2 Gigabyte size can be used allowing many data points to be stored over long periods of time. Cards will not routinely be swapped. Occasionally a card will be exchanged to verify the ability to retrieve the data at the APCD office. Monthly validation of data being recorded for the previous month will otherwise suffice to verify the ability of the backup system (Monarch Instruments, MLK 071612 Rev1.62).

Teledyne iDAS System

The TAPI internal data acquisition system (iDAS) is available on all analyzers. The non-volatile memory retains the data even when the instrument is powered off or the firmware is updated (back up before update advised). Access to the iDAS is available either through the front panel or the APICOM remote interface. The remote interface allows for data to be automatically downloaded to a remote PC. The iDAS is flexible in the parameters stored and triggering events to initiate data storage. The maximum iDAS data storage is limited to the analyzers available memory and the number of data parameters and channels.

Thermo Internal Data Logging System

The Thermo internal data logging is available for both the 48C and the 48i-TLE CO analyzers. The data is stored in memory on the C-Link Board, which is powered by a +5 volt battery when the instrument power is off. The internal data logging settings and data are accessible through the remote interface iPort software for both 48C and 48i-TLE analyzers. The 48i-TLE also allows for front panel access to the internal data logging menu. The 48C is very limited in the amount of data storage due to the small memory size. For long record storage on the 48C, which include diagnostic variables as well as 1 minute average concentrations, a maximum of 1 day of records is stored before being overwritten. The short record, which is the concentrations, with an averaging period of 1 minute has a maximum of 2.5 days of data storage. The 48i-TLE however, has significantly more memory. Allocating 70% of the available memory will allow for 168 days worth of long records, using a 1 minute averaging period for concentrations.

13.2 Calculations and Data Reduction

As mentioned above, data collected on a DAS are available as soon as the averaging period is complete. Data are polled automatically via modems (analog phone, wireless cellular, or DSL) by the Central polling computer hourly. If needed, sub-hourly polls or remote checks can also be performed.

Data from the continuous air monitoring equipment are generally stored at hourly and minute resolution averages. The software on the Central polling computer stores the downloaded minute and hourly averages and is capable of aggregating these averaging intervals into larger averaging intervals such as 8-hour or 24-hour averages.

A more detailed description of the DAS is given in the manufacturers' operators manual.

14 COMPUTER HARDWARE AND SOFTWARE

The primary DAS Central polling computer is a Windows based server. The Airvision data system on this server provides for polling the sites using dial-up modems and broadband access for data. A printer is attached to the system for printing out reports. The primary repository for data, and the engine for information assembly, is the Microsoft SQL Server operated and maintained by the Governor’s Office of Information Technology. The CDPHE/APCD/TSP maintains a database owner position responsible for logical maintenance of the data system.

The 8872 is a Windows based PC with attached monitor, keyboard, and mouse. The 8832 and 8816 are proprietary hard-circuit systems that may or may not have attached screens and keyboards. Sites usually include other computer hardware and software such as switches, RS232 cables, Ethernet cables, and analog cables.

15 DATA MANAGEMENT AND RECORDS MANAGEMENT

15.1 Data Management

Data are generated from the analyzer at intervals internally set, ranging from an averaging time of 20 seconds to 5 minutes. The data is collected by the on-site data logger as near-real-time data (often every 3 to 10 seconds) and is aggregated into 1-minute averages, which are in turn aggregated into 1-hour averages. Some data streams may be stored at a third averaging interval, meteorological data can be stored as a 15-minute average and SO₂ data can be stored in a 5-minute average. Note the capacity of the on-site data logger is limited to three time-base averaging intervals and that the 5-minute SO₂ average supersedes the 15-minute meteorological average. The Central polling computer collects these averages routinely.

For reporting purposes, other averaging intervals are derived, such as an 8-hour moving average for ozone. In these cases, the data is aggregated by the Central polling computer for the purpose of the report and are often not stored independently. The Central polling computer connects to a SQL server, which is maintained, and backed up, by the Office of Information Technology.

Data are sent to the EPA centralized Air Quality System (AQS) database for long-term storage. Additionally, the data are stored and archived by the APCD/TSP in both electronic and hard copy formats. Monthly electronic data files and related printed material packets (maintenance forms, etc.) are produced.

A more detailed description of the data management is given in the Data Processing Central SOP in the CDPHE/APCD/TSP QAPP.

