

Appendix A – System Description Details

This section of the document will walk you through the flow of data in AirVision and detail the features and advantages at each step. The RFQ Responses reference sections of this document to provide additional detail. The sections are ordered as:

1. Company Overview
 - a. Overview of Offering
 - i. System Architecture Diagram
 - ii. Hosted or Self-Hosted
 - b. Customizations / Enhancements
 - c. Small Sensor Strategy
2. Model 8872 Data Logger (site data collection)
3. AirVision Data Acquisition Engine
 - a. Generic File Import Tool
 - b. Direct Instrument Polling
 - c. Logger Polling
4. Automatic Data Validation Process (real-time data screening)
 - a. Real-Time Notification
5. Manual Data QA (data editor)
6. Internal Agency Reports
7. Electronic Logbook, Asset and Work Item Tracking
 - a. AV-Doc Electronic Document Management
8. Camera Integration
9. Public Information Web Site
 - a. Public Notification System
10. Database Connectivity and Data Interchange
11. Client User Interface and Browser Client Options
12. Database Self-Management and Disaster Recovery Methods
13. Project Support
 - a. Support Capabilities
 - b. User Acceptance Test
 - c. Training
 - d. Key Personnel Resumes
14. Change Management Process

Appendix B – Sample Reports

Appendix C - Reference / Similar Projects

Appendix D – Hosting and Disaster Recovery Policies

Appendix E – Agilaire Company Disaster Recovery Plan

1. Company Overview

Company Overview

Agilaire (www.agilaire.com) and its predecessor, ESC, has been the supplier of continuous air monitoring data loggers and data collection systems since 1979, and has constantly pushed monitoring technology forward in improved data collection devices, digital analyzer communications, direct poll of instruments (to eliminate loggers where not necessary), and wireless/IP communications. Our experience covers every ambient monitoring instrument and some of the most unusual applications and requirements.

Agilaire is a Tennessee LLC founded in December 2005. Agilaire is a private company with one owner, its principal and President, Mr. Steve Drevik.

Agilaire maintains two office locations totaling 4,900 SF in the same office park in North Knoxville, at 2904-B Tazewell Pike, Suite A, Knoxville, TN 37918 (tel: 865-927-9440). Agilaire is a Microsoft Certified Gold Partner for Web Development and as Independent Software Vendor (ISV).

The primary engineering office is for its nine professional staff members (President, Information Officer, two support specialists, two project engineers, and three senior-level software developers). The Production Annex houses our production/repair technician and the Model 8864/8872 production and repair facilities and inventory. Key resumes of personnel involved in this project are included.

For a project of this size, our anticipation of resources would involve:

- Hosting Director (Paul Yankey) – setup of hosted system or assistance with setup of self-hosted environment; AgileWeb integrations.
- Project Manager (Debra Grey) – Conversion of data, configuration, site installation, on-site training. Assuming the DOH chooses to update 2 sites per month, conversion could be complete within the first year (if the DOH wishes to accelerate that schedule, we can support that as well).
- President (Steve Drevik)- project management and oversight.
- Support (Rena' Dykes) – Ongoing user support
- Development (Randy Brown, Scott Wood) – provide any enhancements to the standard product required to meet the requirements of this project.

Agilaire's employee count has maintained at this level (9 employees) for the last five years. No overseas employees or call centers are used. Agilaire utilizes full time, permanent employees, and minimizes use of subcontractors whenever possible. We feel strongly that the need to keep development and support staff in-house and working closely together is critical to the mission of providing the best technical support, and quickly resolving any customer or software issues. The only subcontractor currently used by Agilaire is a technical editor (who does mostly formatting, not the generation of the content), given the sporadic need for updating our standard documentation. Any project-specific documentation is usually developed by the project engineer to ensure its accuracy and that it reflect all field changes in a timely manner.

Agilaire maintains strong, direct relationships with many of the major vendors and integrators in this market (Teledyne-API, Thermo Fischer Scientific, Consolidated Analytical Systems, 2B Tech, TSI, Grimm, Vaisala, MetOne, Purple Air, AirPointer, etc.) to maintain the AirVision / Site Node Logger functionality with the latest equipment, technology, and processes.

Expected Goals

Our objectives and desired outcomes are to quickly provide an updated data management system and site data acquisition network that improves DOH workflow, and provides a foundation for a mutually beneficial relationship for decades to come, like we have enjoyed.

a. Overview of Offering

AirVision may be licensed as a permanent license for on-premise hosting, or contracted as a hosted Software as a Service (SaaS). SaaS includes services for applying regular upgrades and enhancements, as well as managing backups, OS patches, etc. For this project, the SaaS model will be provided.

The goal of the project is to improve the workflow and reliability of the system for DOH staff, by modernizing their existing system to the more modern AirVision platform, and to provide a solid, expandable, modular software platform that can be supported and expanded over time to meet new requirements (small / evolving sensor technology, communication technologies, EPA requirements, etc.)

Agilaire Advantage: Technology

AirVision and its family of related products, AV-Trend and the Site Node Logger, all were developed with many of the goals of most enterprise-level air quality agencies in mind. Specific examples include:

- Scalability- AirVision has no logical limit in the number of sites, parameters, calibrations, or other entities that can be supported, proven with two systems running over 120 sites and 2500 parameters on a single server. Server tasks can be scaled across multiple application servers, with no logical software limitation on the number of remote users, web site visitors, sites, loggers, or measured parameters. Each particular task entity (polling site X, run Automatic Data Validation Processor rule Y, automatic report Z, etc.) can be allocated to an individual server. There is no limit to the number of application servers that can be added to the system to manage tasks. Additional application servers also serve as redundant points for login to the system.
- Interoperability- AirVision offer the highest level of compatibility with new and existing air monitoring instruments, including support for the newest instruments such as the BAM-1022,

API T640, API's 602 hourly filter sampler, Markes/Agilent field continuous GC monitors for USEPA's evolving ozone precursor (PAMS) requirements.

The AirVision database also offers strong features for interoperability with external databases or third party / customer-authored applications, such as web services, database views for easy queries, and import tables for data insertion by third party applications.

- **Ease of Management-** AirVision has built-in capabilities for monitoring database size, performing data purge and archive functions and automated backups without the administrator having to leave the AirVision application. Extensive video tutorials provide step by step instructions on using these functions as well as ongoing configuration management of adding or updating sites, instruments, calibrations, etc.
- **User Experience-** AirVision and its companion products interface based off Microsoft CAB framework, using a Ribbon interface, customized color styles for high/low contrast, colorblind, etc.

Standard tab / mouse / keyboard controls are supported, pick lists, check boxes, radio buttons, as well as standard mouse / selection conventions (select-drag, shift-click, CTRL-click, etc.). Right-click context menus are also extensively utilized at various points in the application, such as the data editor.

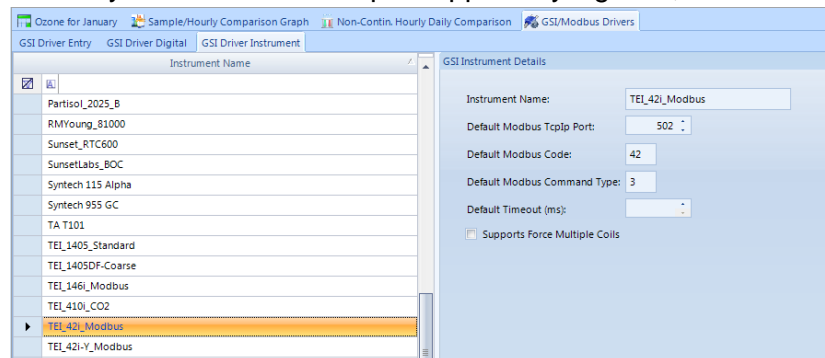
The application also supports Favorites, like browser favorites, that allow the user to save a report or editor criteria selection (sites, parameters, date range, average interval, report preferences, etc.) as a single-selection item for later, and Favorites can be set to automatically load when a particular user logs in.

Consistent controls are used through the application for user interface functions such as selecting sites/parameters (reports and editors), date and time selections, and lists of programmed items (alarms, ADVP rules, wind rose profiles, violation of standards, etc. all use a consistent presentation). Note also that the interface and configuration editors for settings are consistent between the central server software and the Site Node Logger software, eliminating complexity and reducing training costs / time.

- **Reusable Components / Not Tightly Coupled-** Every effort was made in the design of AirVision / AV-Trend / SNL to eliminate dependencies on a particular platform (other than Windows OS and MS-SQL), communication technology, or anything that would require a structural change in the foreseeable future. This has proven out with no required changes to the product to support Windows 10 and new server operating systems. The AirVision service container architecture already allows for reuse of existing code to easily add new Web Services for any function or required interface.
- **Configuration Driven-** All of the relationships with instruments, calibrators, communication devices, and other external equipment is managed through configuration editors available to

the user. Scheduled tasks, digital driver settings, FTP settings, and all other settings necessary for operation is available to the user through configuration editors.

Similarly, AirVision was architected to accommodate changing telecommunication and instrument technologies- easier setup of channels for digital analyzer integration in the 8872s, the ability to directly poll non-continuous instruments with on-board storage (BAM, API T640, etc), support for new field GC instruments like the Synspec and Chromatatec, etc. Updates can be made by the user or via scripts supplied by Agilaire, so no drivers are hard-coded.



The DOH will enjoy free updates with new instrument drivers, but also has the freedom to create their own or add to the list of internal measurements / control functions, if needed.

- Device Independent Design- The AirVision /AV-Trend product requires no specific platform or equipment for communications, and can operate in a wide variety of architectures (bare metal, virtualized, SQL clusters separate from the AirVision server, etc.).
- Web Services- AirVision Service currently acts as a container for plug-ins providing web services, and the structure exists to easily add new web services. Current web services include an AQI web service for outside web sites to easily obtain AQI information, and an AQS/XML web service currently used as the interface for 3rd party Exchange Network Node plug-ins.
- Self-Documenting- AirVison contains configuration reports for parameter settings, channel configurations, calibration configurations, scheduled tasks, and e-mail subscription settings.
- Data Access Layer- AirVision and its related products use LLBLGen Pro's Data Access Layer to:
 - Fully implement IDataErrorInfo interface such that data bound entities automatically get default validation, error provider support, pre save validation, etc. Validation messages are also generated based off metadata at this level.
 - Provide validation routines ensure common issues such as: ensuring non nullable values are supplied, string lengths are observed, date ranges are valid, performing variable type checks and foreign key checks, etc..
 - Maintain change and delete tracking on entities and entity collections to allow the data transfer of minimal sized change sets across the wire.

- Abstract data access calls to allowing a single entry point that can be hosted up on the server for proxied data access (clients in the field typically connect directly to our executive service for data access to avoid IT hassles although the system does support a direct connect mode as well.)
 - Compress client data on the fly to and from the server to minimize traffic. This helps facilitate WAN and internet access where bandwidth is critical.
 - Verify security access at the DAL level to ensure users have permissions to access sites and related data.
 - Allow clientside as well as serverside queries in a type safe way (no nested sql strings in code.) Also supports different shaped entity graphs to be passed to the client from the same DAL interface. Between the two of these features, it allows new client forms to be added without modifying the server.
 - Ensure data access is done in a type safe manner it makes us very agile towards database modifications. We immediately know the impact of a change upon regeneration of the DAL and can quickly adapt code to conform to it.
- Standards-Based- 100% .NET C# codebase for all products, built against .NET Framework. Winforms Client based on Microsoft CAB (Composite UI Application Block). Communication technologies: .NET remoting, WCF.
 - Database: Table and column names kept < 30 char to ensure compatibility with other database engines/access. Consistent Pascal style naming conventions, abbreviations avoided where possible. Strong typing of all columns.

It is also critically important to understand the importance of Agilaire's use of Generic Universal IDs (GUIDs) in keying all tables- configuration, customer data, static data, etc. Most other competing DAS's archive data into text files using natural keys. This is problematic, because it is common over years for customers to change site names, parameter names, channel numbers, etc. For data archived with natural keys, that makes archived data unretreivable, or requires considerable additional manipulation (and introduces error) to retrieve. ALL tables in AirVision and AV-Trend use GUIDs for table references and links to other tables, so any user-editable setting can be changed without affecting archived data. AirVision is, to our understanding, the only DAS on the market that offers this critical data protection feature.

- Life Cycle Protection of Customizations- All "customizations" are included in the standard product build, and hidden (if necessary) via product activation key controls or an internal UtilitySettings table. This eliminates the potential "orphaning" of any custom feature, ensures that any customizations are carried into future main line releases, and simplifies product testing.
- APIs- AirVision and its companion products offer database views to 'flatten' tables for easy query of configuration settings, data, etc. The database also offers Import tables for third

party components to insert data into the database, if needed. Import tables exist for average data, sample data, annotations, site logbook entries, calibrations, AQS records, etc.

- Transport-Independent Protocols- Data connection from server to site PCs can run over TCP/IP, dial-up modem, radio, direct RS-232, or any connection that resembles the above.
- Mobile Applications- Agilaire offers mobile applications both for public access to air quality data ("MyAQI") as well as the Tech Assist mobile app for the Model 8872, allowing site technicians to access and view real-time information on the site PCs, and even remotely start or stop calibrations from their phone.
- Continuous Product Enhancement- Agilaire routinely takes product enhancement suggestions during training sessions, EPA technical conferences, and as part of regular support activities. Enhancement suggestions are reviewed for their applicability to the user base, and recommendations are ranked based on ease of implementation and their utility to the entire user base. Items which are easy and/or have wide appeal tend to be given higher priority, while those with higher difficulty or more limited appeal are placed further down on the priority list.

A review of AirVision's release history demonstrates Agilaire's commitment to implementation of customer recommendations and needs as part of our ongoing product enhancement strategy. We view it as critical to maintaining our premier position in the market. Recent enhancement requests from customers that have been completed include:

- Added direct poll capability to retrieve interval and Filter data from Partisols
- HTTP/JSON direct polling.
- Add 'test now' button to email settings editor
- Added trend chart for PM filter sample data
- Add tool to compare average of 24 hour averages from BAM to PM daily filter sample
- New Asset report showing current location of all assets.
- AV-Doc system for uploading and managing uploaded forms/documents, equipment manuals, and SOP documents.

Agilaire has also clearly demonstrated the ability, through its modular design, code re-use, and agile development process, to be faster at updating the product to meet USEPA requirements and guidance.

"Agilaire is constantly working to improve their system to fit our ambient needs. You can't beat their customer service- they respond quickly and work with you until the problem is resolved. They have often helped us resolve issues with instruments that rightfully should have been the responsibility of the manufacturer. So, not only are they up to date on their own data system, but also with the instruments we use in the field." – J. Bradley (Jennifer.bradley@polkcountyiowa.gov – Polk Co runs the NCore site for Iowa)

Agilaire Advantage: Protection of Investment

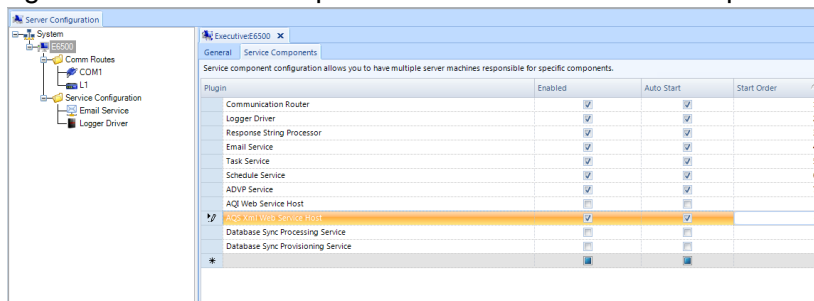
The life cycle of a software product can take many forms. In the worst cases, they become orphaned and unsupported and a high point of risk for the purchasing organization. This can happen over decades, or a time frame as short as a few years when customization is involved. If we investigate the history of product ‘deaths’, we find that they mainly occur because there is an insufficient base of users to finance ongoing development for product modernization, and the product languishes in its original state, slow to update or unable to update to new technologies and adapt to new instruments.

With a user base of 80+ monitoring agencies on active support agreements, Agilaire users can be assured the user base is large enough to perpetuate not just ongoing support and modernization, but usage enhancements and being updated to evolving federal and state requirements. Agilaire reinvests the stream from these support agreements both in highly qualified support personnel (for quicker issue resolution), and in continuous product improvements. In the last three years, Agilaire has rolled out several use enhancements in its base AirVision product, such as:

- Graphical tools and reports to compare filter-based PM25 measurements with continuous BAM / TEOM monitors
- New AQI reports including the AQI Monthly Reports, AQI Network report (see Report)
- Separate editor to allow “annotation only” users.
- Improved editors and handling of filter (FRM) sample data.
- AV-Doc system for storing attached documents to logbook entries, work orders, etc.

It is also important to note that the very architecture of AirVision itself, with its use of service plug-in modules and modular menu system, is specifically designed to make it easy to add new functions, reports, menu selections, tasks, and data processing capabilities without changes to the base system architecture. Customizations are built into the base product and hidden with activation keys or menu controls, so no custom work is ever “orphaned.” **AirVision is based on “technology resilient” development processes and architecture.**

The design of AirVision itself represents another facet of asset protection for IDEM.

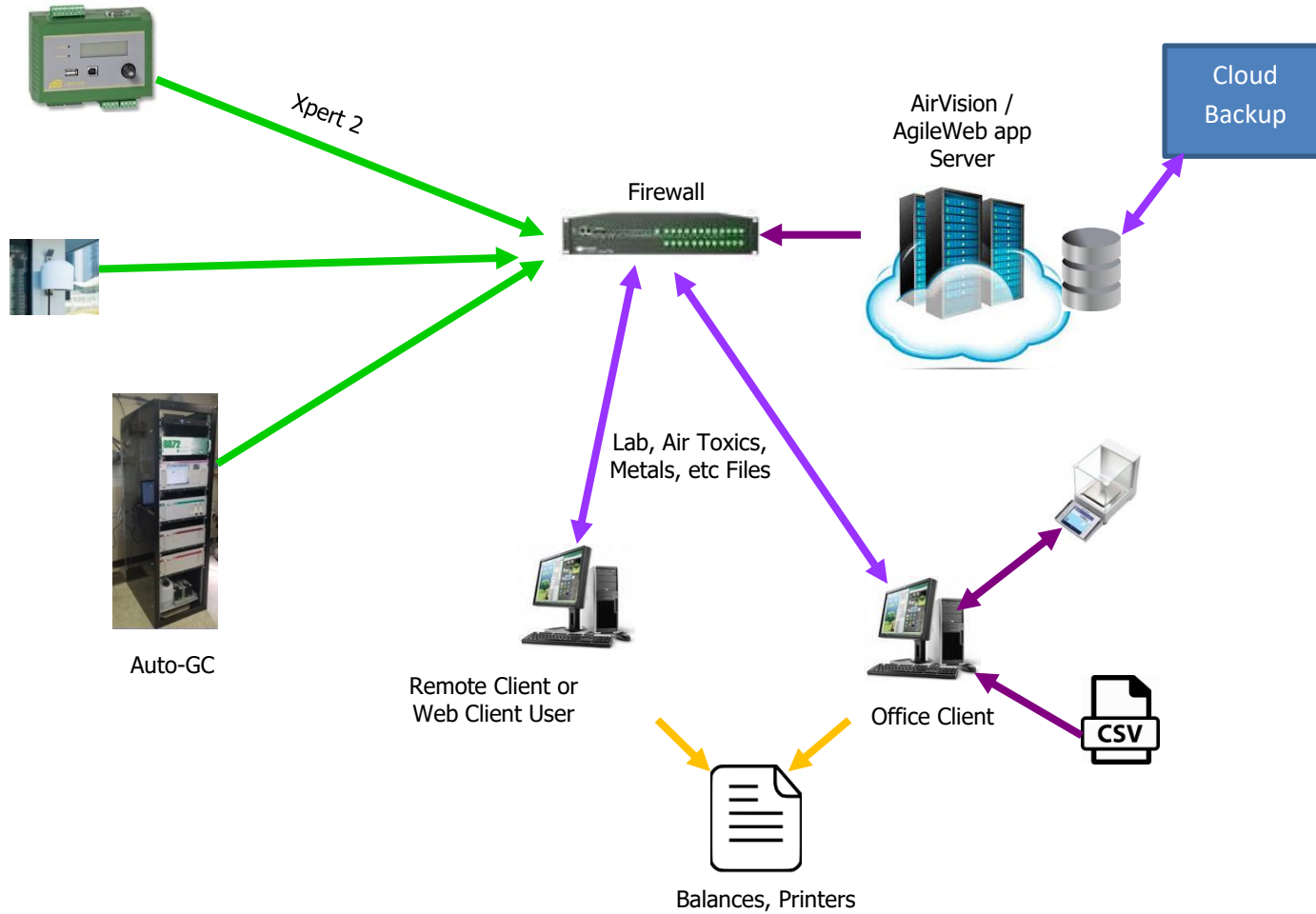


AirVision Service Plug-In System- new functions not yet dreamed up are easy to build into the AirVision Service “container”

Most importantly, it should also be noted that all Agilaire customers on the standard support agreement received their upgrade from the old E-DAS product to AirVision *at no additional charge* as part of the support and upgrade service, unlike most other vendors that charged customers for upgrades from their similar era (2000-2013) products.

i. System Architecture Diagram

Example system diagram showing a typical AirVision system and its relationship to the monitoring network and equipment.