15.1.1 System Redundancy

Data generated by an analyzer is available to manually download for up to 30 days. While methods differ between manufacturers, generally a laptop can be connected to the instrument and the internal data storage can be recovered. This data can then be integrated into the AirVision Central system.

Data is stored in the data logger for up to 30 days in non-volatile memory that will withstand a power failure. Data is collected at least once per hour by Central where criteria data is stored in perpetuity (see Section 8.1.1 for a discussion about long-term Central storage and database bifurcation) and diagnostic data is stored for six weeks. Diagnostic data is purged after this period and is not recoverable aside from database backups managed by GOIT. Data in the GOIT data warehouse, which is the actual data storage location once data has been polled from the data logger, is backed up once per day and off-site once per week in accordance with a Memorandum of Understanding with GOIT.

15.2 Records Management

Continuous ambient air monitoring data are archived both in electronic and hard-copy formats. Electronic data and calibration files from the primary DAS are archived. Data from the backup electronic strip chart recorders, where used, are downloaded annually and archived on a computer hard drive. Hard copy printouts of the data are kept at the APCD office for a minimum of three full calendar years before being sent to an off-site archive/storage facility.

16 QUALITY ASSURANCE AND QUALITY CONTROL

Quality assurance and quality control are two terms commonly discussed, but often confused. Quality assurance refers to the overall process of ensuring that the data collected meet previously stated Data Quality Indicators (DQI) and associated measurement quality objectives (MQOs). The principal DQIs are precision, bias, representativeness, completeness, comparability, and sensitivity. The principal MQO's are parameter specific and are listed in CDPHE's QAPP. Guidance for developing DQI's and MQO's is given in EPA's Quality Assurance Handbook (US EPA, 2013). Quality control covers specific procedures established for obtaining and maintaining data collection within those limits.

16.1 Quality Assurance

The goal of the quality assurance program is to control measurement uncertainty to an acceptable level through the use of various quality control and evaluation techniques. The entire Quality Assurance effort put forward by the APCD is too large to include here. The scope of this SOP will describe efforts taken by site operators and data validation personnel to ensure the quality of the data collected meets standards set forth in various sections of the *Code of Federal Regulations*. For a complete description of the Quality Assurance and Quality Control process undertaken by the APCD, see the appropriate quality assurance appendices in the QAPP. Two of the most significant Quality Assurance procedures are described below.

16.1.1 Audits

Audits are evaluation processes used to measure the performance of effectiveness of a system and its elements. APCD quality assurance staff performs two types of audits. These audits are performed at a frequency as described in APCD QAPP.

Systems Audits - A systems audit is an on-site review and inspection of an ambient air monitoring program or air monitoring site to assess its compliance with established regulations governing the collection, analysis, validation, and reporting of ambient air quality data. This also includes audits of the data processing and validation systems.

Performance Audits - A performance audit is a type of audit in which the quantitative data generated in a measurement system are obtained independently and compared with routinely obtained data to evaluate the proficiency of an analyst, laboratory, or measurement system. Two types of performance audits discussed below.

- **Monitoring Organization Performance Audits** - These performance audits are used to provide an independent assessment of the measurement operations of each instrument being audited. This is accomplished by comparing performance samples or devices of "known" concentrations or values to the values measured by the instruments being audited. Detailed information about how specific audits are performed can be found in the Quality Assurance SOPs section.
- **National Performance Evaluation Program (NPEP)** - These performance audits are implemented at the federal level although some programs may be implemented by the monitoring organizations if certain requirements are met.

16.1.2 Data Quality Assessment

Data Quality Assessment is used to assess the type, quantity, and quality of data in order to verify that the planning objectives, Quality Assurance Project Plan components, and sample collection procedures were satisfied and that the

data are suitable for its intended purpose. Data Quality Assessment is a five-step procedure for determining statistically whether or not a data set is suitable for its intended purpose. This assessment is a scientific and statistical evaluation of data to determine if it is of the type, quantity, and quality needed and is performed annually by quality assurance staff to check if objectives were met.

16.2 Quality Control

Quality Control is the overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the Quality Assurance Project Plan or by the EPA. Quality control includes establishing specifications or acceptance criteria for each quality characteristic of the monitoring/analytical process, assessing procedures used in the monitoring/analytical process to determine conformance to these specifications, and taking any necessary corrective actions to bring them into conformance.