System Architecture Narrative

The AirVision system will be hosted in a Tier 3 hosting environment as described in Section 1.a.ii below. Access to the server will be through either the AirVision thick client or web client, as described and differentiated in detail in Section 11 of this document. Connections to the server can be IP restricted to the IDEM offices (or a short list of IP source addresses), or can be left as open (to allow for mobile access by IDEM personnel, although IP filtering can still be used if mobile users use a VPN into the IDEM network). Client connections would require only one outbound port on the IDEM network, and data in motion can be encrypted via shared key.

Incoming data will be acquired/inserted by one of four main processes:

- Polling of the Xpert2 logger using CCSail protocol over public IP, as described in Section 3.b / 3.b.1
- Collection of auto-QC data through File Hiker program installed on EZChrom computer, as described in Section 3.b.2.
- Automatic collection of PurpleAir2 data through their Thinkspeak API / Direct Poll
- Other Direct Poll instruments (BAM, T640, etc).
- Manual import via Client/Web Client upload for other data types not connected through the other above listed methods (SaSS, metals, etc).

Per AQS reporting guidelines, all data is stored in standard time, although AirVision recognizes time zone differences when determining polling time windows (e.g., although the server may run in Eastern time, if a site is in Central Time, it knows that at 3:00pm on the server, it should only poll the site logger for the 01:55 to 01:59 average).

Note also that Direct Polling of some instruments (Section 3.b) is an available option, and Direct Poll licenses are provided for 20 instruments in the IDEM network (BAMs and T640s, of which 7 sites could potentially be used without a logger). This could create additional 'spare' Xpert2 loggers to increase the longevity and extend the time until site logger upgrades.

The collected data is stored in an open, relational MS-SQL database on the hosted server, which receives nightly backups, both to local drive and a secondary cloud backup system. Sensitive data (user passwords, AirNow/FTP passwords, etc) are stored in encrypted form, but the primary air data is not encrypted per Addendum 1.

:

ii. Hosting

AirVision can be licensed and hosted in three different models:

1. Self hosted, with license purchase
2. License purchase with Agilaire hosting
3. Fully hosted Software as a Service (SaaS), no license purchase costs

Under options 2 and 3, Agilaire utilizes a hosting partner to host the Windows Server (2016+) systems in a Tier 3 hosting environment, with redundant internet, power, and HVAC systems in a secured environment. SOC2 compliance reports are provided, and Agilaire manages all OS updates/patches, routine vulnerability testing of the system, backups to a separate cloud system, and AirVision application updates and patches. We utilize a combination of both automated monitoring as well as biweekly manual checks of the systems.

These hosting environments use **dedicated** servers for each project, not multi-tenant servers, so each system is guaranteed its full allotment of CPU and memory resources, as well as ensuring no security concerns that can exist with multi-tenant systems.

Our hosting partner agreement is based on 4-hour replacement of any failed hardware, so that even a complete server failure (with no redundant backup) can be replaced and in service within 24 hours.

Agilaire hosts 18 other AirVision systems, with an uptime > 99.5% (some scheduled downtime for AirVision and Windows updates) and no security breaches.



One of our partner's Tier 3 data centers, complete with redundant power, HVAC, and internet connectivity.

b. Customizations / Enhancements

Details of customizations and enhancements are discussed in the "Cost Proposal Narrative" document.

c. Small Sensor Strategy

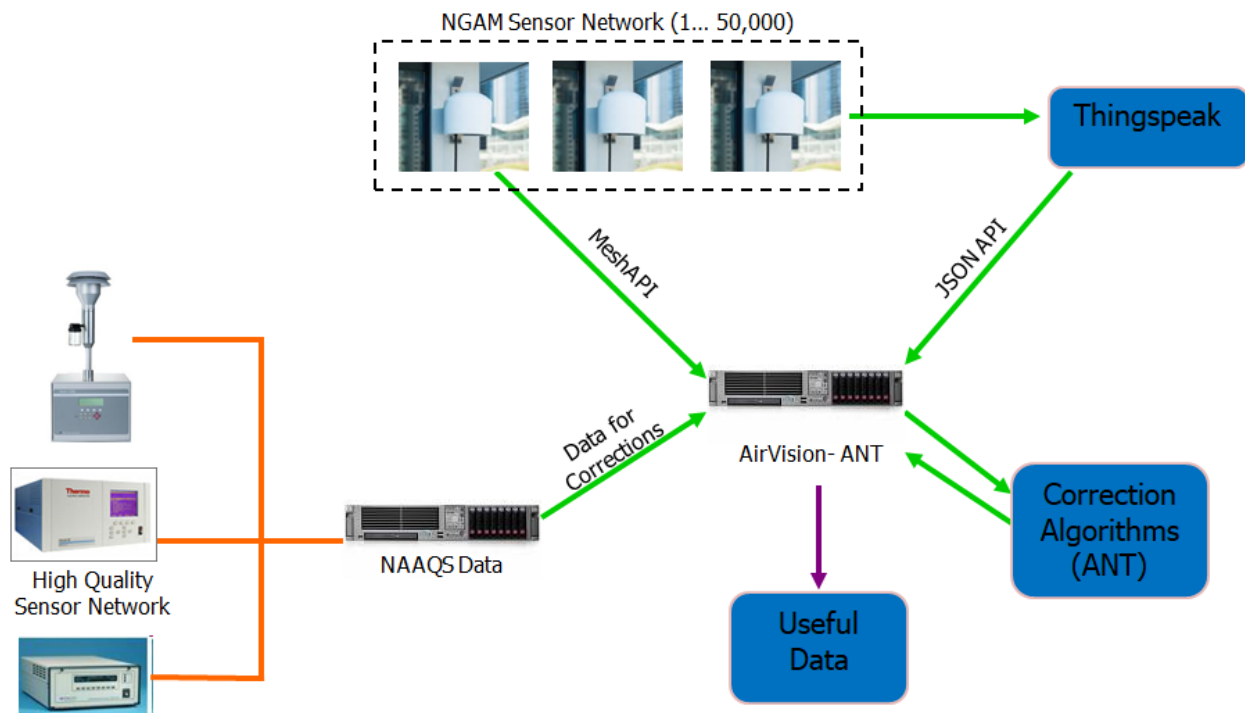
Small Sensors Data Integration and Correction

A clear new challenge facing the industry evolving need for agencies to integrate small inexpensive data sensors (e.g., PurpleAir2 for PM25/PM10) to increase granularity of data measurements between the NAAQS level sensors. AirVision has been specifically architected from the ground up to collect data from a variety of different kinds of data sources, without data loggers.

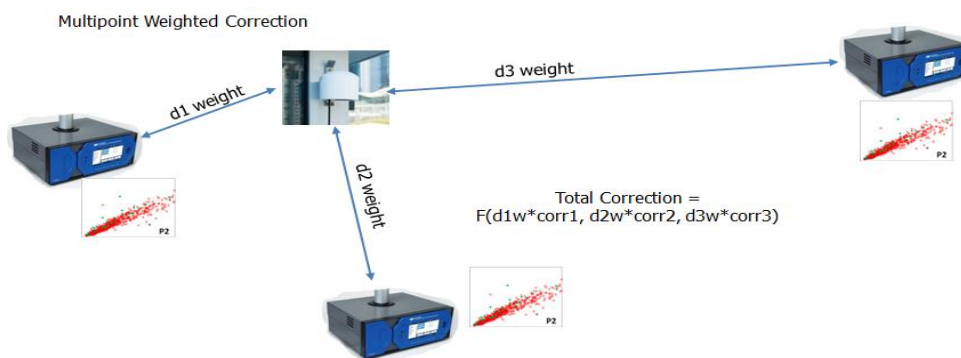
AirVision's Direct Poll method (see Section 3.b) has been used very successfully to collect data from small sensor/systems like PA2, AirPointer, MetOne Comet Cloud Service, etc, and is very well adapted to JSON/REST interfaces supported by most instruments, as well as proprietary interfaces used by some of the new instruments. Agilaire is following / support new instruments that may come on the market in the next decade or more, because of its generalized base architecture and easy development for plug-ins for special formatting cases (again, part of the "technology resilient" design of AirVision).

The major issue with these sensors is that they are qualitative, not quantitative measurements- that is, out of the box, they do not measure a concentration accurately, but provide a relative measurement as compared to other similar sensors. To be useful, data has to be corrected, and to be useful in a real-time role (e.g., to provide additional data points for the contour mapping of the web site), the data must be corrected in real-time.

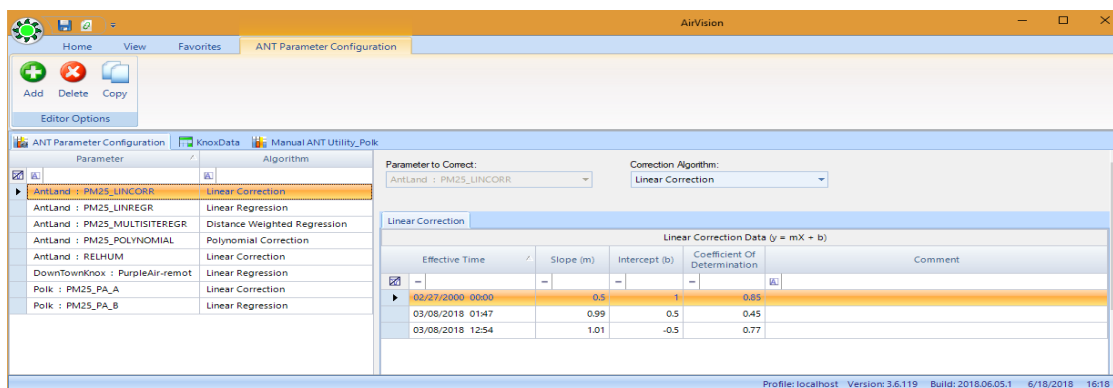
Agilaire has solved the problem with its optional Advanced Normalization Tool (ANT), which can provide both connectivity to sensors (many small sensors have difficult data interfaces), as well as real-time correction of data values and data screening through ADVP. **Note that the ANT is an option not included in the base proposal, but Direct Polling of up to 15 Purple Air sensors is included.**



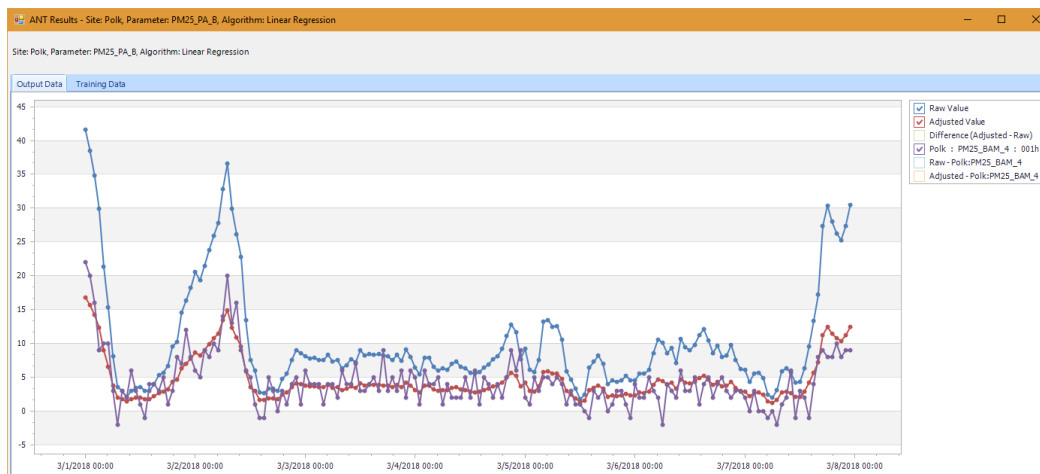
Data can be corrected as a fixed linear or polynomial correction derived by collocation with a NAAQS sensor (for a sensor installed far away from a NAAQS sensor), or it can have its regression updated nightly by a nearby NAAQS sensor, or even a network of NAAQS sensors (more suitable for a network in a municipal area).



ANT's library of correction algorithms is designed in a way to be modular and thus support other correction algorithms (e.g., machine learning) as the knowledge of the sensors grows.



Multiple Algorithms Supported



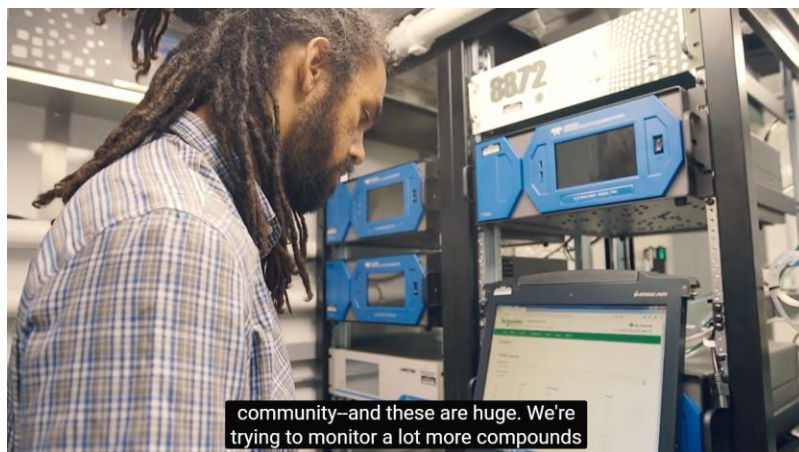
Visualization of Correction Results

Example Project: San Joaquin APCD Mobile Vans/Trailers Project

The State of California embarked on a major initiative to install small and community air monitors at every Air District in the state, including several mobile trailers (semi-permanent) sites and vans (mobile monitoring with GPS / geo-located data sets). These trailers and vans would use emerging technology instruments for VOCs, methane, raw particulate counters, as well as established criteria pollutant measurements.

In August of 2019, Agilaire worked with a consultant for the San Joaquin APCD to put together two trailers and two vans in less than 30 days, integrating dozens of instruments that have never been connected to a permanent data acquisition system, so drivers had to be developed and tested on the fly, very quickly.

Agilaire worked with the contractor to meet the deadline and deliver four operational systems with tested data collection, thanks to the flexibility of the unique Generic Serial Interface (GSI) system used in Agilaire's Site Node Logger software.



Model 8872 driving a small sensor/criteria monitoring system



San Joaquin APCD's Mobile AAQMS system, with both criteria analyzers and “emerging tech” small sensors. See the whole video at <https://youtu.be/iHh7BaRj-wU>

2. Model 8872 Data Logger [optional, not quoted]

8872 Platform:

The 8872 represents a generational change over previous model data loggers. The PC-based platform allows for a more full user interface experience (graphical user interface, a full depth of real-time trends and tabular displays, calibration reports and trends, tabular data reports, and graphical forms for entering logbook entries and annotations that can be transferred back to the site computer.

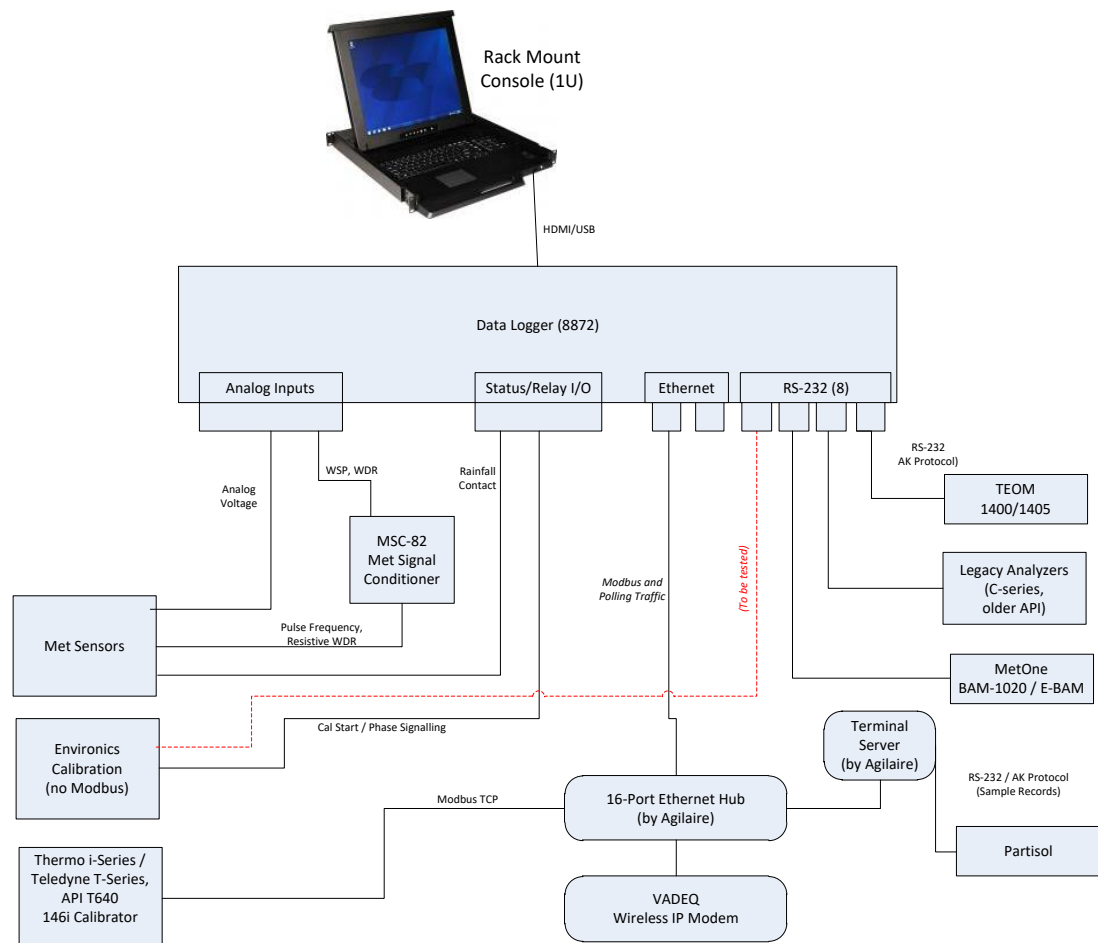


Metro Nashville Air Technician Morgan Dickie doing regular checks on her rooftop TEOM site with her Model 8872. The site was later changed to a T640 using Direct Poll, so the logger was eliminated from the site.

The logger also supports a bidirectional 'synchronization' method for managing configuration settings (e.g., channels, calibrations, etc), so that changes made on either the server OR logger/field end can be synchronized with each other.

Finally, the 8872 offers a more open programmatic environment for handling digital instrument interfaces (e.g., new protocols and work-arounds can be offered easily, since the code base is under Agilaire's control), as well as more tools for remotely troubleshooting digital analyzer protocol issues.

The data storage of the data loggers (> 90 days minute data, 10 years of hourly data, QC checks, etc) is sufficient to avoid data loss, other than loss at the single point of failure (the logger itself). The proposal includes a spare logger to keep available for immediate replacement at a site. With prompt return for repair (within one week), and based on the average mean time between failure, this should prevent any data outages caused by logger failures.