Quality control refers to procedures established for collecting data within pre-specified tolerance limits. These pre-specified tolerances are defined in the Measurement Quality Objectives as defined in APCD's QAPP. While all Quality Control procedures are important, the most significant procedure employed by the APCD is the routine measurement of a known test gas by gaseous analyzers. All procedure documented in this SOP are Quality Control procedures because they allow the analytical systems to continue running in exceptional condition and serves to identify and prevent out-of-control conditions as defined by APCD MQO's. By definition, the creation and use of this SOP is a Quality Control function. All Quality Control procedures are described in Sections 9 of this SOP.

16.2.1 Documentation

Documentation is an important component of the quality control system. Extensive certification paperwork and log sheets must be rigorously maintained for maintenance procedures, data validation procedures, standards and analyzers. APCD takes special care to prepare and preserve backup copies of all data, especially calibration data. All data and supporting documentation should be held on-site for a minimum of three calendar years then sent for offsite archive. See Section 15 for additional information.

17 BIBLIOGRAPHY

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Figure 11. Channel Configuration Report

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Parameter Name	Source Name	Logger Id	Channel #	Channel Name	Units	Type	Round Precision	Intervals			Storage			Analog Input Channel	Input Channel	Input		Output		Hold Between Updates	Secondary Input Channel	Input Interval Name	Rolling Interval Name	Duration Interval	Storage Interval
								Base	Ext 1	Ext 2	Base	Ext 1	Ext 2			High	Low	High	Low						
CO Internal Temperature	LACASA	14	24	COINTTMP	DEGC	Q	1	001m	015m	001h	2H		1D	1						True					
PM10_r	LACASA	14	92	PM10_R	ug*10	I	0	001m	015m	001h	001d	1D	4D	1						False					
NOY	LACASA	14	10	NOY	PPB	Q	1	001m	015m	001h	3H		33D	1						False					
CO Motor Speed	LACASA	14	31	COMOTOSP	PERCENT	Q	1	001m	015m	001h	4H		33D	1						False					
PMFINE_H	LACASA	14	80	PMFine_h	UG/M3	I	1	001m	006m	001h	1D	1D	4D	1						False					
TempK	LACASA	14	77	TempK	DEGK	M	1	001m	006m	001h	1D	1D	4D	1						False					
PMFINE	LACASA	14	81	PMFine	UG/M3	M	0	001m	006m	001h	001d	1D	10D							False					
SO2 RCell Temperature	LACASA	14	67	SORCTEMP	DEGC	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True					
SO2 UV Lamp	LACASA	14	58	SOUVLAMP	MVOLTS	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True					
PMFSTAT	LACASA	14	90	PMFSTAT	None	I	0	001m	006m	001h	001d	1D	4D	1						False					
Cal Dil Gas Pressure	LACASA	14	75	CADPRESS	None	I	0	001m	015m	001h	1H			1						True					
O3	LACASA	14	4	O3	PPM	I	3	001m	015m	001h	003D		033D	02		1	0	0.5	0	False					
SO2 PMT Temperature	LACASA	14	69	SOPMTTMP	DEGC	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True					
CO Coefficient	LACASA	14	30	COCOEFF	None	Q	1	001m	015m	001h	2H		1D	1						True					
NOx Converter Temperature	LACASA	14	47	NOCONTMP	DEGC	Q	1	001m	015m	001h	2H		1D	1						True					
CAPS NO2	LACASA	14	2	CAPSNO2	PPB	Q	1	001m	015m	001h				1						False					
SO2 Stability	LACASA	14	54	SOSTABIL	PPB	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True					
SO2MAX	LACASA	14	12	SO2MAX	PPB	C	0	001h	015m	001h	001d			1	11					False			001H	031D	
NOx Box Temperature	LACASA	14	45	NOBOXTMP	DEGC	Q	1	001m	015m	001h	2H		2D	1						True					
SO2 Box Temperature	LACASA	14	68	SOBOXTMP	DEGC	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True					
O3 Measurement	LACASA	14	32	O3MEASUR	MVOLTS	I	1	001m	015m	001h	2H		1D	1						True					
SO2 Stray Light	LACASA	14	60	SOSTRLGT	PPB	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True					
TEMPU	LACASA	14	21	TEMPU	DEGF	A	2	001m	015m	001h	004H	004D	032D	11		1	0	122	-58	False					
NOX	LACASA	14	9	NOX	PPB	Q	0	001m	015m	001h	3D		032D	16		1	0	1000	0	True					