Typical Site block diagram.

Hardware Options

The Model 8872 hardware platform is a rack-mounted device for easy replacement, and includes internal space and networking for discrete (digital in/out) and analog I/O modules, with additional I/O protection boards for the external I/O.



Production Tech Cassie Foust shows off her latest creation.

An internal fanless (no moving parts) industrial PC forms the heart of the data collection platform, reaching out to both the internal I/O modules and external instruments (Modbus/Ethernet, RS-232, HTTP, etc) as defined in the setup using the Site Node Logger software.

The Site Node Logger software runs within any Windows OS and is hardware agnostic, so for some occasions, we have implemented on the fanless PC alone:



Fanless / SSD PC in standalone form, rackmount options available, as well as other Windows-based hardware platforms. RS-232 expansions available if more than 4 ports needed for application.

Similarly, the Site Node Logger service could run on any Windows 7/10 PC platform, including locally sourced or agency-provided hardware, or small PCs specially designed for solar/ low power applications:



Fanless PC Site Node Logger platform drawing a stingy 2.3 watts of power. Communication connections (site modems) and instruments will typically draw much more, as you can see from the panels on this solar powered site in New Hampshire.

3. AirVision Data Acquisition Engines

a. File Import Tool

AirVision will be supplied with the Generic File Import Tool that allows the user to define “templates”, or a description of the layout of a delimited file. The file may be delimited by commas, pipes, whitespace, etc, and have various header or footer information to consider.

Each of the delimited columns may be mapped to dates, times, particular parameters, or flag/error conditions on the data. Once a template is defined, it may be used repeatedly to import data from files for different sites, and can be easily updated if the file definition changes in the future.

For example, a File Import Template for parsing a Partisol Filter data file might look like this:

Template Name: Partisol 2025 Filter Data

File Layout
Number of Header Rows: 0
Number of Footer Rows: 0
Maximum Number of Columns:
Field Delimiter: Comma
Sample Type: Standard
☐ Back Stamp Data Time

Parameter Information
Parameter Matching
☒ Match Parameter by Column Number
☐ Match Parameters from Row
☐ Match Parameters from Header

☐ Overwrite Existing Data?
Parameter Data Type:
☐ Average (Continuous)
☐ Composite Sample
☒ Particulate Sample

Duration Code: 7 - 24 HOURS
Frequency Code: 3 - EVERY 3RD DAY

File Column Mapping

Column Number	Data Field	Parameter Template	Parse Format	Flag Map
1	Sample Identifier	PM25LC		
5	Date		yyyy/MM/dd	
6	Time		HH:mm	
11	Value	PMFLOWCOV		
12	Sample Total Flow	PM25LC		
13	Value	PMMINTMP		
14	Sample Ambient Temp	PM25LC		
15	Value	PMMAXTEMP		
19	Value	PMMINBP		
20	Sample Barometric Press	PM25LC		
21	Value	PMMAXBP		
38	Value	PMSAMPTIM		

Add ...

Add Column Mapping

While a file designed to import data from a BAM-1020 (PM 2.5) might look like this. Note that the Tool allows flag fields to be mapped into system flags and annotations automatically.

The screenshot displays the 'File Import Tool' interface. At the top, the 'Template Name' is set to 'BAM1020_FIT_Flags'. The 'File Layout' section on the left includes settings for 'Number of Header Rows' (2), 'Number of Footer Rows' (0), 'Maximum Number of Columns' (empty), 'Field Delimiter' (Comma), 'Sample Type' (Standard), and a checked 'Back Stamp Data Time' option. The 'Parameter Information' section on the right shows 'Parameter Matching' with 'Match Parameter by Column Number' selected, and 'Overwrite Existing Data?' checked. The 'Parameter Data Type' is set to 'Average (Continuous)', and the 'Average Interval' is '001h'. Below these sections is the 'File Column Mapping' table.

Column Number	Data Field	Parameter Template	Parse Format	Flag Map
1	Date/Time		MM/dd/yy HHmm	
2	Value	PM25LC		
3	Value	PMVOLUME		
6	Value	AMBTEMP		
7	Value	RELHUM		
10	Flags	PM25LC		BAMFLAG_E
11	Flags	PM25LC		BAMFLAG_U
12	Flags	PM25LC		BAMFLAG_M
13	Flags	PM25LC		BAMFLAG_I
14	Flags	PM25LC		BAMFLAG_L
15	Flags	PM25LC		BAMFLAG_R
16	Flags	PM25LC		BAMFLAG_N
17	Flags	PM25LC		BAMFLAG_F
18	Flags	PM25LC		BAMFLAG_P

At the bottom of the mapping table, there are buttons for 'Add ...' and 'Add Column Mapping'.

Custom handlers can be created for specialized files from instruments or systems (e.g., PAMS data files from the Markes/Agilent auto-GC, how we handle legacy polling for Ecotech loggers, etc, if some preformatting of the file must be done before using the regular file import approach, or if certain special data like dates has to come from the header or the file name itself.).

The system also supports 'row-wise' import, where each row contains a single value, but the file may have mixed sites and data for various parameters. For example a file may have data presented this way:

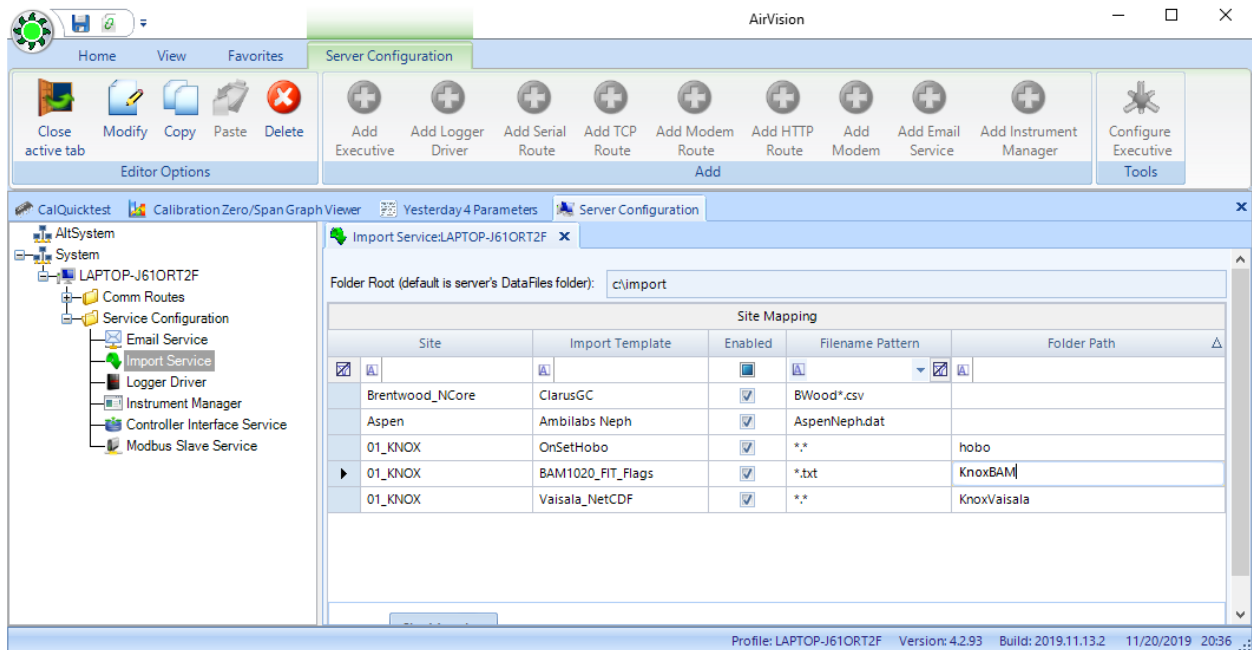
```
SampleID,SiteCode,SampleDate, Parameter,, MeasValue,,,,,,,,,
AI42445, SD060402,6/4/2014,0:00, Formaldehyde,TO-,0.2,ORGANICS,AIR,12/30/1999 0:00,12/30/1999
AI42447, SD060402,6/4/2014,0:00, Butyraldehyde,TO-,0.37,ORGANICS,AIR,12/30/1999 0:00,12/30/1999
```

In this case, each row may also use names or codes for sites and parameters that are different from the AirVision settings/names. AirVision and the File Import Tool allow 'alias' names to be set for sites and parameters to make this correlation (e.g., "SD060402" = North Fork site), and multiple aliases are supported to support files from different sources / workflows.

Thus, the file import system can be used for the generic import of average data, FRM data, air toxics, PAMS, and other non-continuous data sets from several file formats. The system is “future proofed” for new data flows or new instruments that the USEPA may need/ require.

Automating File Import for Workflow Automation

AirVision includes the ability to ‘sweep’ files in designated directories on the server (linked to IDEM via Google Drive, OneDrive, etc) into the File Import tool, directing data to particular sites and File Import Templates based on the folder it is placed into or by characteristics of the file name. This allows for easy automation of import of lab / FRM data, external weather data, etc. via ‘drop folders’ or using site names within the file names.



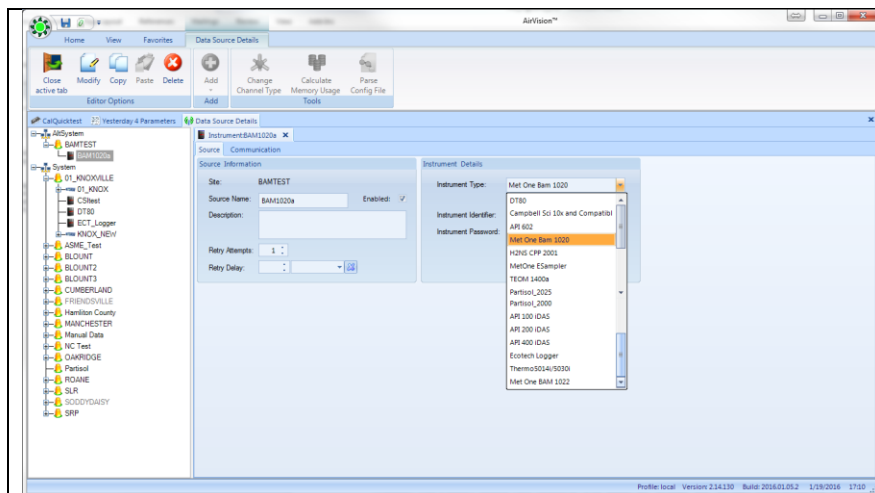
In this example, three subfolders are used to distinguish data for various instruments for the 01_KNOX site. The main C:\import folder distinguishes by filename what site to import data for, and which import template to use.

b. Direct Polling

AirVision builds on the File Import Tool with capability to “direct poll” instruments with on-board storage (e.g., BAMS, Partisols, other loggers, web based data hosts like Purple Air, etc.). Direct polling of Partisol filter-based to download Filter records can reduce the labor required in site visits or manual COMET / RPCOMM polls, streamline the process and accuracy of data ingestion, and improve data availability. This tool has the additional function of being able to support an instrument without a data logger / site PC (sites with only a BAM or API T640 monitor). This saves costs and can eliminate concerns for power at remote / solar / low power monitoring PM monitoring sites.

AirVision’s Direct Polling capability provides a generic environment to poll third party devices, and will be the environment that allows us to, with off-the-shelf and well-tested existing code, poll the Xpert2 loggers for averages (and, with an enhancement, map calibration data) and do logger time updates using the CCSAIL protocol. Direct Poll also provides IDEM with future options to support a network of future instruments that might become part of a future IDEM strategy (e.g., other non-NAAQS sensors like AirPointer, etc).

As more and more ‘smart’ instruments with their own data storage come into the market, AirVision is uniquely situated to benefit its customers with this capability, lowering costs and eliminating unnecessary complexity by breaking the “everything must come through the logger” model. Unlike some other systems still internally architected around that model, AirVision does not require the user to ‘break up’ smart instruments with delayed data (API 602, Cooper Xact) into different “sites”, creating an awkward reporting system. Why? **AirVision was designed from the ground up based on making the source of the data as generic as possible.** Thus, AirVision is positioned not only to reduce IDEM operating costs / time now, but is better positioned than competing systems to reduce future costs and offer more Productivity Improvements in the future, as technology progresses in the ambient monitoring industry.



An extensive list of directly polled instruments, and table-driven design for commands and parsing means that new instruments can usually have a driver added in a few minutes.

Generic File Import Tool

For this project, the Generic File Import Tool will be a key component of the Direct Poll system, allowing the returned logger data streams to be mapped into specific sites and parameters in AirVision. The Generic File Import Tool that allows the user to define “templates”, or a description of the layout of a

delimited file. The file may be delimited by commas, pipes, whitespace, etc, and have various header or footer information to consider.

Each of the delimited columns may be mapped to dates, times, particular parameters, or flag/error conditions on the data. Once a template is defined, it may be used repeatedly to import data from files for different sites, and can be easily updated if the file definition changes in the future.

1. Xpert2 / IDEM Triplet Handling

In testing the Xpert2 data logger, one limitation in FIT we found handling of the ‘data triplet’ found in the data streams. Example:

#00010002

2,20/12/02,01:00:00,8,6,K,72.71,7,K,25.08,8,P,0.000,24,K,69.98

2,20/12/02,01:05:00,8,6,K,72.61,7,K,25.03,8,P,0.000,24,K,69.98

For the basic testing (focused on reliability, polling for defined times, etc), we simply mapped data fields and map fields explicitly by column number:

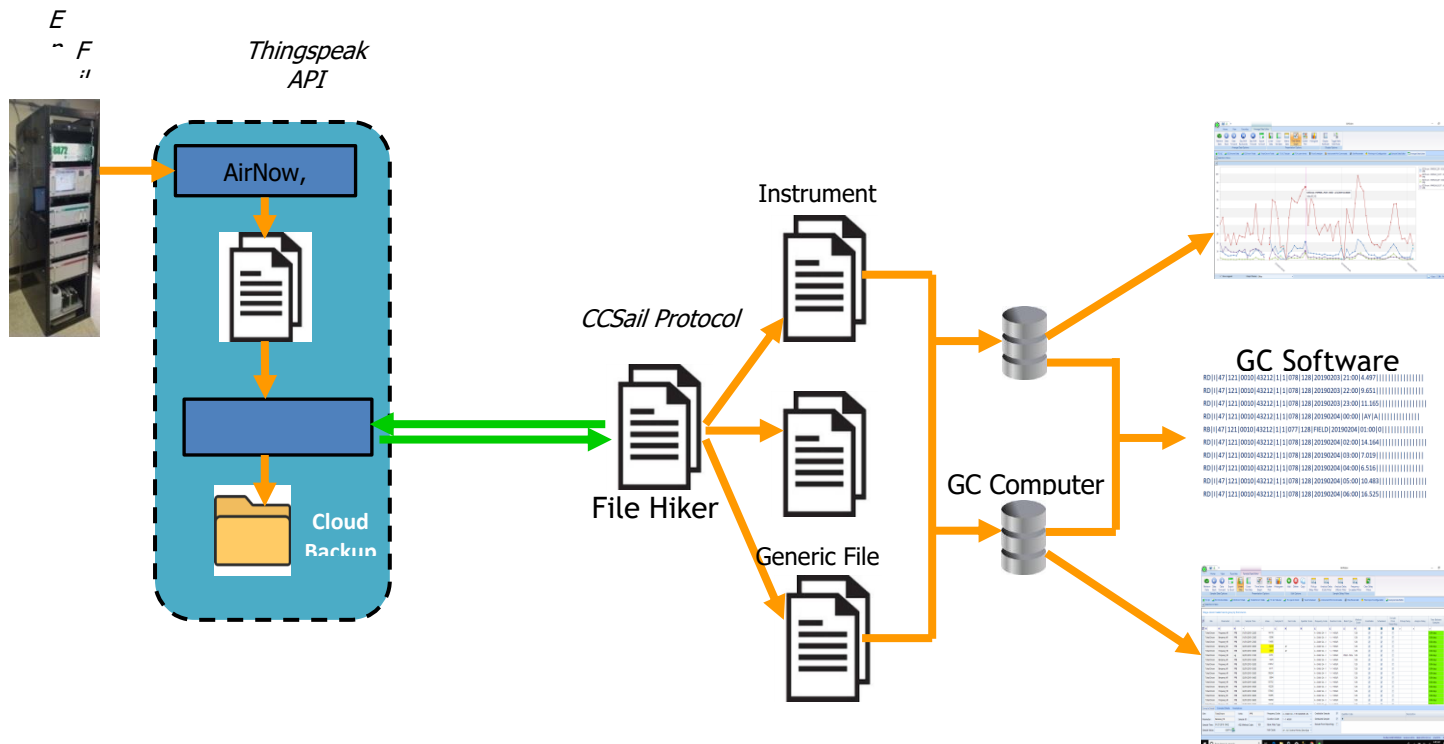
File Column Mapping		Advanced	Processing	Multi-Line	
Column Number	Δ	Data Field	Parameter Template	Parse Format	Flag Map
▶	2	Date		yy/MM/dd	
	3	Time		HH:mm:ss	
	6	Flags	AMBTMP		Sutron Flags
	7	Value	AMBTMP		
	9	Flags	DEWPOINT		Sutron Flags
	10	Value	DEWPOINT		
	12	Flags	RAINFALL		Sutron Flags
	13	Value	RAINFALL		
	15	Flags	shelter_temp		Sutron Flags
	16	Value	shelter_temp		
	18	Flags	RELHUM		Sutron Flags

However, we realize this approach is not viable long-term or across many sites, as simply adding or removing parameters will disrupt the column order. Instead, the File Import Tool will be enhanced to support the data triplet, allowing IDEM to map triplet numbers to Parameter Templates, and using inherent flag rules. A new “Sample Type” selection in the File Import Template editor will simply allow for the selection “IDEM Sutron” as the primary definition of the template logic. The date/time format fields will be retained in case of an variation from site to site or logger to logger.

Agilaire has considerable experience in developing preprocessing / additional processing Sample Type selections for special cases (Processing EZChrom/TotalChrom headers, API CSV output, MetOne sequential sampler header / event files, LoggerNet, etc).

2. FileHiker and AutoGC Data Collection

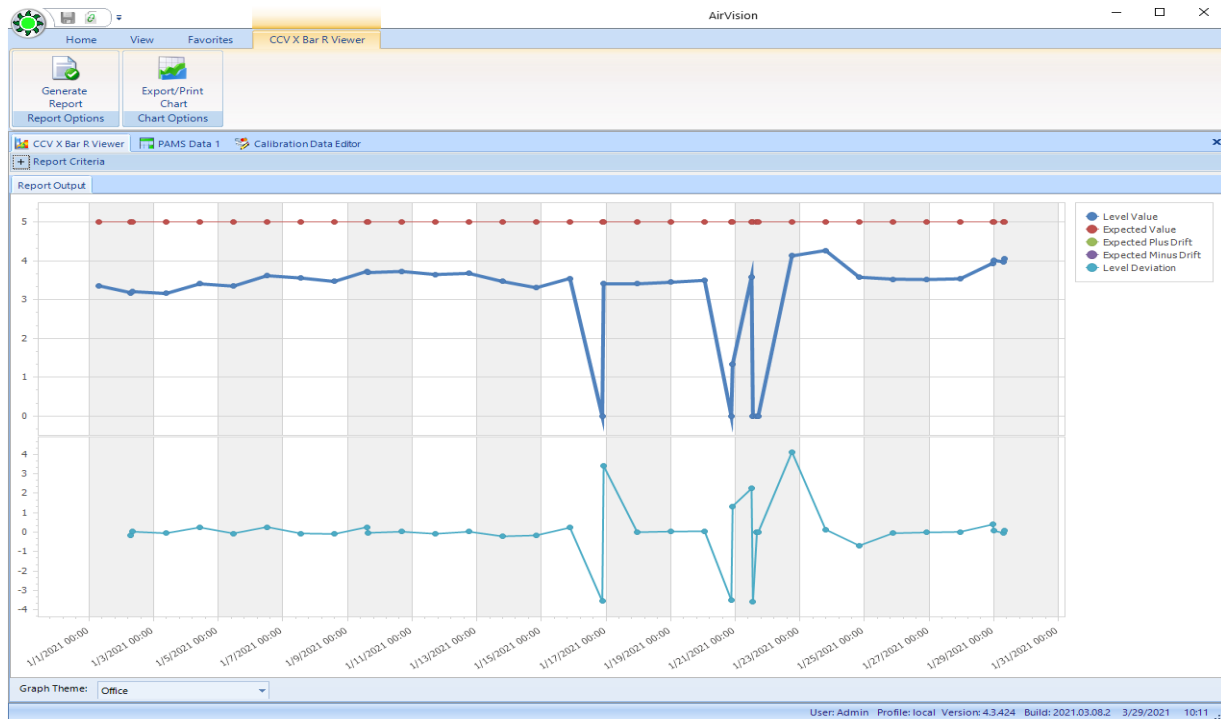
For EZChrome and TotalChrome systems, the file name embeds whether the hourly file is a blank (zero) or upscale check, our File Hiker system associates obtaining those file names with particular File Import Templates set to tag those hours accordingly. File Hiker is a simple .msi installer that can run on any Windows 7/10 computer, and allows for transfer of selected files to the AirVision server in an IT-friendly way through a REST API web service, with a configurable port # for the data collection.