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General Value

Parameter Name	Source Name	Logger Id	#	Channel Name	Units	Type	Round Precision	Intervals			Storage			Analog Input Channel	Input Channel	Input		Output		Hold Between Updates	Secondary Input Channel	Input Interval Name	Rolling Interval Name	Duration Interval	Storage Interval
								Base	Ext 1	Ext 2	Base	Ext 1	Ext 2			High	Low	High	Low						
NOx Ozone Flow	LACASA	14	42	NOO3FLOW	ATM	Q	1	001m	015m	001h	2H	1D	1												True
O3CAL	LACASA	14	6	O3CAL	PPM	Q	3	001m	015m	001h	4H	33D	07			1	0	0.5	0						False
PM10STP	LACASA	14	91	PM10STP	UG/M3	M	1	001m	015m	001h	004D	1D	010D												False
NOx Sample Pressure	LACASA	14	49	NOSAMPRS	INHG	Q	1	001m	015m	001h	2H	1D	1												True
CO Signal Ratio	LACASA	14	29	COSR	None	Q	1	001m	015m	001h	2H	1D	1												True
RHamb_R	LACASA	14	96	RHamb_R	VAR	I	0	001m	015m	001h	001d	1D	4D	1											False
WD	LACASA	14	17	WD	DEG	4	1	001m	015m	001h	004H	004D	032D	03		1	0	540	0						False
TDIFF	LACASA	14	3	TDIFF	DEGF	P	1	001m	015m	001h				1											False
SO2 Dark Lamp	LACASA	14	62	SODRKLMP	MVOLTS	I	0	001m	005m	001h	2H	1D	05			1	0	500	0						True
WS	LACASA	14	15	WS	MPH	3	1	001m	015m	001h	004H	004D	032D	02		1	0	100	0						False
CO Chamber Temperature	LACASA	14	25	COCHMTMP	DEGC	Q	1	001m	015m	001h	2H	1D	1												True
O3 Sample Pressure	LACASA	14	34	O3PRESSU	INHG	I	1	001m	015m	001h	2H	1D	1												True
NOx Sample Flow	LACASA	14	41	NOSAMFLO	ATM	Q	1	001m	015m	001h	2H	1D	1												True
Pamb_R	LACASA	14	95	Pamb_R	VAR	I	0	001m	015m	001h	001d	1D	4D												False
NO2	LACASA	14	8	NO2	PPB	Q	0	001m	015m	001h	3D	032D	04			1	0	1000	0						True
RH	LACASA	14	20	RH	None	A	1	001m	015m	001h	004H	003D	032D	14		1	0	100	0						False
AMBDEW	LACASA	14	85	AMBDEW	DEGC	I	0	001m	006m	001h	001d	1D	10D	1											False
SO2 HVPS	LACASA	14	65	SOHVPS	VOLTS	I	0	001m	005m	001h	2H	1D	05			1	0	500	0						True
Cal Cal Gas Pressure	LACASA	14	74	CACPRESS	None	I	0	001m	015m	001h	1H		1												True
NOx PMT Temperature	LACASA	14	46	NOPMTTMP	DEGC	Q	1	001m	015m	001h	2H	1D	1												True
O3 Cell Temperature	LACASA	14	36	O3CELTMP	DEGC	I	1	001m	015m	001h	2H	1D	1												True
RefMC	LACASA	14	83	RefMC	UG/M3	I	0	001m	006m	001h	001d	1D	4D	1											False
ACTCONC	LACASA	14	13	ACTCONC	PPB	I	0	001m	015m	001h	4H	3D	1												True
PMFLOAD	LACASA	14	88	PMFLOAD	PERCENT	A	0	001m	006m	001h	001d	1D	4D	9				100	0						False

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Parameter Name	Source Name	Logger Id	#	Channel Name	Units	Type	Round Precision	Intervals			Storage			Analog Input Channel	Input Channel	Input		Output		Hold Between Updates	Secondary Input Channel	Input Interval Name	Rolling Interval Name	Page Valid 24	Duration Interval	Storage Interval
								Base	Ext 1	Ext 2	Base	Ext 1	Ext 2			High	Low	High	Low							
RS	LACASA	14	16	RS	MPH	I	1	001m	015m	001h	004H	004D	032D	02		1	0	100	0	False						
PAMB	LACASA	14	79	PAMB	LPM	M	0	001m	015m	001h	001d	1D	4D							False						
O3 Offset	LACASA	14	40	O3OFFSET	PPB	I	1	001m	015m	001h	2H		1D	1						True						
RHAMB	LACASA	14	86	RHAMB	None	M	0	001m	006m	001h	001d	1D	10D							False						
BaseMC	LACASA	14	82	BaseMC	UG/M3	I	0	001m	006m	001h	001d	1D	4D	1						False						
SO2 Sample Pressure	LACASA	14	55	SOPRESSU	INHG	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True						
ITEMP	LACASA	14	14	ITEMP	DEGF	A	1	001m	015m	001h	002H	001H	007D	08		5	1	135	-29	False						
O3 Photo Lamp Temperature	LACASA	14	37	O3PHLTMP	DEGC	I	1	001m	015m	001h	2H		1D	1						True						
CO ACG Intensity	LACASA	14	28	COACG	Hz	Q	1	001m	015m	001h	2H		1D	1						True						
CO Bias Voltage	LACASA	14	23	COBIASVT	VOLTS	Q	1	001m	015m	001h	2H		1D	1						True						
SO2 Dark PMT	LACASA	14	61	SODRKPMT	MVOLTS	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True						
O3 Slope	LACASA	14	39	O3SLOPE	None	I	1	001m	015m	001h	2H		1D	1						True						
CO TRACE	LACASA	14	1	CO_TRACE	PPM	Q	3	001m	015m	001h	003D		033D	01		1	0	50	0	False						
SO2 Slope	LACASA	14	63	SOSLOPE	None	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True						
tamb_r	LACASA	14	94	Tamb_R	VAR	I	0	001m	015m	001h	001d	1D	4D							False						
SO2 PMT	LACASA	14	57	SOPMT	MVOLTS	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True						
Cal Target Dil Flow	LACASA	14	73	CATDFLOW	PPB	I	0	001m	015m	001h	1H			1						True						
SIGMA	LACASA	14	19	SIGMA	DEG	5		001h	004H	001h	032D	33D	0000	10	03	1	0	540	0	False						
TEMPL	LACASA	14	22	TEMPL	DEGF	A	2	001m	015m	001h	004H	004D	032D	12		1	0	122	-58	False						
SO2 Lamp Ratio	LACASA	14	59	SOLMPRTO	None	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True						
SO2 DCPS	LACASA	14	66	SODCPS	MVOLTS	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True						
PMFine_r	LACASA	14	93	PMFine_r	ug*10	I	0	001m	015m	001h	001d	1D	4D	1						False						
NOx RCell Temperature	LACASA	14	44	NORCTEMP	DEGC	Q	1	001m	015m	001h	2H		1D	1						True						
PMFNOISE	LACASA	14	87	PMFNOISE	UG/M3	I	0	001m	006m	001h	001d	1D	4D	1						False						
SO2 Offset	LACASA	14	64	SOOFFSET	PPB	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True						
Cal Actual Cal Flow	LACASA	14	70	CAACFLOW	ATM	I	0	001m	015m	001h	1H			1						True						

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Parameter Name	Source Name	Logger Id	#	Channel Name	Units	Type	Round Precision	Intervals			Storage			Analog Input Channel	Input Channel	Input		Output		Hold Between Updates	Secondary Input Channel	Input Interval Name	Rolling Interval Name	General Duration Interval
								Base	Ext 1	Ext 2	Base	Ext 1	Ext 2			High	Low	High	Low					
O3 Box Temperature	LACASA	14	38	O3BOXTMP	DEGC	I	1	001m	015m	001h	2H	1D	1							True				
SO2	LACASA	14	11	SO2	PPB	Q	0	001m	005m	001h	3D	2H	032D	05		1	0	500	0	True				
Cal Actual Diluent Flow	LACASA	14	72	CAADFLOW	ATM	I	0	001m	015m	001h	1H			1						True				
PM10LTP	LACASA	14	89	PM10ltp	UG/M3	M	0	001m	015m	001h	001d	1D	4D							False				
NOx RCell Pressure	LACASA	14	48	NORCPRES	INHG	Q	1	001m	015m	001h	2H		1D	1						True				
NO	LACASA	14	7	NO	PPB	Q	0	001m	015m	001h	3D		032D	03		1	0	1000	0	True				
NOx Offset	LACASA	14	51	NOXOFFSE	PPB	Q	1	001m	015m	001h	2H		1D	1						True				
CO Barometric Pressure	LACASA	14	26	COPRESS	MM/HG	Q	1	001m	015m	001h	2H		1D	1						True				
NO Slope	LACASA	14	52	NOSLOPE	None	Q	1	001m	015m	001h	2H		1D	1						True				
CO Sample Flow	LACASA	14	27	COFLOW	ATM	Q	1	001m	015m	001h	2H		1D	1						True				
SO2 Sample Flow	LACASA	14	56	SOSAMPFL	CC\Min	I	0	001m	005m	001h	2H		1D	05		1	0	500	0	True				
RD	LACASA	14	18	RD	DEG	2	1	001m	015m	001h	004H			03		1	0	540	0	False				
NOx HVPS	LACASA	14	43	NOHVPS	VOLTS	Q	1	001m	015m	001h	2H		1D	1						True				
O3 Sample Flow	LACASA	14	35	O3SAFLOW	ATM	I	1	001m	015m	001h	2H		2D	1						True				
Cal Target Cal Flow	LACASA	14	71	CATCFLOW	ATM	I	0	001m	015m	001h	1H			1						True				
TAMB	LACASA	14	78	TAMB	DEGC	M	0	001m	015m	001h	001d	1D	4D							False				
SMPDEW	LACASA	14	84	SMPDEW	DEGC	I	0	001m	006m	001h	001d	1D	4D	1						False				
NO Offset	LACASA	14	53	NOFFSET	PPB	Q	1	001m	015m	001h	2H		1D	1						True				
NOx Slope	LACASA	14	50	NOXSLOPE	None	Q	1	001m	015m	001h	2H		1D	1						True				
O3 Reference	LACASA	14	33	O3REFERN	MVOLTS	I	1	001m	015m	001h	2H		1D	1						True				