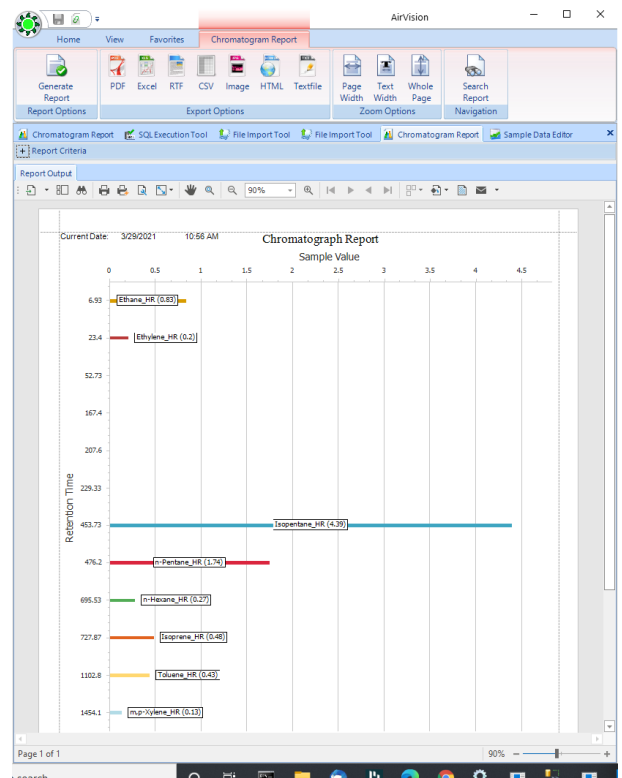
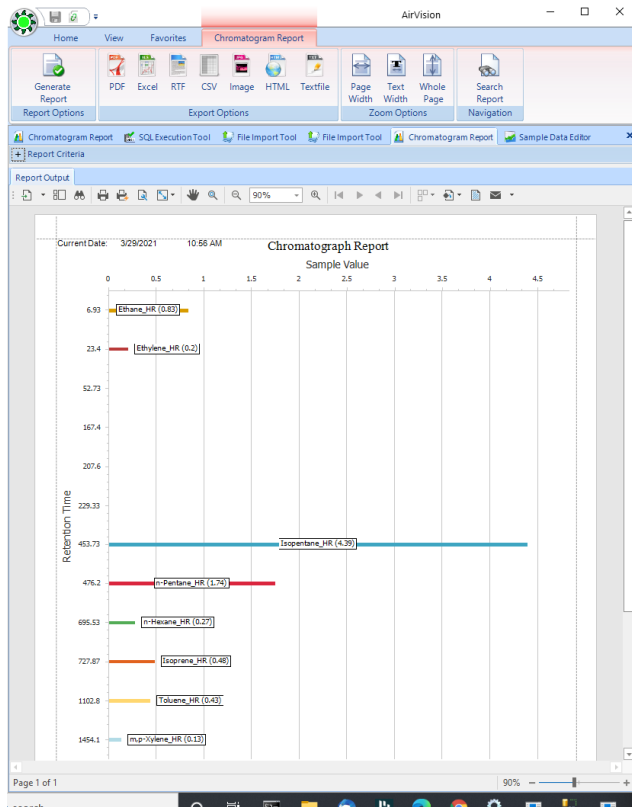
Agilaire has tested and demonstrated long-term reliability of continuous auto-GC collection in a cooperative test with Orsat, polling auto-GCs using both the EZChrom and TotalChrom software. In this environment, we used our File Hiker plug-in, which allows files from any PC to be transferred through a secure and IT-friendly web service, eliminating the complexity of FTP setups. We ran the environment polling from Knoxville to the Orsat offices for roughly 3 months (and run attended for several months after the initial 3-month evaluation). Any downtime encountered was found to be related to the auto-GC environment (test systems being temporarily disabled, etc). We understand Carol Meyer did a presentation for some LEADS customers in February 2019 covering the interface and her experience with it.

AirVision also allows CCV and blank checks to be mapped into the same QC check database as gas analyzers, so that this data can be viewed by AirVision's existing suite of calibration (QC check) reports.

Mapped CCV / Blank Results:



Chromatogram Reports:



c. 8872 Logger Polling (Future Upgrade)

AirVision's polling system supports a variety of communication hardware layers (telephone modem, cellular, WAN, radio, satellite, etc), including easy to set read/write timeouts and inter-character delays that might be required by more demanding communication environments (e.g., satellite). So, future networks like SpaceX's *Starlink* satellite internet can be easily supported.

The polling system also supports both polled and 'push' methods (e.g., where a fixed IP might not be available), as well as manual backup of hand-carried USB drives from sites, if needed.

All polling tasks and FTP transmission tasks can have Task Notifications enabled, which allow any authorized user to subscribe to email notifications of failed data transmission tasks.

The application also has retry settings, which can retry a failed poll or FTP transmission a user-defined number of times before the task fails (and the email notifications).

The polling tasks can be structured in groups, as seen below, offering granular control of the polling time at each site, or the simplicity of changing the poll time/interval for one group of multiple sites.

If a poll fails, the next time it is scheduled to run, it knows what the last 'good' task execution time and automatically calculates how far back to ask for data in the next poll. That is, backpolling or 'catchup' polling is automatic in the system, including after a restored backup. The status of all polling can be viewed in the Task Status Display.

Name	Type	Status	Last Start Time	Last End Time	Next Run Time	Last Successful R.	Latest Data Time	Task Status Message
[In Average Data Archive & Purge Task] Start: 9/15/20 02:22:38, Repeat:00:01	Purge Average Data	Success	11/1/19 02:22:38	11/1/19 05:36:45	9/15/20 02:22:38	11/1/19 02:22:38		
[AQI 120d Calc Task] Start: 8/29/19 20:17:25, Repeat:00:02	AQI Calculation Task	Success	11/4/19 20:17:25	11/15/19 01:03:08	11/15/19 20:17:25	11/4/19 20:17:25		
[AQI 72hr Calc Task] Start: 10/8/19 00:07:00, Repeat:00:01	AQI Calculation Task	Success	11/15/19 08:07:00	11/15/19 08:09:05	11/15/19 12:07:00	11/15/19 08:07:00		
[Database backup] Start: 1/27/18 21:35:02, Repeat:00:02	Group Task	Success	11/4/19 21:35:02	11/4/19 23:46:09	11/15/19 21:35:02	11/4/19 21:35:02		
[Pericent Task] Start: 2/9/12 11:01:30, Repeat:03:00	Group Task	Success	11/15/19 09:01:30	11/15/19 09:14:37	11/15/19 09:31:30	11/15/19 09:01:30		
[Perryth BAM Polling] Start: 9/27/19 14:01:30, Repeat:00:01	Group Task	Success	11/15/19 09:01:30	11/15/19 09:01:32	11/15/19 09:01:30	11/15/19 09:01:30		
[Logger [ALBANY] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:21	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [ATHENS] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:21	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [AUGUSTA] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:22	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [BALTIMORE] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:21	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [COLASPT] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:22	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [COLCLAB] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:22	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [CONFEDAV] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:22	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [CONVERS] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:22	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [DAVISVILLE] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:22	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [DOUGLASS] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:21	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [EVANS] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:22	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [FORTMY] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:22	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [KENNESAW] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:23	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [LESLIE] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:30	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [MACON-RE] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:23	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [MCDONALD] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:23	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [NR-GAT] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:22	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [PINE] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:25	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [ROSSVILLE] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:22	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [SAKAL] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:23	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [SAVRETS] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:22	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [SODAKAL] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:23	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [SUMMER] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:21	11/15/19 09:24:20	11/15/19 09:24:20		
[Logger [NR-285] polling tasks	Group Task	Success	11/15/19 09:24:20	11/15/19 09:24:22	11/15/19 09:24:20	11/15/19 09:24:20		
[NR GT Ande High Poll Task] Start: 4/10/19 12:16:30, Repeat:01:00	Instrument Poll Task	Success	11/15/19 09:16:30	11/15/19 09:16:30	11/15/19 09:16:30	11/15/19 09:16:30	11/15/19 09:17:00	
[NR GT High Backup Processing] Start: 9/12/19 11:04:30, Repeat:00:01	Group Task	Success	11/15/19 09:04:30	11/15/19 09:04:32	11/15/19 10:04:30	11/15/19 09:04:30		
[Post Lab Carbon Import] Start: 3/20/17 14:02:30, Repeat:00:01	Group Task	Success	11/15/19 09:02:30	11/15/19 09:08:13	11/15/19 10:02:30	11/15/19 09:02:30		
[Post Lab Metals Import] Start: 6/8/17 14:07:30, Repeat:00:01	Group Task	Success	11/15/19 09:07:30	11/15/19 09:18:41	11/15/19 10:07:30	11/15/19 09:07:30		
[Post Lab PM10 Import] Start: 6/13/19 15:20:30, Repeat:00:01	Group Task	Success	11/15/19 09:20:30	11/15/19 09:20:40	11/15/19 10:20:30	11/15/19 09:20:30		
[Post Lab PM2.5 Import] Start: 3/20/17 14:17:30, Repeat:00:01	Group Task	Success	11/15/19 09:17:30	11/15/19 09:17:41	11/15/19 10:17:30	11/15/19 09:17:30		
[Thrive and Archive Task (Round) Start: 1/25/18 02:55:49, Repeat:00:01	Device Task	Success	11/15/19 02:55:49	11/15/19 02:55:53	11/16/19 02:55:49	11/15/19 02:55:49		

4. Automatic Data Validation Processor (ADVP)

As agencies have to contend with larger and larger data sets / more measurements, it is clear that manual data QA/validation must be supplemented to maintain the same level of data quality.

AirVision's unique and Automatic Data Validation Processor (ADVP) has no equal in this market, and represents a generational leap in data quality assurance for ambient air quality data.

ADVP currently provides 25 state and local agencies a highly sophisticated way to automate and improve its basic quality assurance checks, far beyond the simple existing range checks. One of the most critical and labor-consuming tasks is the quality assurance of the data, to ensure that every single data point presented to AQS and to the public (e.g, web site) is a correct and accurate indication of the air quality at that given moment. In addition to analyzer calibrations and audits, data points are reviewed and compared against logical assumptions. Quite often, this process involves a person scanning through data in printed or graphical form, applying dozens or even hundreds of logical rules in their heads.

This process becomes more time-intensive with the inclusion of analyzer diagnostic information into the data stream. Many agencies use four to six significant performance metrics (sample flow, chamber temperature and pressure, etc.), so adding these metrics to the data management system can add hundreds of new data points to the system. Some system to automatically correlate acceptable values with the primary measurements (ozone, NOx, etc.) is essential.

AirVision modernizes this system with the Automatic Data Validation Processor (ADVP). The ADVP allows the user to create any number of rules, likely expanding over time, to “grade” the validity on the incoming data based on comparison with other monitored parameters or to statistical values. For example, simple **trigger** might consist of:

“If ozone is > 70 ppb and ambient temperature is < 75 degC, then data is suspect”

“If the difference between the hourly average of wind speed or wind direction at Site A and neighboring Site B is > 10%, then data is suspect”

“If the difference between ambient temperature and the historical average of the same day/hour over the previous 10 years is > 15%, then data is suspect”

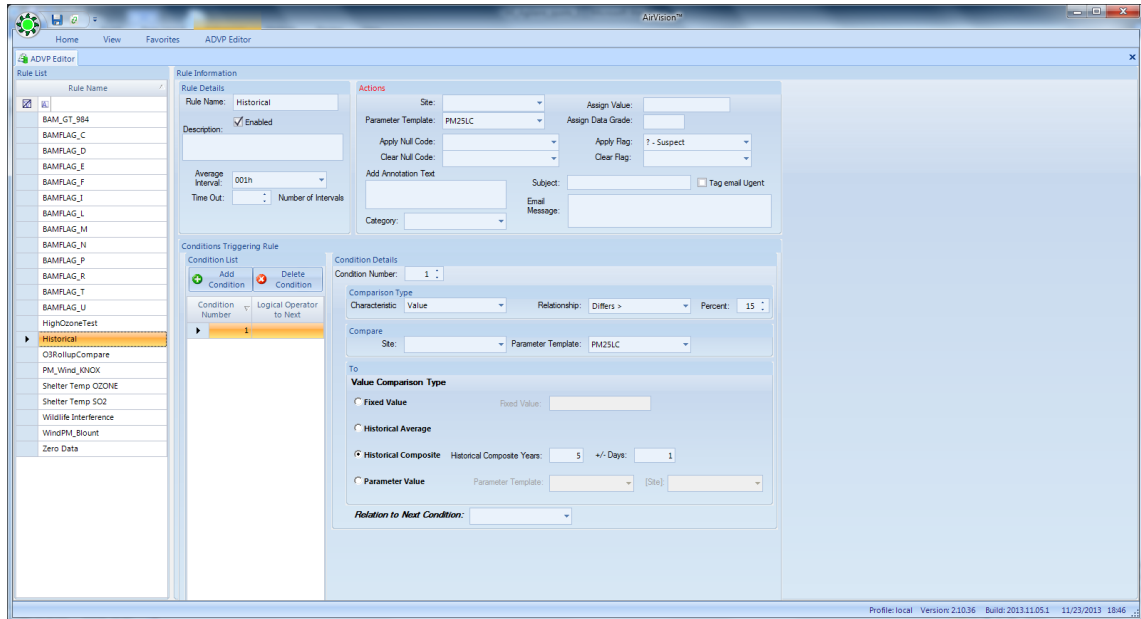
An even more complex rule might consist of:

“If the PM25LC value is > 50 ug/m3 and there is a technician annotation which includes the text “FIRE” then invalidate the data and code with the AQS Code for Wildfire.”

“If the PM25LC value is > 40 ug/m3, and the average wind speed is > 15 mph, then mark the data with the annotation “Dust Storm?” and mark the data suspect.”

Triggers may consist of any number of conditions (linked by AND/OR Boolean operators, including:

- Value greater than, less than, differs > (by value or %), differs < (by value or %) or equal to a fixed value or another parameter in the system, or a historical average, or MDL
- Variation of a value > or < (by value or %)
- Annotation text on data includes <string>
- Flags on data include (or do not include)
- Additional condition filters for hour of day, day of year, or day of week.



Actions can consist of any or all of these steps, and can be applied to any one parameter (template), not necessarily the one that triggered the rule:

- Assign a fixed value
- Apply a flag
- Clear a flag
- Apply a Null Code
- Clear a Null Code
- Add Qualifier Code
- Add Annotation Text
- Create Logbook Entry
- Set QA approval level
- Send an Email to a user or list of users.

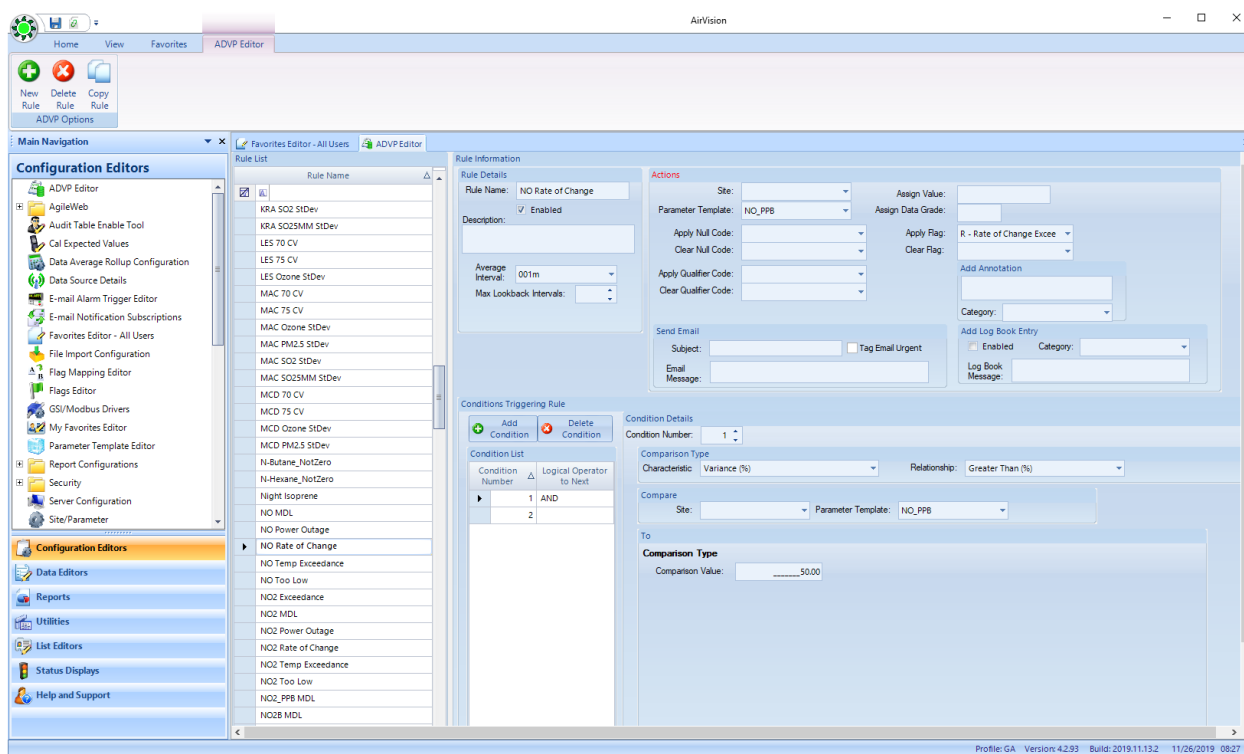
The action can be applied to any parameter at the same site, or a specific site can be designated (the latter approach is unlikely to be used in most cases). In a case of a persistency check, we may wish to mark the data invalid and set the AW (Wildlife Damage) null code. We also want to send an email to the QA person, just in case the sensor really just failed, the less likely case.

Now consider the synergistic effects of the continuous monitoring of analyzer operational parameters (internal flow, temp, PMT voltage, etc.) with a tool like the ADVP. Analyzer metrics can be constantly compared to historical norms, so that even data that would appear to be “normal” but is in fact erroneous due to analyzer failure can be detected. Users can receive real-time notifications via e-mail

or SMS messages of pending analyzer failures or other instrumentation/data issues. *The overall system becomes a more professional managed flow of data, with data quality being ensured every step of the way, while reducing the amount of labor required to achieve this higher level of data integrity.*

The key to ADVP is that the system offers a chance for the user to constantly enhance it by adding new rules, simplifying the data QA process by applying rules already in existence and sorting the data into three piles- a large pile of obviously valid data, a pile of obviously invalid data, and a smaller pile of suspect data, where the data QA process can be focused. The second **and more important** key is that ADVP can run **immediately** on data the moment it is polled, quickly filtering and marking bad or suspect data before it reaches the public web site or real-time notification systems, dramatically reducing embarrassing false alarms.