Figure 12. Calibration Configuration Report

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<u>Calibration Name</u>	<u>Start Time</u>	<u>Repeat Interval</u>	<u>Recovery Time</u>	<u>Phase Name</u>	<u>Phase Number</u>	<u>Duration</u>	<u>Response Time</u>	<u>Status Pattern</u>	<u>Affected Channel</u>
CNO2-SPZ	06/26/12 20:46	2D	2M	CHARCHEK	1	10M	5S		CAPSNO2
	06/26/12 20:46	2D	2M	NO2-SPAN	3	20M	5M	20	CAPSNO2
	06/26/12 20:46	2D	2M	NO2-SPAN	3	20M	5M	20	ACTCONC
CNO2-ZPR	06/25/12 20:46	2D	2M	CHARCHEK	1	10m	5m	18	CAPSNO2
	06/25/12 20:46	2D	2M	NO2-PREC	3	20M	5M	22	CAPSNO2
	06/25/12 20:46	2D	2M	NO2-PREC	3	20M	5M	22	ACTCONC
	06/25/12 20:46	2D	2M	NO2-ZERO	4	10M	5M	13	CAPSNO2
CO-SP-Z	06/26/12 21:46	2D	002M	CO-SPAN	1	010M	005M	14	ACTCONC
	06/26/12 21:46	2D	002M	CO-SPAN	1	010M	005M	14	CO_TRACE
	06/26/12 21:46	2D	002M	CO-ZERO	2	010M	005M	13	CO_TRACE
CO-Z-PRE	06/25/12 21:46	2D	002M	CO-PREC	1	012M	005M	1,15	ACTCONC
	06/25/12 21:46	2D	002M	CO-PREC	1	012M	005M	1,15	CO_TRACE
	06/25/12 21:46	2D	002M	CO-ZERO	2	009M	005M	1,13	CO_TRACE
NOX-CE	08/26/12 02:46	7D	2M	NO-SPAN	1	20M	5M	23	NO2
	08/26/12 02:46	7D	2M	NO-SPAN	1	20M	5M	23	NO
	08/26/12 02:46	7D	2M	NO-SPAN	1	20M	5M	23	NOY
	08/26/12 02:46	7D	2M	NO-SPAN	1	20M	5M	23	ACTCONC
	08/26/12 02:46	7D	2M	NO2-SPAN	2	20M	5M	24	NO
	08/26/12 02:46	7D	2M	NO2-SPAN	2	20M	5M	24	NO2
	08/26/12 02:46	7D	2M	NO2-SPAN	2	20M	5M	24	NOY
	08/26/12 02:46	7D	2M	NO2-SPAN	2	20M	5M	24	ACTCONC
	08/26/12 02:46	7D	2M	NPN-SPAN	3	10M	5M	25	NO
	08/26/12 02:46	7D	2M	NPN-SPAN	3	10M	5M	25	NOY
	08/26/12 02:46	7D	2M	NPN-SPAN	3	10M	5M	25	NO2
	08/26/12 02:46	7D	2M	NPN-SPAN	3	10M	5M	25	ACTCONC
	08/26/12 02:46	7D	2M	NOY-ZERO	4	10M	5M	13	NOY
	08/26/12 02:46	7D	2M	NOY-ZERO	4	10M	5M	13	NO2
	08/26/12 02:46	7D	2M	NOY-ZERO	4	10M	5M	13	NO
NOX-SP-Z	06/26/12 19:46	2D	2M	CHARCHEK	1	10M	5S		NOY
	06/26/12 19:46	2D	2M	CHARCHEK	1	10M	5S		NO2
	06/26/12 19:46	2D	2M	CHARCHEK	1	10M	5S		NO
	06/26/12 19:46	2D	2M	NO-SPAN	2	15M	5M	19	NO2