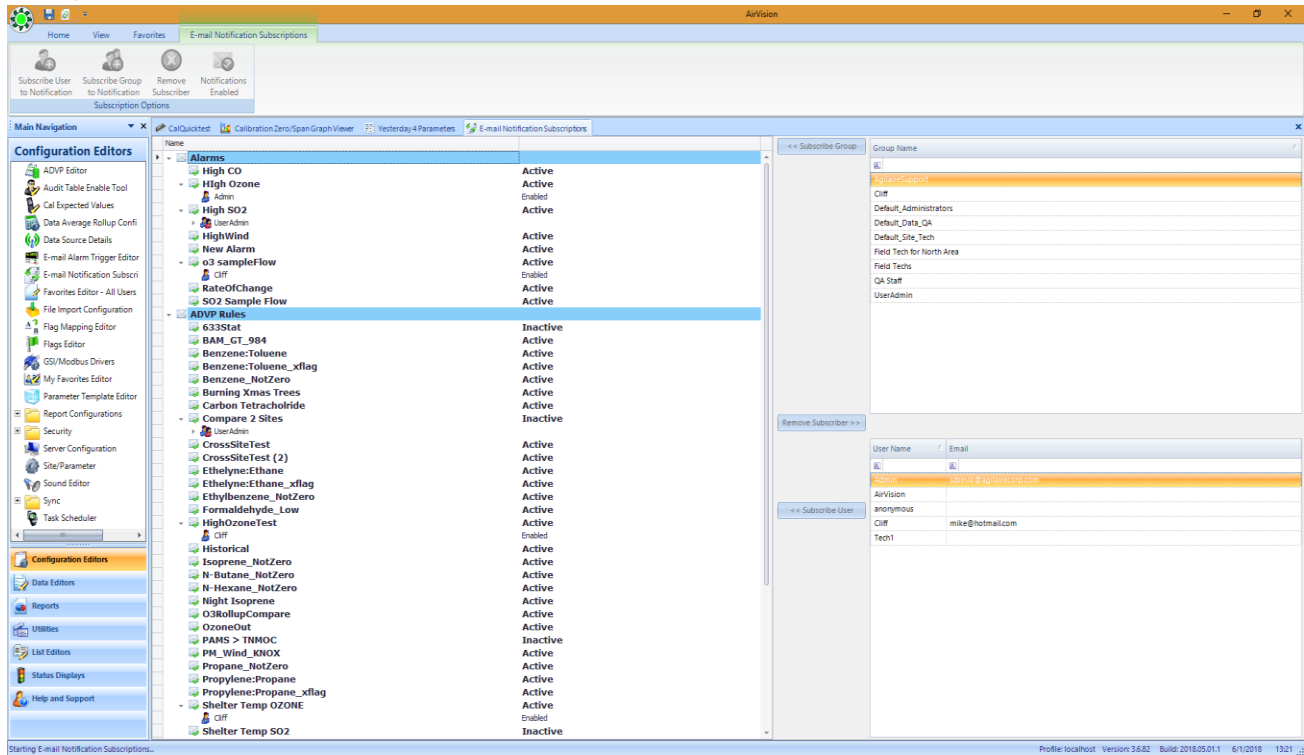
Note that ADVP can potentially be used in conjunction with next generation (“community”) air monitors, if desired, to validate data from lower quality monitors (including comparison with nearby SLAMS sites) and determine if they can be used to fill spatial gaps in the AQI maps.



Georgia ADVP system with > 250 rules to QA data in realtime after polling.

a. Real-Time Notification

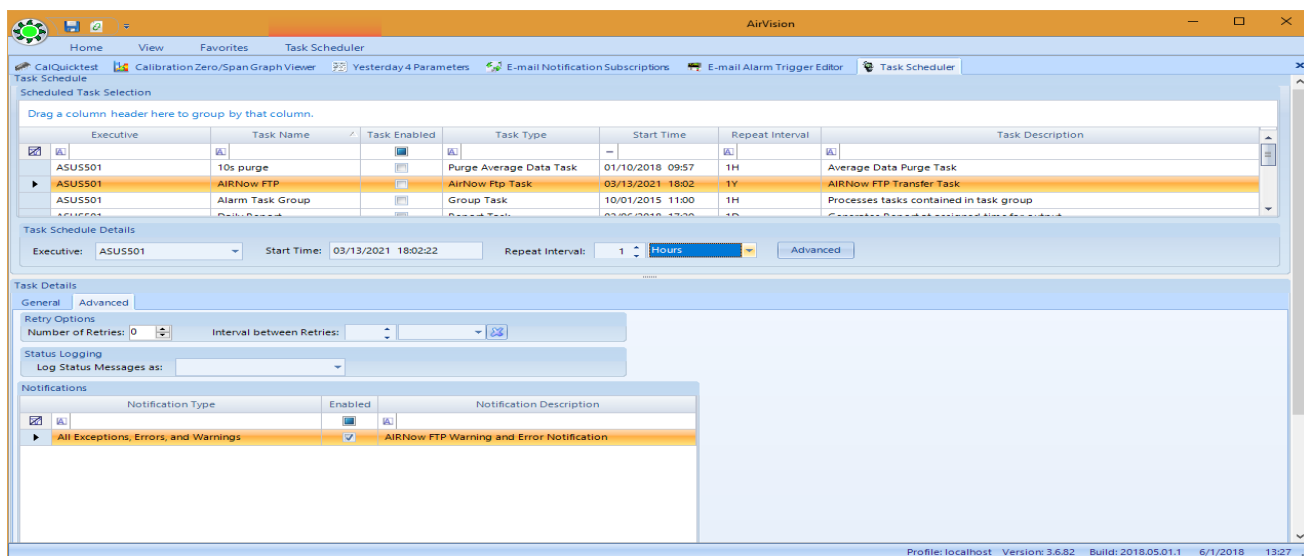
All alarms and errors are provided to the users via Notifications, and managed by the Notifications Subscriptions Editor, where users can subscribe to notifications either by individual user, or by User Group:



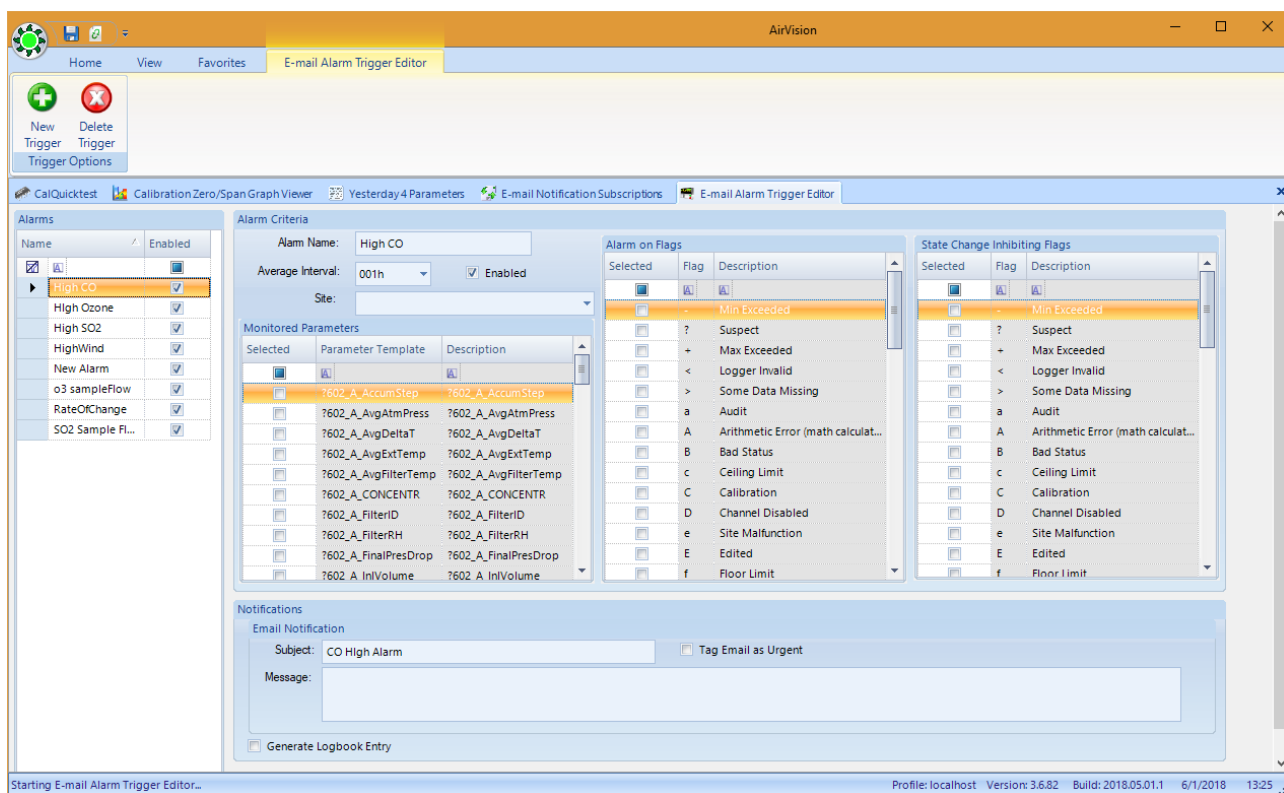
Notification emails/SMS can be generated by the systems by (currently) four kinds of events:

1. Email Alarm Notifications- a rule based on looking on a flag on an average data value when it comes from the data logger (or some other source that can provide a flag on data). Also allows an 'inhibiting' flag to prevent the alarm, if needed.
2. Automatic Data Validation Processor (ADVP)- An ADVP rule (see pg. 81) also allows for an 'action' to include Notification to subscribing users.
3. Scheduled Report Task- a scheduled report may have subscribers to receive the report via email.
4. Task Notifications- a scheduled task (e.g., polling, outgoing FTP to AirNow, etc) may have a notification email to subscribers if the task receives a Warning and/or Error condition.

Example Task Notification setup (hourly AirNow FTP Task):



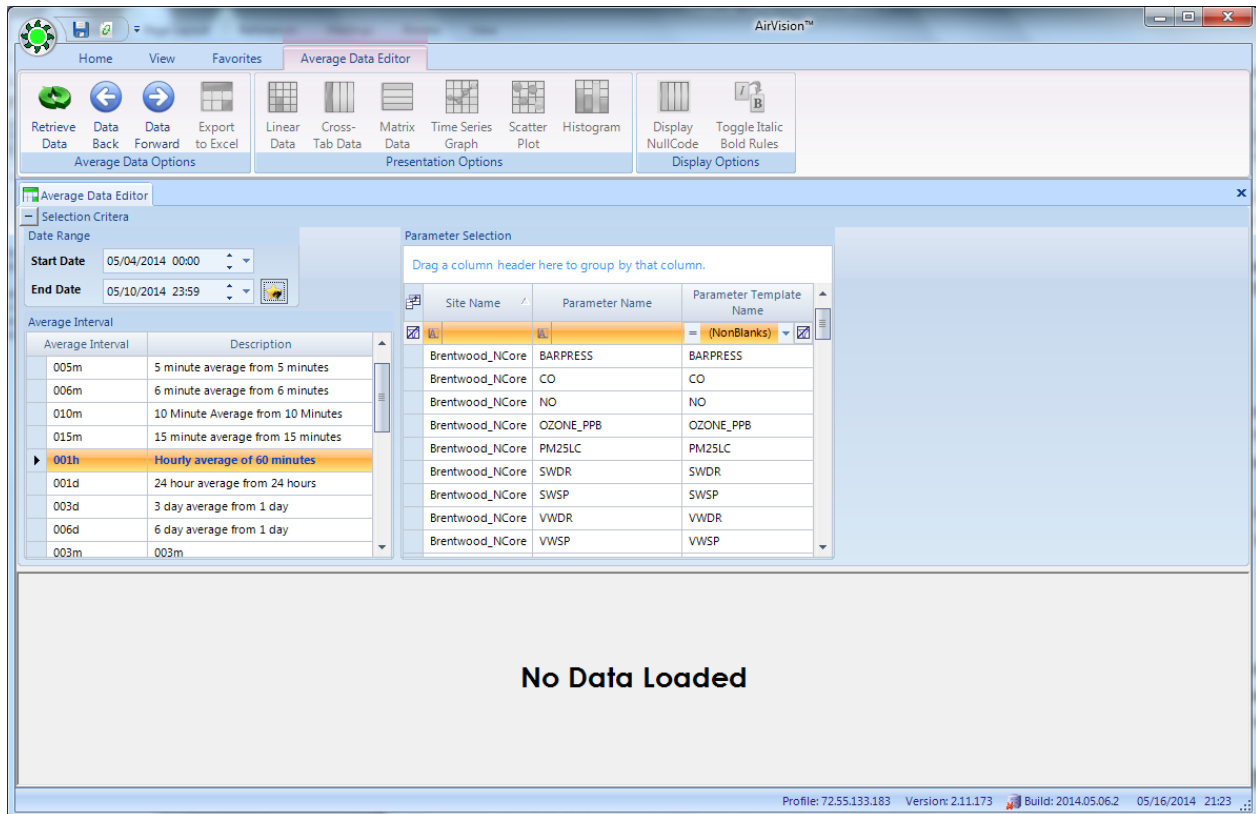
Example E-mail Alarm Configuration:. Note also that email alarms may automatically create logbook entries, if selected.



5. Manual Data QA (data editor)

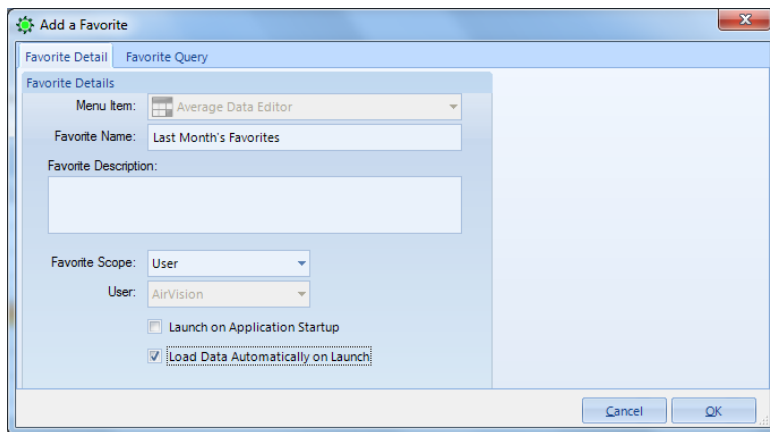
AirVision provides an all-in-one tool to review the data in tabular and graphical format, filter/sort data, and make necessary adjustments to the data.

The user first loads the desired data set by selecting the list of sites, parameters, the desired average interval, and time range. A quick-select tool is available to select time ranges such as “yesterday”, or “this week” or “last quarter.”



Note that the criteria selection allows for filtering or sorting of the site names, parameter names, etc, to make it easy for selections such as “ozone from all sites” or “all parameters from site X”, or “all parameters that have ‘NO’ as part of the name”, to easily select NO, NO₂, NO_x.

AirVision also includes the capability save criteria sets as “Favorites” for one-click recall. So, if a user selected, for example, ozone and PM2.5 from all sites in the network for last month, this could be saved as a Favorite, and each month, the data set could be retrieved with a single selection. This Favorites system makes routine activities easier and quicker. Favorites can be saved for each individual user, or saved as Global Favorites for use by everyone.

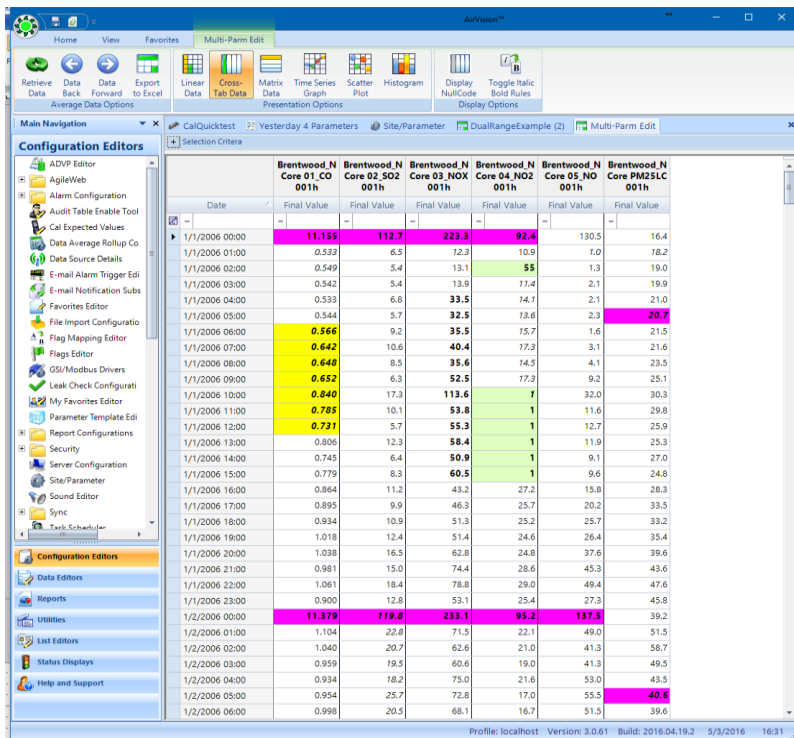


Once the data is selected and retrieved from the database, the user has several edit modes they can toggle between:

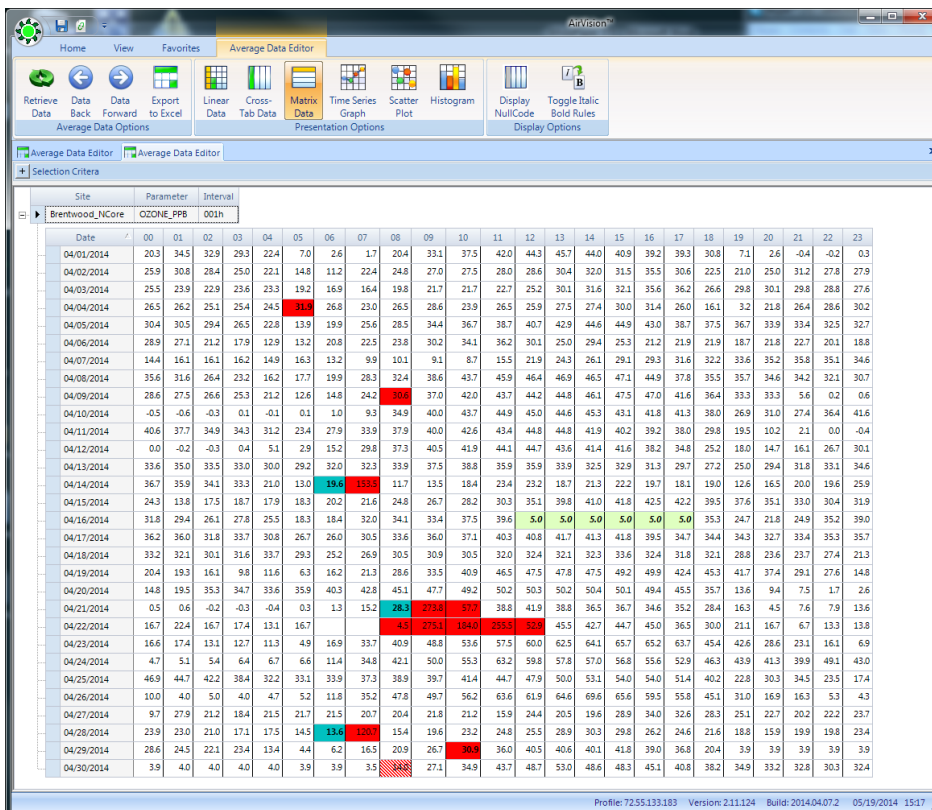
- **Linear Mode-** This mode allows best viewing of and filtering by all the database fields (final value, raw value, flags, null codes, qualifier codes, method code, annotations, etc.).