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<u>Calibration Name</u>	<u>Start Time</u>	<u>Repeat Interval</u>	<u>Recovery Time</u>	<u>Phase Name</u>	<u>Phase Number</u>	<u>Duration</u>	<u>Response Time</u>	<u>Status Pattern</u>	<u>Affected Channel</u>
NOX-SP-Z	06/26/12 19:46	2D	2M	NO-SPAN	2	15M	5M	19	NOY
	06/26/12 19:46	2D	2M	NO-SPAN	2	15M	5M	19	ACTCONC
	06/26/12 19:46	2D	2M	NO-SPAN	2	15M	5M	19	NO
	06/26/12 19:46	2D	2M	NO2-SPAN	3	20M	5M	20	NO
	06/26/12 19:46	2D	2M	NO2-SPAN	3	20M	5M	20	NO2
	06/26/12 19:46	2D	2M	NO2-SPAN	3	20M	5M	20	NOY
	06/26/12 19:46	2D	2M	NO2-SPAN	3	20M	5M	20	ACTCONC
	06/26/12 19:46	2D	2M	NOX-ZERO	4	15M	5M	13	NOY
	06/26/12 19:46	2D	2M	NOX-ZERO	4	15M	5M	13	NO2
NOX-Z-PR	06/26/12 19:46	2D	2M	NOX-ZERO	4	15M	5M	13	NO
	06/27/12 19:46	2D	2M	CHARCHEK	1	10m	5m	18	NOY
	06/27/12 19:46	2D	2M	CHARCHEK	1	10m	5m	18	NO2
	06/27/12 19:46	2D	2M	CHARCHEK	1	10m	5m	18	NO
	06/27/12 19:46	2D	2M	NO-PREC	2	10M	5M	21	NO2
	06/27/12 19:46	2D	2M	NO-PREC	2	10M	5M	21	NOY
	06/27/12 19:46	2D	2M	NO-PREC	2	10M	5M	21	ACTCONC
	06/27/12 19:46	2D	2M	NO-PREC	2	10M	5M	21	NO
	06/27/12 19:46	2D	2M	NO2-PREC	3	20M	5M	22	NO
	06/27/12 19:46	2D	2M	NO2-PREC	3	20M	5M	22	NO2
	06/27/12 19:46	2D	2M	NO2-PREC	3	20M	5M	22	NOY
	06/27/12 19:46	2D	2M	NO2-PREC	3	20M	5M	22	ACTCONC
	06/27/12 19:46	2D	2M	NO2-ZERO	4	10M	5M	13	NOY
	06/27/12 19:46	2D	2M	NO2-ZERO	4	10M	5M	13	NO2
	06/27/12 19:46	2D	2M	NO2-ZERO	4	10M	5M	13	NO
O3-SP-Z	06/26/12 21:46	2D	002M	O3-SPAN	1	010M	005M	30	O3
	06/26/12 21:46	2D	002M	O3-SPAN	1	010M	005M	30	O3CAL
	06/26/12 21:46	2D	002M	O3-ZERO	3	009M	005M	28	O3
	06/26/12 21:46	2D	002M	O3-ZERO	3	009M	005M	28	O3CAL
O3-Z-PRE	06/25/12 21:46	2D	002M	O3-PREC	1	011M	005M	29	O3
	06/25/12 21:46	2D	002M	O3-PREC	1	011M	005M	29	O3CAL
	06/25/12 21:46	2D	002M	O3-ZERO	3	008M	005M	28	O3
	06/25/12 21:46	2D	002M	O3-ZERO	3	008M	005M	28	O3CAL