Site	Parameter	Average Interval	Date	Value	Raw Value	AQS Null Code	Flags	Qualifier Codes	AQS Method Code	Data Grade	Annotations
Brentwood_NCore	O1_CO	001h	01/01/2006 00:00	11.155	11.1550016403198		C<E				[7/29/2016 15:57][Audit][Admin] Removed Flag: < - Logger Invalid: [7/29/2016 15:55][Audit][Admin] Reading Null Code Changed from: AA - Sample Pressure o
Brentwood_NCore	O2_SO2	001h	01/01/2006 00:00	113	112.661094665527				080		
Brentwood_NCore	O3_NOX	001h	01/01/2006 00:00	223	223.32235107422	AD	IC<E		080		[3/17/2020 12:59][Audit][Admin] Reading Null Code Changed from: Not Specified to: AD - Shelter Storm Damage: [3/17/2020 12:59][Audit][Admin] Added Flag: I
Brentwood_NCore	O4_NO2	001h	01/01/2006 00:00	92	92.4201431274414				080		
Brentwood_NCore	O5_NO	001h	01/01/2006 00:00	130	130.575592041016		C<E		080		
Brentwood_NCore	PM25LC	001h	01/01/2006 00:00	16	16.476692199707				080		
Brentwood_NCore	O1_CO	001h	01/01/2006 01:00	0.533	0.53287261724472	AC			070	2	[4/26/2012 10:25][Audit][Admin] Reading Null Code Changed from: Not Specified to: BE - Building/Site Repair: [7/29/2016 15:55][Audit][Admin] Reading Null Co
Brentwood_NCore	O2_SO2	001h	01/01/2006 01:00	6	6.48795413970947	AC			080	2	[4/26/2012 10:25][Audit][Admin] Reading Null Code Changed from: Not Specified to: BE - Building/Site Repair: [11/25/2020 17:29][Audit][Admin] Data Grade Ch
Brentwood_NCore	O3_NOX	001h	01/01/2006 01:00	12	12.3079328369887	AC			080	2	[4/26/2012 10:25][Audit][Admin] Reading Null Code Changed from: Not Specified to: BE - Building/Site Repair: [11/25/2020 17:29][Audit][Admin] Reading Null Co
Brentwood_NCore	O4_NO2	001h	01/01/2006 01:00	10	10.9114799499512	AC			080	2	[11/25/2020 17:29][Audit][Admin] Data Grade Changed from: Not Specified to: 2; [7/29/2016 15:53][Audit][Admin] Added Flag: < - Zero Adjusted:
Brentwood_NCore	O5_NO	001h	01/01/2006 01:00	1	1.0915207862854	AC			080	2	[4/26/2012 10:28][Audit][Admin] Added Qualifier Code: CC - Clean Canister Residue; [4/25/2012 10:28][Audit][Admin] Added Qualifier Code: D - Sandblasting; [4
Brentwood_NCore	PM25LC	001h	01/01/2006 01:00	16	16.2382965087891	AC			080	2	[4/26/2012 10:28][Audit][Admin] Added Qualifier Code: CC - Clean Canister Residue; [4/25/2012 10:28][Audit][Admin] Added Qualifier Code: D - Sandblasting; [4
Brentwood_NCore	O1_CO	001h	01/01/2006 02:00	0.549	0.549017548561096				070		
Brentwood_NCore	O2_SO2	001h	01/01/2006 02:00	5	5.42737429494556				080		
Brentwood_NCore	O3_NOX	001h	01/01/2006 02:00	13	13.1008625030519				080		
Brentwood_NCore	O4_NO2	001h	01/01/2006 02:00	11	11.4197149276733				080		
Brentwood_NCore	O5_NO	001h	01/01/2006 02:00	1	1.3542803338318				080		
Brentwood_NCore	PM25LC	001h	01/01/2006 02:00	19	19.0217571255545				080		
Brentwood_NCore	O1_CO	001h	01/01/2006 03:00	0.542	0.541867971420288				070		
Brentwood_NCore	O2_SO2	001h	01/01/2006 03:00	5	5.45426064918433	AD	I		080		[10/6/2020 11:16][Audit][Admin] Reading Value Changed from: 77 to: 19.0217571255545;
Brentwood_NCore	O3_NOX	001h	01/01/2006 03:00	13	13.9309597015381				080		[3/17/2020 13:02][Audit][Admin] Reading Null Code Changed from: Not Specified to: AD - Shelter Storm Damage: [3/17/2020 13:02][Audit][Admin] Added Flag: I
Brentwood_NCore	O4_NO2	001h	01/01/2006 03:00	11	11.460636138916				080		
Brentwood_NCore	O5_NO	001h	01/01/2006 03:00	2	2.18611335754395		<E		080		[4/25/2012 18:31][Imported][AirVision] annotated data
Brentwood_NCore	PM25LC	001h	01/01/2006 03:00	77	19.9929008483887		E		080		[7/17/2019 18:01][Audit][Admin] Added Flag: < - Logger Invalid;
Brentwood_NCore	O1_CO	001h	01/01/2006 04:00	0.533	0.533399820327759				070		
Brentwood_NCore	O2_SO2	001h	01/01/2006 04:00	7	6.8481760250244	AD	I		080		[3/17/2020 13:02][Audit][Admin] Reading Null Code Changed from: Not Specified to: AD - Shelter Storm Damage: [3/17/2020 13:02][Audit][Admin] Added Flag: I
Brentwood_NCore	O3_NOX	001h	01/01/2006 04:00	33	16.788742064297				080		
Brentwood_NCore	O4_NO2	001h	01/01/2006 04:00	28	14.15072720947266				080		[4/25/2012 18:31][Imported][AirVision] annotated data
Brentwood_NCore	O5_NO	001h	01/01/2006 04:00	2	2.16037011146545				080		
Brentwood_NCore	PM25LC	001h	01/01/2006 04:00	21	21.03723815918		B<E		080		
Brentwood_NCore	O1_CO	001h	01/01/2006 05:00	0.544	0.543930231620789				070		
Brentwood_NCore	O2_SO2	001h	01/01/2006 05:00	6	5.6886568609458	AD	I		080		[3/17/2020 13:02][Audit][Admin] Reading Null Code Changed from: Not Specified to: AD - Shelter Storm Damage: [3/17/2020 13:02][Audit][Admin] Added Flag: I

- **Cross-Tab Mode-** This mode mimics the “Daily Report” layout many users are familiar with. Flags are depicted as color/pattern changes on the cells, and using the mouse to hover over any data point can show full details on the value and flags.



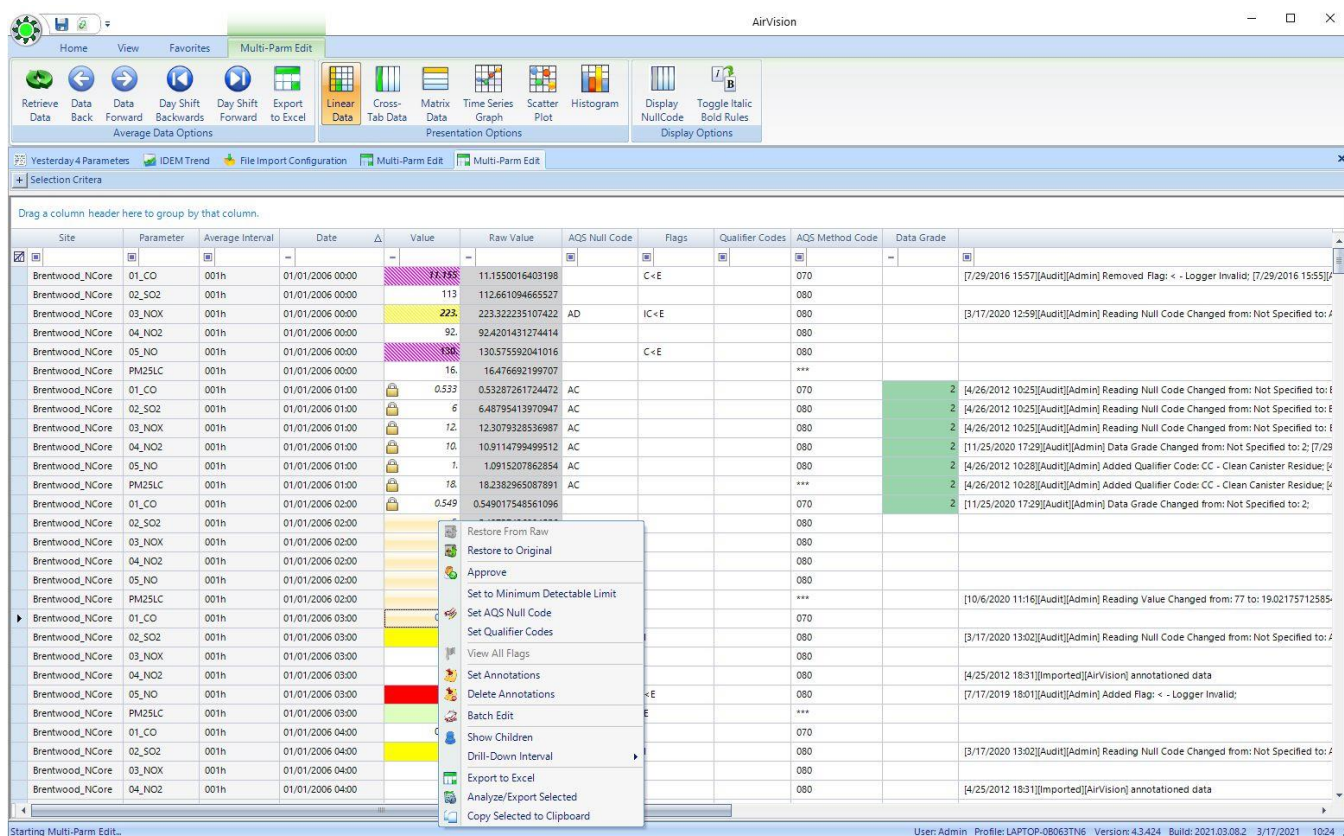
- Matrix Mode- This mode mimics the “Monthly Report” layout, and is good for making edits that are associated with particular diurnal patterns (e.g., the need to select hour 06 of every day, or to review the normal calibration hour to make sure the calibration occurred).



Particular Capabilities of Note in the Data Editor:

All Grid Modes (Linear, Cross-Tab, Matrix)

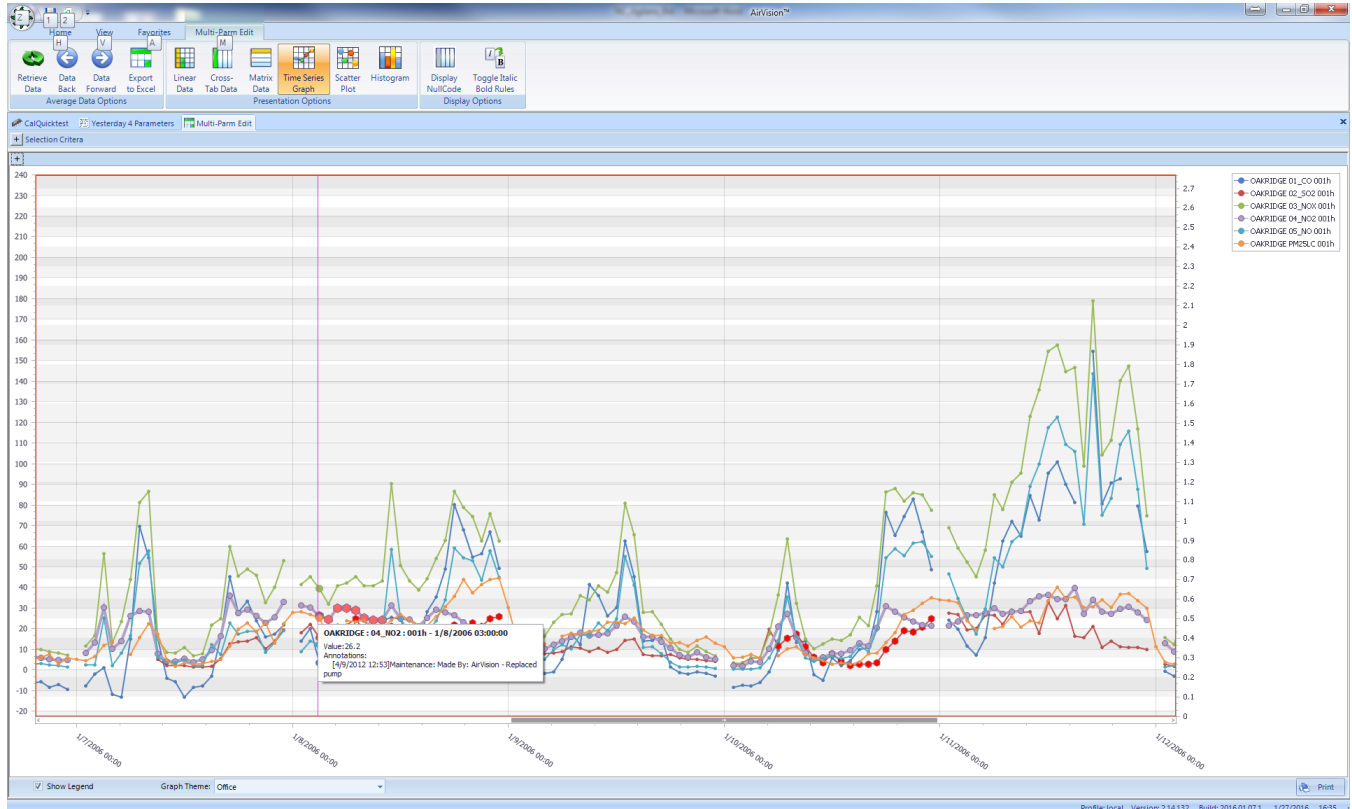
- Users may use standard Windows convention to select data points (shift-select to select a range, CTRL-select to select non-adjacent points, click-drag, etc.).
- After selecting points, user may right-click and will be presented with action options:
 - o Add Annotation
 - o Drill Down Interval (e.g., hourly data to minute data)
 - o Show Children (e.g., analyzer diagnostics for a primary measurement)
 - o Add/Remove Flags
 - o Add/remove Null code or Qualifier Code
 - o Batch Edit (e.g., mx+b scaling, change method code, null code, qualifier code)
 - o Set Approval Level



Linear Mode:

- Above each column are filter fields, similar to Excel Smart Filters, where users can filter the data set (e.g., CO > 60, contains a certain flag or doesn't contain a certain flag, null code or uncoded, etc.). This can be helpful in filtering data sets to where data of interest (e.g., Ozone > 75 AND 'no calibration flag' AND 'no null code') can be easily click-drag selected for one of the right-click edit options shown above.

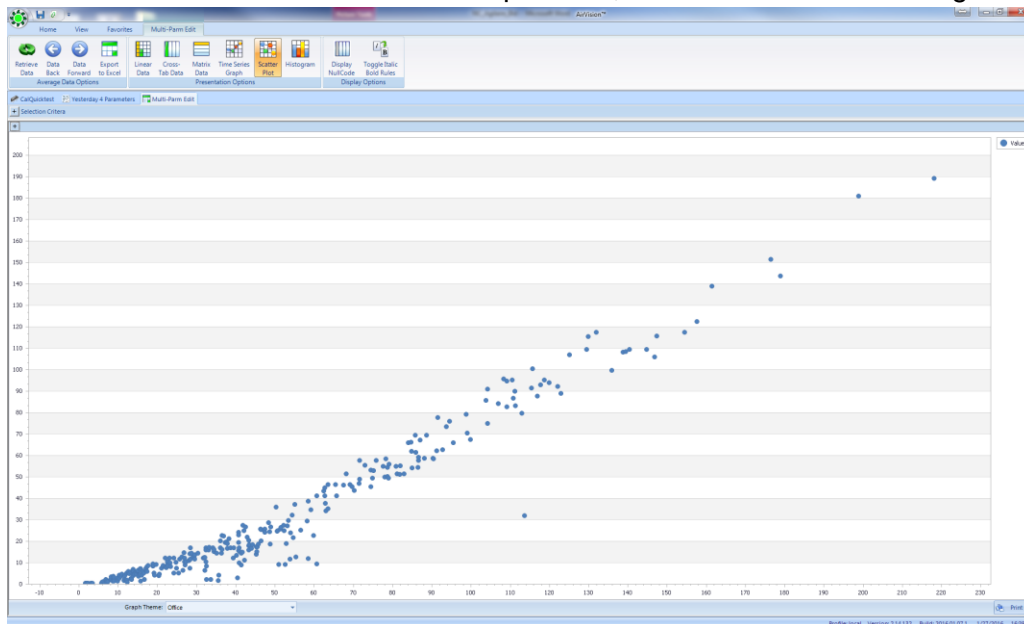
- Time Series Chart- A powerful tool for looking at data as a time-series chart (like a strip chart). Can be used for multi-site/same parameter comparisons (e.g, ozone at all / neighboring sites), reviewing diurnal variations, or cross-parameter comparisons at the same site (e.g., continuous PM25 / PM10).



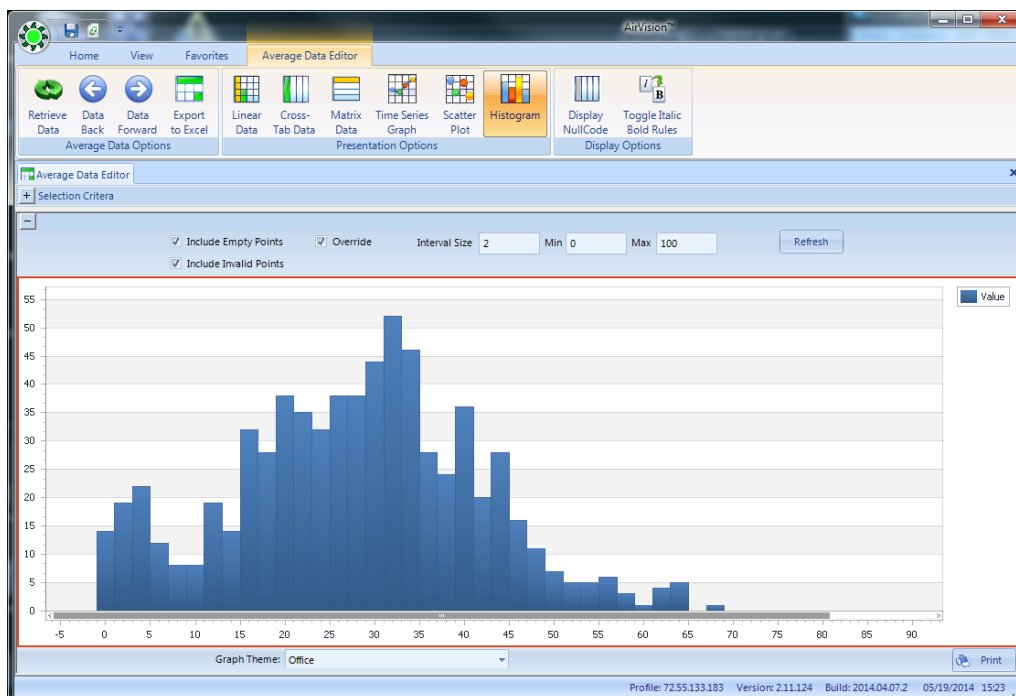
Time Series Plot:

- Any combination of sites and parameters (e.g., cross-site comparisons, NO/NO2/NOx comparisons, co-located samplers/analyzers, etc.)
- Mouse hover-over of any point shows details (date/time, value, flags, annotations)
- Any point with an annotation is marked with a large red dot (the marker type/color is configurable).
- Supports charting against a fixed Y max/min axis, or dynamic scaling against the range of data in the data set.
- Supports dual range Y axis (if fixed ranges configured)
- If only one parameter is selected, the user may also chart previous weeks/months/years for the same parameter, same hour for comparison (e.g., each X-axis point shows current value, value from 1 year ago for same day/hour, 2 years ago, etc.). Previous years can be shown individually or as statistical composites (N-previous years max/min/average).
- Right click on data point to add flag, annotation (note), null code, or qualifier code.

- Scatter Plot- Can be used to compare any two parameters to identify correlations. Commonly used for “buddy site” comparisons or looking for patterns between associated parameters, such as ozone vs. solar radiation or temperature; or CO vs noise monitoring for city streets.