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<u>Calibration Name</u>	<u>Start Time</u>	<u>Repeat Interval</u>	<u>Recovery Time</u>	<u>Phase Name</u>	<u>Phase Number</u>	<u>Duration</u>	<u>Response Time</u>	<u>Status Pattern</u>	<u>Affected Channel</u>
QC-CNO2	02/22/13 00:00	001D	005M	CHARCHEK	1	10M	5M		CAPSNO2
QC-CNO2	02/22/13 00:00	001D	005M	NO2-PREC	3	10M	5M		CAPSNO2
	02/22/13 00:00	001D	005M	NO2-PREC	3	10M	5M		ACTCONC
	02/22/13 00:00	001D	005M	NO2-ZERO	4	10M	5M		CAPSNO2
QC-CO	02/22/13 00:00	001D	2M	CO-PREC	1	10M	5M		ACTCONC
	02/22/13 00:00	001D	2M	CO-PREC	1	10M	5M		CO_TRACE
	02/22/13 00:00	001D	2M	CO-ZERO	2	10M	5M		CO_TRACE
QC-NOX	02/22/13 00:00	001D	005M	CHARCHEK	1	10M	5M		NOY
	02/22/13 00:00	001D	005M	CHARCHEK	1	10M	5M		NO2
	02/22/13 00:00	001D	005M	CHARCHEK	1	10M	5M		NO
	02/22/13 00:00	001D	005M	NO-PREC	2	10M	5M		NOY
	02/22/13 00:00	001D	005M	NO-PREC	2	10M	5M		NO2
	02/22/13 00:00	001D	005M	NO-PREC	2	10M	5M		ACTCONC
	02/22/13 00:00	001D	005M	NO-PREC	2	10M	5M		NO
	02/22/13 00:00	001D	005M	NO2-PREC	3	10M	5M		NOY
	02/22/13 00:00	001D	005M	NO2-PREC	3	10M	5M		NO2
	02/22/13 00:00	001D	005M	NO2-PREC	3	10M	5M		ACTCONC
	02/22/13 00:00	001D	005M	NO2-PREC	3	10M	5M		NO
	02/22/13 00:00	001D	005M	NOX-ZERO	4	10M	5M		NOY
	02/22/13 00:00	001D	005M	NOX-ZERO	4	10M	5M		NO2
	02/22/13 00:00	001D	005M	NOX-ZERO	4	10M	5M		NO
	02/22/13 00:00	001D	005M	CHARCHEK	6	010M	005M	13	CAPSNO2
	02/22/13 00:00	001D	005M	NO2-PREC	7	015M	005M		CAPSNO2
	02/22/13 00:00	001D	005M	NO2-PREC	7	015M	005M		ACTCONC
	02/22/13 00:00	001D	005M	NO2-ZERO	8	015M	005M		CAPSNO2
QC-O3	02/22/13 00:00	001D	2M	O3-PREC	1	10M	5M		O3
	02/22/13 00:00	001D	2M	O3-PREC	1	10M	5M		O3CAL
	02/22/13 00:00	001D	2M	O3-ZERO	3	10M	5M		O3
	02/22/13 00:00	001D	2M	O3-ZERO	3	10M	5M		O3CAL
QC-SO2	02/22/13 00:00	001D	2M	SO2-PREC	2	10M	5M		ACTCONC
	02/22/13 00:00	001D	2M	SO2-PREC	2	10M	5M		SO2
	02/22/13 00:00	001D	2M	SO2-ZERO	3	10M	5M		SO2

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Affected Channel

<u>Calibration Name</u>	<u>Start Time</u>	<u>Repeat Interval</u>	<u>Recovery Time</u>	<u>Phase Name</u>	<u>Phase Number</u>	<u>Duration</u>	<u>Response Time</u>	<u>Status Pattern</u>	<u>Affected Channel</u>
SO2-SP-Z	06/26/12 22:16	2D	003M	SO2-SPAN	1	13m	5m	11,16,23	ACTCONC
SO2-SP-Z	06/26/12 22:16	2D	003M	SO2-SPAN	1	13m	5m	11,16,23	SO2
	06/26/12 22:16	2D	003M	SO2-ZERO	2	38m	5m	13	SO2
SO2-Z-PR	06/25/12 22:16	2D	003M	SO2-PREC	1	13m	5m	11,17	ACTCONC
	06/25/12 22:16	2D	003M	SO2-PREC	1	13m	5m	11,17	SO2
	06/25/12 22:16	2D	003M	SO2-ZERO	2	38M	005M	13	SO2