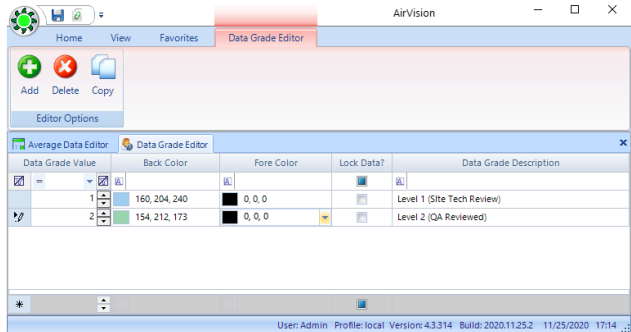


- Histogram- Shows a distribution of concentration values. Can be used to show distribution of a single parameter / site, or even a combination of data for multiple sites (e.g., network ozone concentrations).



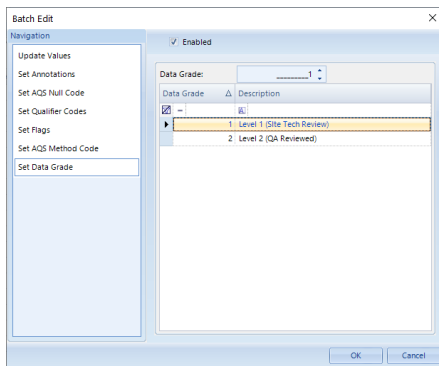
QA Level Approval System (User-Definable Levels)

The Data Grade Level Editor lets you assign levels to the “Data Grade” field in the database (previously only used by ADVP) to track QA levels. For a simple common system, you can use the “Add” button to create two levels, one for site tech review, and the other for QA review complete.

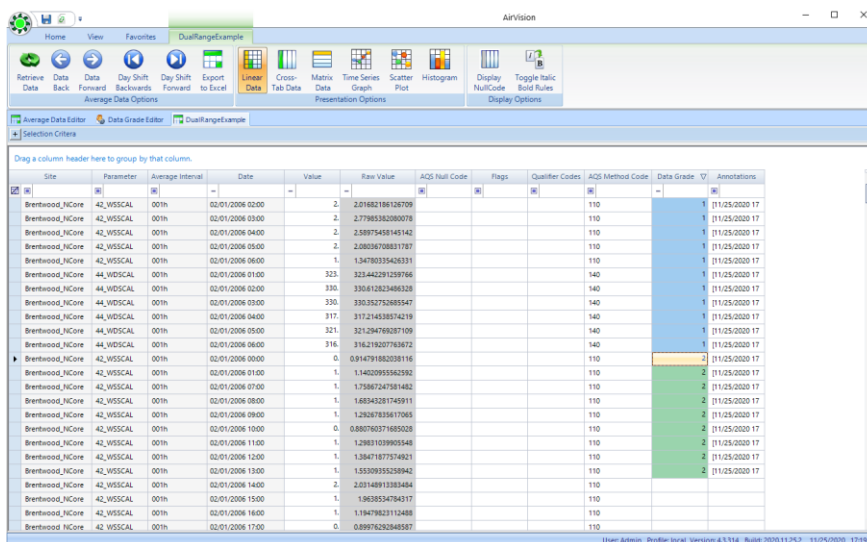


You can assign whatever background colors you want for the QA Level / Data Grade display field. A particular data grade can also be associated with locking the data, if the data is set to that data grade.

Once configured, the selections will appear in places like the Batch Reading Updater:



Marked data will appear as such in the Average Data Editor:



Or directly on that field in the Average Data Editor:

Drag a column header here to group by that column.

Site	Parameter	Average Interval	Date	Value	Raw Value	AQS Null Code	Flags	Qualifier Codes	AQS Method Code	Data Grade
Brentwood_NCore	01_CO	001h	01/01/2006 00:00	11.1550016403198	11.1550016403198		C<E		070	[7/29/2016 15:57][Audit][Admin] Removed Flag:
Brentwood_NCore	02_SO2	001h	01/01/2006 00:00	112.661094665527	112.661094665527				080	
Brentwood_NCore	03_NOX	001h	01/01/2006 00:00	223.322235107422	223.322235107422	AD	IC<E			[3/17/2020 12:59][Audit][Admin] Reading Null Co
Brentwood_NCore	04_NO2	001h	01/01/2006 00:00	92.4201431274414	92.4201431274414					
Brentwood_NCore	05_NO	001h	01/01/2006 00:00	130.575592041016	130.575592041016		C<E			
Brentwood_NCore	PM25LC	001h	01/01/2006 00:00	16.476692199707	16.476692199707					
Brentwood_NCore	01_CO	001h	01/01/2006 01:00	0.533	0.53287261724472	AC				[4/26/2012 10:25][Audit][Admin] Reading Null Co
Brentwood_NCore	02_SO2	001h	01/01/2006 01:00	6	6.48795413970947	AC				[4/26/2012 10:25][Audit][Admin] Reading Null Co
Brentwood_NCore	03_NOX	001h	01/01/2006 01:00	12	12.3079328536987	AC				[4/26/2012 10:25][Audit][Admin] Reading Null Co
Brentwood_NCore	04_NO2	001h	01/01/2006 01:00	10	10.9114799499512	AC				[7/29/2016 15:53][Audit][Admin] Added Flag: z -
Brentwood_NCore	05_NO	001h	01/01/2006 01:00	1	1.0915207862854	AC				[4/26/2012 10:28][Audit][Admin] Added Qualifier
Brentwood_NCore	PM25LC	001h	01/01/2006 01:00	18	18.2382965087891	AC				[4/26/2012 10:28][Audit][Admin] Added Qualifier
Brentwood_NCore	01_CO	001h	01/01/2006 02:00	0.549	0.549017548561096				070	
Brentwood_NCore	02_SO2	001h	01/01/2006 02:00	5	5.42737436294556				080	
Brentwood_NCore	03_NOX	001h	01/01/2006 02:00	13	13.1008625050518				080	
Brentwood_NCore	04_NO2	001h	01/01/2006 02:00	11	11.4197149276733				080	
Brentwood_NCore	05_NO	001h	01/01/2006 02:00	1	1.35428023338318				080	
Brentwood_NCore	PM25LC	001h	01/01/2006 02:00	19	19.0217571258545				***	[10/6/2020 11:16][Audit][Admin] Reading Value C
Brentwood_NCore	01_CO	001h	01/01/2006 03:00	0.542	0.541867971420288				070	[7/29/2016 15:55][Audit][Admin] Reading Null Co
Brentwood_NCore	02_SO2	001h	01/01/2006 03:00	5	5.43426084518433	AD	I		080	[3/17/2020 13:02][Audit][Admin] Reading Null Co
Brentwood_NCore	03_NOX	001h	01/01/2006 03:00	13	13.9309597015381				080	
Brentwood_NCore	04_NO2	001h	01/01/2006 03:00	11	11.460636138916				080	[4/25/2012 18:31][Imported][AirVision] annotat
Brentwood_NCore	05_NO	001h	01/01/2006 03:00	2	2.18611335754395		<E		080	[7/17/2019 18:01][Audit][Admin] Added Flag: < -

User: Admin Profile: local Version: 4.3.314 Build: 2020.11.25.2 11/25/2020 17:20

You will want to assign user approval levels under List Editors->Data Grade User Level Editor.

User: Admin Profile: local Version: 4.3.314 Build: 2020.11.25.2 11/25/2020 17:26

Once this is done, the editor will add a right-click context option for “Approve” if they have the level that includes the ability to lock data. Selecting “Approve” will set the QA level to the lock level and lock the data against future edits.

Brentwood_NCore	05_NO	001h	01/01/2006 00:00	130.575592041016	130.575592041016		C<E		080	
Brentwood_NCore	PM25LC	001h	01/01/2006 00:00	16	16.476692199707				***	
Brentwood_NCore	01_CO	001h	01/01/2006 01:00	0.533	0.53287261724472	AC			070	2 [4/26/20
Brentwood_NCore	02_SO2	001h	01/01/2006 01:00	6	6.48795413970947	AC			080	2 [4/26/20
Brentwood_NCore	03_NOX	001h	01/01/2006 01:00	12	12.3079328536987	AC			080	2 [4/26/20
Brentwood_NCore	04_NO2	001h	01/01/2006 01:00	10	10.9114799499512	AC			080	2 [11/25/2
Brentwood_NCore	05_NO	001h	01/01/2006 01:00	1	1.0915207862854	AC			080	2 [4/26/20
Brentwood_NCore	PM25LC	001h	01/01/2006 01:00	18	18.2382965087891	AC			***	2 [4/26/20
Brentwood_NCore	01_CO	001h	01/01/2006 02:00	0.549	0.549017548561096				070	2 [11/25/2
Brentwood_NCore	02_SO2	001h	01/01/2006 02:00	5	5.42737436294556				080	

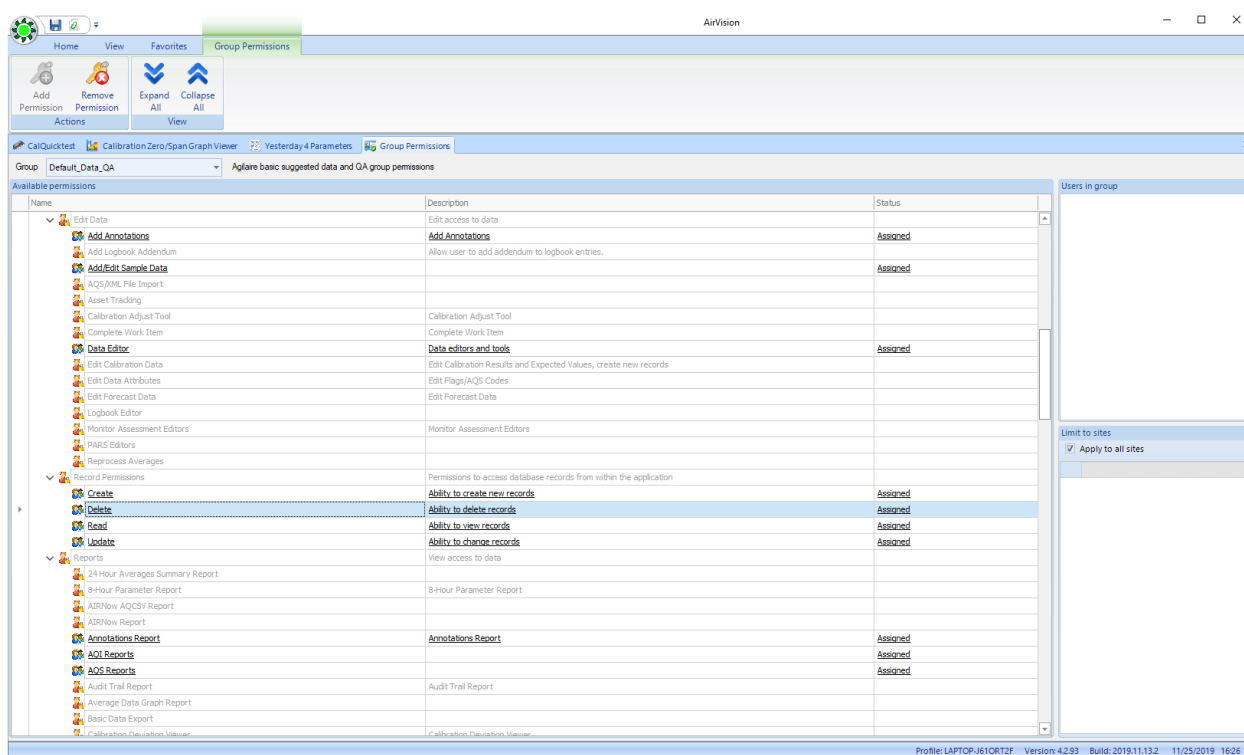
Application Security

User access is controlled by a username and password created by the system administrator. Users are assigned membership to User Groups, and permissions are assigned to those User Groups by the system administrator. The user is granted access based on the intersection of all permissions granted, if the user is a member of multiple groups.

Most group permissions are assigned to menu selections themselves (e.g., a particular report, or the Manual Poll Utility). To accommodate this, some specialized functions have been created as separate menu actions (e.g., a limited data editor that allows viewing of data, and only adding annotations for site technicians).

Some permissions can be granted to user groups on a per-monitoring-site basis (e.g., by using two groups, the administrator could give a user access to run certain reports on all monitoring sites, but only able to access the configuration settings or logbook entry forms for only certain sites they are responsible for).

Thus, for example, two group permissions could be used to give configuration/edit functions to users for a certain list of monitoring sites, but the second group membership could give them rights to run reports / view data for all sites.



Password login attempts are 'throttled' as follows:

"If X number of failed logins occur within Y minutes, then lock out that user for Z minutes."

The values of X, Y, and Z are configurable. Login failures are tracked and can be reported.

6. Internal Agency Reports

AirVision includes ~ 80 pre-built reports to portray averages, calibration data, and other data sets in a variety of ways, built by user / agency input over 30 years. No special query language is required, and the interface and resultant reports are intuitive.

Reports can be run interactively via the Client or web Client, or can be scheduled by the administrator to be automatically generated and sent to a defined list of users. Emailed reports can be sent as attachments (PDF, RTF, Excel, CSV, TXT, HTML, or image) or as embedded HTML in the email body. FTP and SFTP automatic transfer of reports is also available.

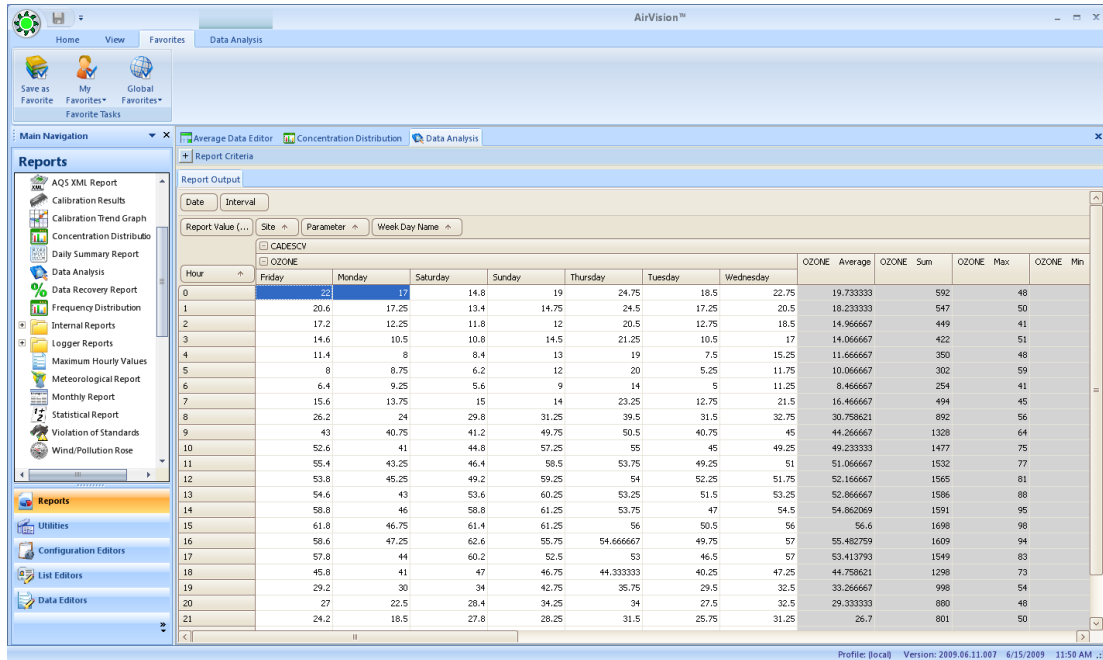
Reports are generally broken out into several main categories:

- Summary Data Reports- Daily Summary, Monthly, Average Trend Graph, Daily (Network by) Parameter Report
- Calibration Reports- Daily Calibration, Calibration Trend, Zero/Span Plot, X-Bar-R, Multi-Phase Calibration Report, Converter Efficiency.
- Statistical Reports – Frequency Concentration, Concentration Distribution, Statistical Report, Data Availability / Capture, Wind Rose, Pollution Rose, Data Analysis Tool
- Compliance- Maximum Hourly Average Report, Violation of Standards, AQS. AirNow, etc.
- Dashboard Reports for site technicians (Site Health), administrators (Polling Status) and managers (Director Dashboard)

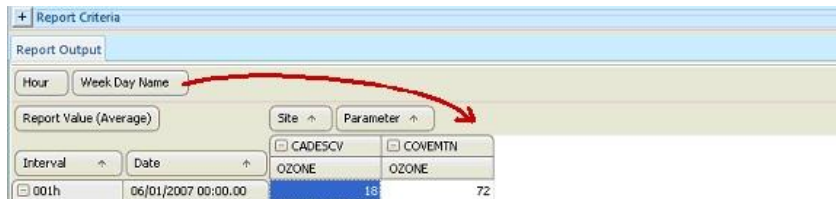
Secondary to this are diagnostic reports (database table size, internal log files, login session history, failed login attempts) and configuration export (tasks, parameter settings, calibration sequence setup, etc) reports for self-documentation.

Examples of the reports and screen shots are listed in Appendix B.

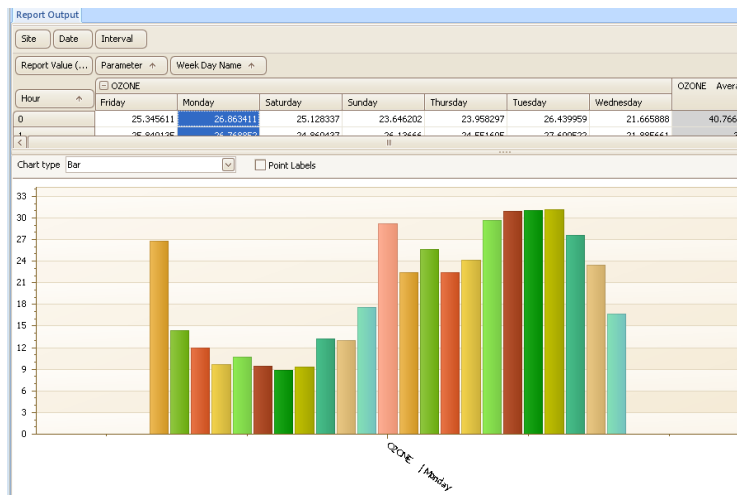
a. Ad Hoc Report Tool



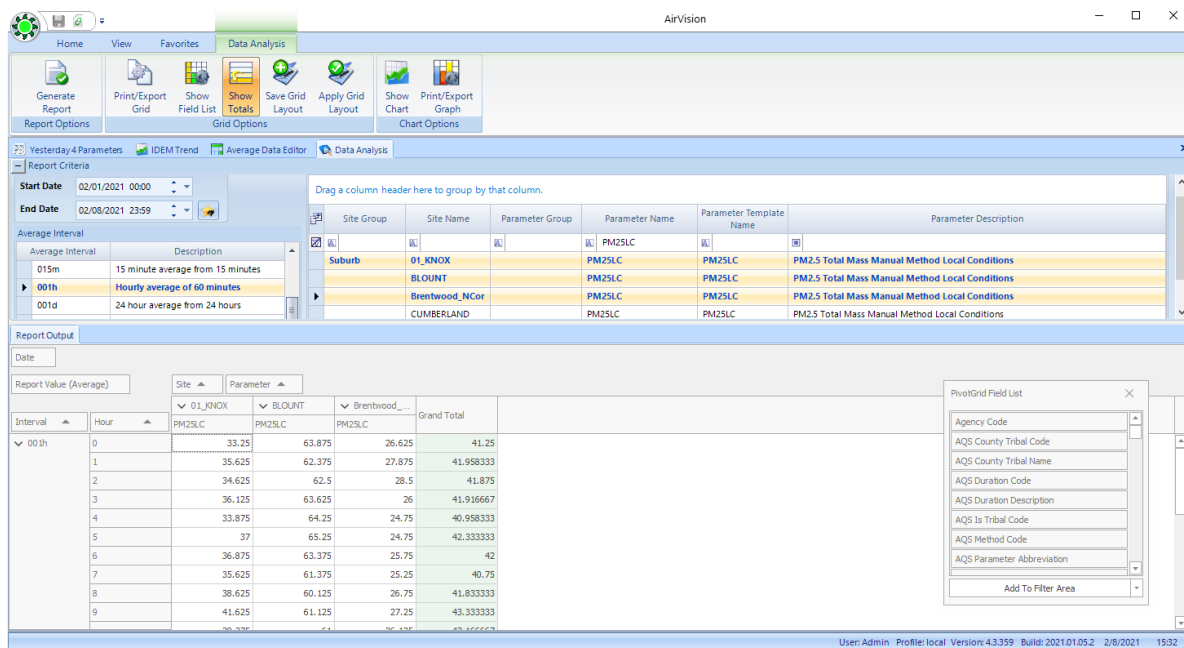
The Ad-Hoc Report Tool is designed to allow the user to take data sets and easily group and sort by various database columns and derived properties (e.g., day of week) with simple 'drag and drop'



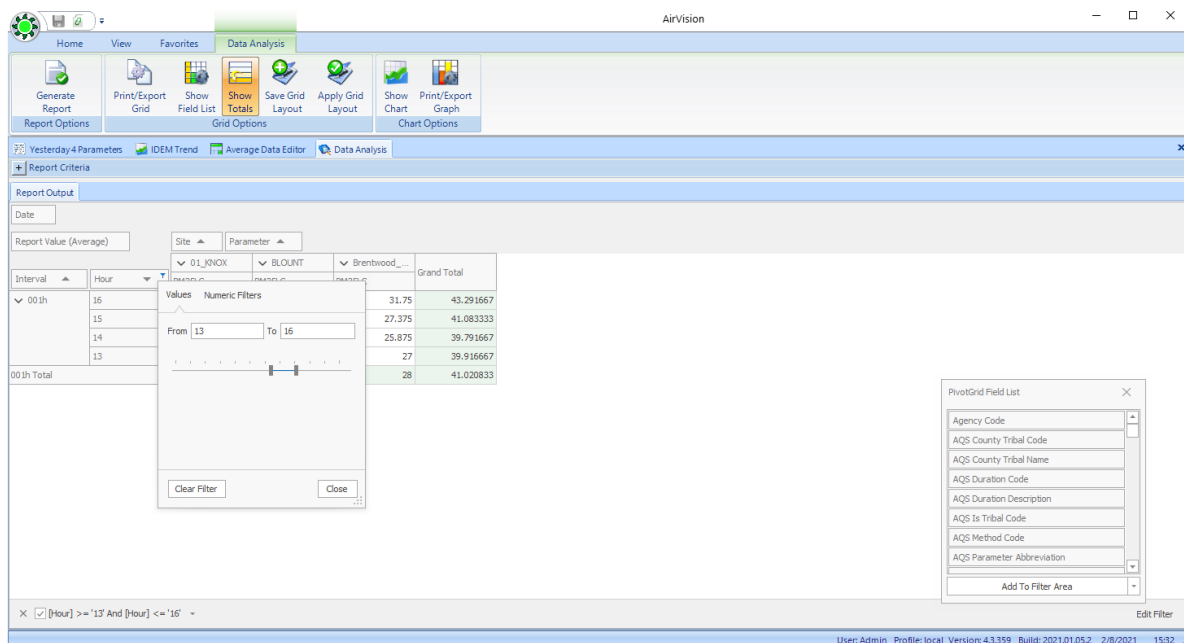
To create charts (bar, pie, line, etc) of newly categorized data (e.g., average ozone values for each day of the week for a particular time range).



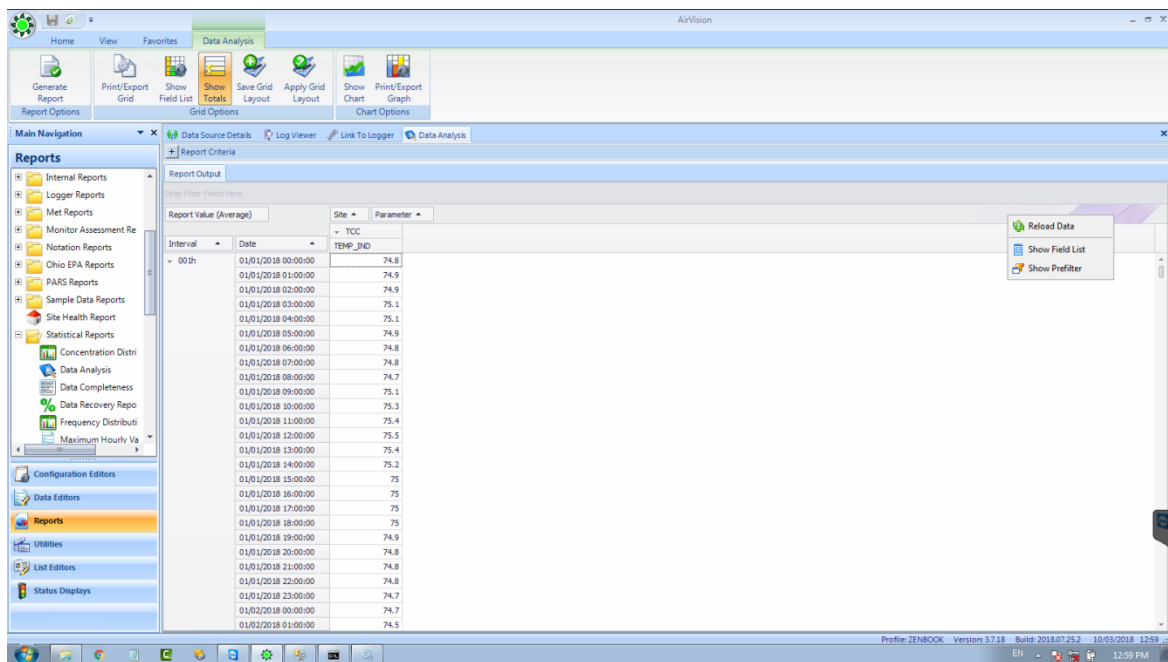
So, for one example (“we want to know the average value for M-F, 13:00 to 19:00”), we could view this data as an aggregate average in the network for a pollutant (e.g., PM25), but in this case, we’ll look at it by site, but aggregate a week’s worth of data. After pulling in the entire data set, we add the field for the hour, and remove the date field using drag/drop



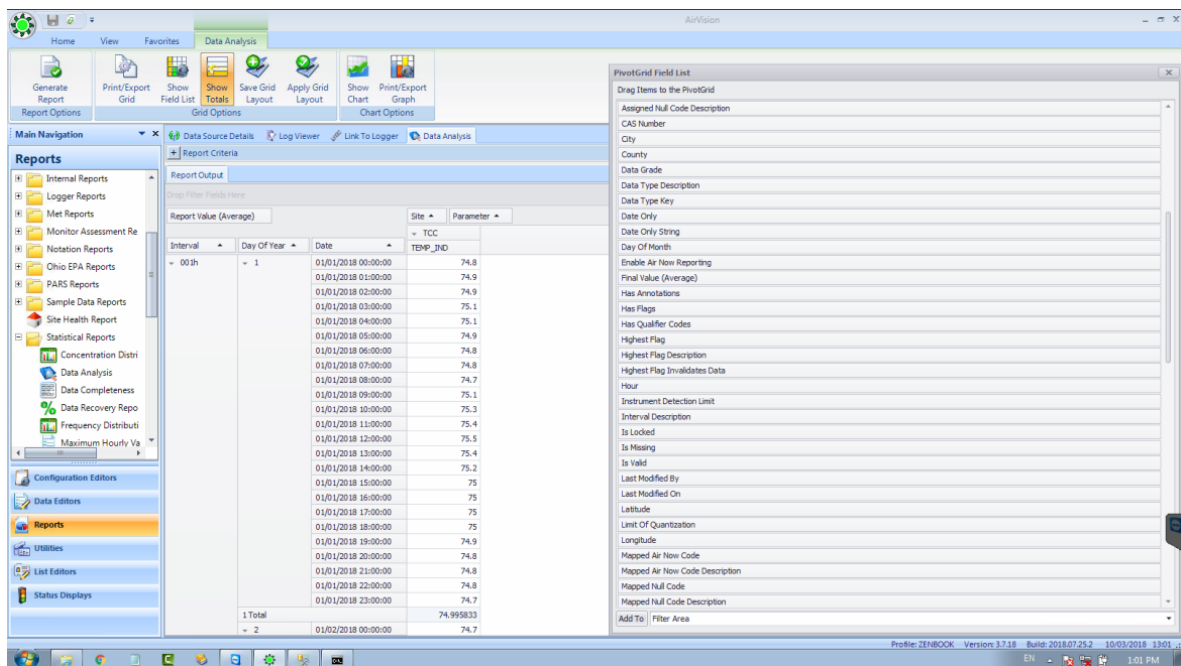
We can then use our slider on the hour to select just hour 13-16:



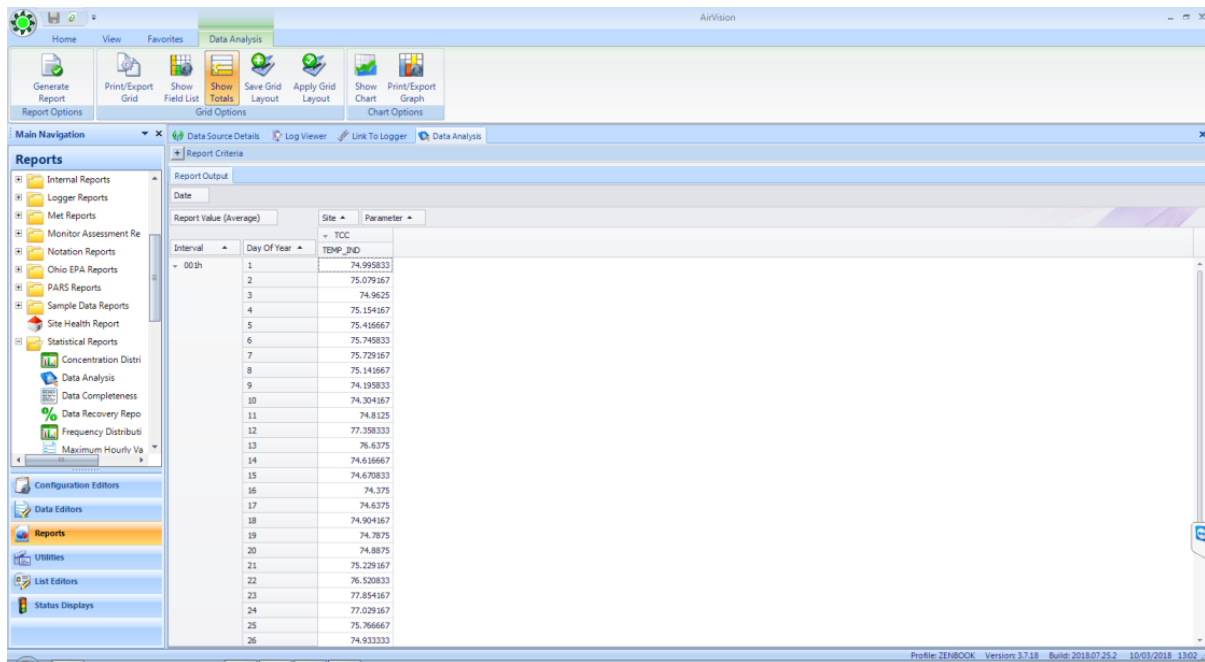
We can then drag ‘hours’ out of the display to show just the aggregate averages for each site, and a summary average (or max, if we were so inclined) for all three sites.



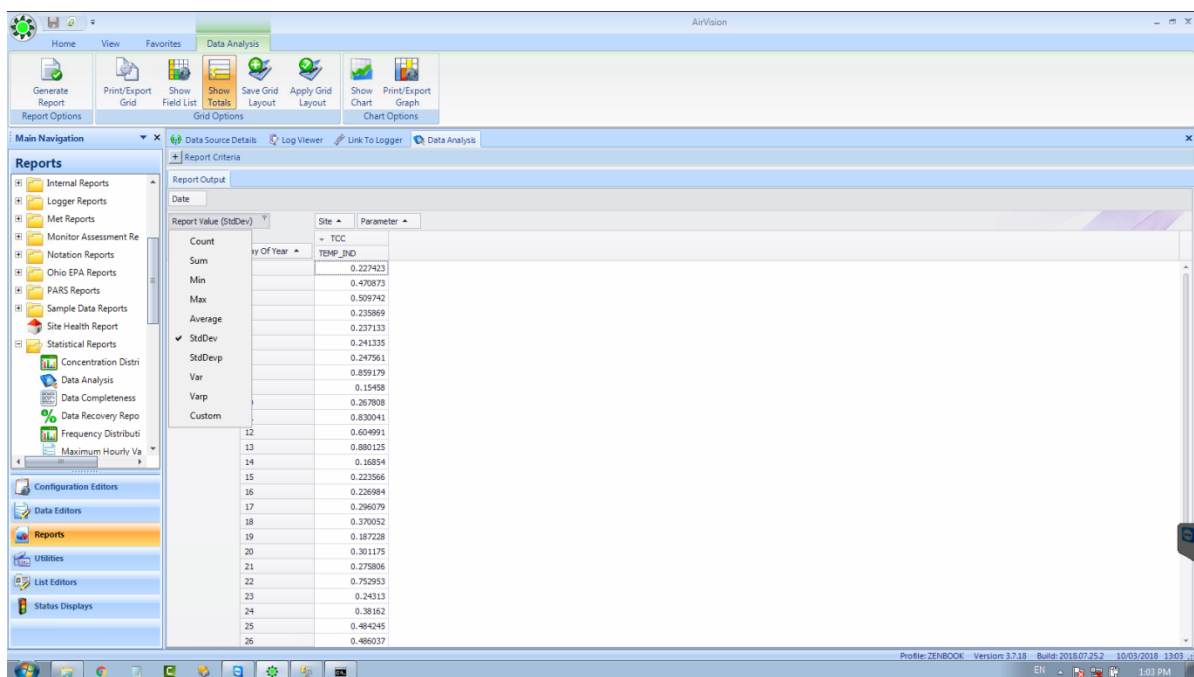
Drag to expand the field list and select a field to better sort days by, like “Day of Year” (Julian day). Drag it between “Interval” and “Date” on the left:



Then drag “Date” into the greyed out “Drag Filter Fields Here” above, since we won’t be using it. You can also close the field selector:



Finally, click on “Report Value:Average” and use the pick list to change the selection to “StdDev”



You can then use “Save Grid Layout” to save the report for later use (using “Apply Grid Layout”)

7. Logbook, Asset and Work Item Tracking

Agilaire's AirVision and SiteNode software has for many years supported a site logbook function, allowing the site user to make electronic logbook entries that can be polled by or bidirectionally synchronized with the central AirVision server. Logbook records are then automatically included in the AirVision database backup, and protected by the same security and auditing system.

The screenshot displays the 'Log Book Entry Editor' window in AirVision. It features a 'Site Selection' dropdown menu with options like 'SITE_NODE', 'ASME_Test', 'BAMTEST', 'BLOUNT', and 'BLOUNT2'. Below this is a 'Log Book Data' table with columns: Site, Category, User Name, Entry Time, Event Time, and Entry. The table shows a single entry for 'BLOUNT' with Category 'Repair', User Name 'Admin', Entry Time '06/17/2015 10:23', Event Time '06/17/2015 15:15', and Entry 'Replaced NDK analyzer pump.' Below the table is the 'Log Book Entry Details' section, which includes fields for Log Entry Time (06/17/2015 10:23), Event Time (06/16/2015 15:15), User (Admin), Site (BLOUNT), Category (Repair), and Entry Text (Replaced NDK analyzer pump.).

The entry tracks the time the entry was made, the username, as well as a user-entered time associated with the event, user-entered category (e.g., maintenance, repair, audit, etc.), and the user entry text. Entries can be made on the site PC and synchronized to the central server, or can be entered into the central server via any Client connection (or via browser with AgileWeb). Entries can also be made automatically by ADVP or Email Alarm events.

Electronic Logbook records are indelible after entry, although a system option allows for records to be appended.

Also, note that the Automatic Data Validation Processor (ADVP) can scan logbook entries for keywords and automatically apply null codes, qualifier codes, or flags, which can automate parts of the QA 'handoff' of field notes to marked data.

The Logbook system was expanded in 2014 to add the Asset Tracking / Work Task module, which allows AirVision to track hard assets (loggers, analyzers, calibrators, flow audit devices, etc.), their location, and their history of use at different sites. In 2015, the Asset Tracking module was further enhanced to allow Asset moves and Work Task completions to automatically create entries in the Site Logbook.

In the Asset Tracking form, users can enter manufacturer, model, serial number, asset tag (+ a third identifier, if needed), purchase date, condition, retirement date, and other information. For calibration standards or bottles, certification dates, cert authorities, and cert expiration dates can also be tracked (and an email generated when expiration is near. The asset can be then tracked as it moves from site to site, with date/times of moves recorded, and then reported later based on the perspective of the monitored parameter ("what analyzers have been used to monitor PM25 at this site over time?") or by the asset ("where has this been for the last 10 years?")

DisplayText	Site	Asset Type	Associate d With	Manufactur er	Model	Serial Number	Asset Tag	Current Status
API/T400/7734	01_KNOX	Analyzer	01_O3	API	T400	77342	WI-88	Active
Met One/BAM	CUMBERL	Analyzer	PM25LC	Met One	BAM-102	837593	FL2903	Active
API/400E/2341	Hamilton	Analyzer	OZONE_PP	API	400E	2341	WI-85	Active

Start	End	Site
10/01/2013 00:00	10/08/2013 15:46	01_KNOX
10/08/2013 15:46	11/12/2013 16:12	Hamilton County
11/12/2013 16:12		01_KNOX

Asset Tracking Form, history also available as a report.

Asset Types

AirVision allows you to define specific asset types, with different properties and links to functions within the AirVision application. All assets have the base properties listed above (serial number, asset tag, additional identifier, status, purchase/retirement dates, manufacturer, model number, description, etc). Specific asset types and their links and additional properties include:

Type	Linked To	Additional Properties / Notes
Analyzer	Site/Parameter	
Instrument	Direct Polled Instrument	
Logger	Logger	
Cal Standard/Bottle	Calibration sequence(s)	Certifying Authority, Standard Owner, Certification Date, Reference Concentration, Expiration Date (used for email notifications of pending expirations)
Other	Site	(used for anything you want to track that does not fit into above categories)

Note that the system is architected to be adaptable to new future asset types

Work Items and Work Task Tracking

Work items can represent one-shot actions (e.g., repair) or a repeating service or PM activity with a set frequency (day of week can be controlled, e.g., not on Sat/Sun). Rescheduling of recurring functions can be based on N days/weeks/etc from the scheduled date, or from the completion date.

The screenshot shows the 'Work Item Editor' window in the AirVision application. The window has a menu bar with 'Home', 'View', 'Favorites', and 'Work Item Editor'. Below the menu bar is a toolbar with icons for 'Add Work Item', 'Delete Work Item', 'Copy Work Item', 'Send Notifications', and 'Show Disabled'. The main area is divided into two panes. The left pane, titled 'CalQuicktest Work Item Editor', contains a table with columns 'Task Name', 'Site', and 'Enabled'. The right pane, titled 'Task Definition', contains fields for 'Task Name', 'Task Description', 'Enabled', 'Notifications Enabled', 'Due Date', 'Assigned To', 'Site', 'Asset', 'Priority', and 'Category'. The 'Task Name' field is set to 'Quarterly Audit of O3'. The 'Due Date' is set to '06/20/2015 09:08'. The 'Assigned To' is set to 'Cliff'. The 'Site' is set to 'BLOUNT'. The 'Asset' is set to 'API/400E/2341/WI-857CC9'. The 'Priority' is set to 'High'. The 'Category' is set to 'RoutineCheck'. The status bar at the bottom shows 'Profile: local Version: 2.13.252 Build: 2015.06.09.1 6/19/2015 09:09'.

Task Name	Site	Enabled
Change Filter	01_KNOX	<input checked="" type="checkbox"/>
Quarterly Audit of O3	BLOUNT	<input checked="" type="checkbox"/>

Task Definition

Task Name: Quarterly Audit of O3

Task Description:

☒ Enabled ☒ Notifications Enabled

Due Date: 06/20/2015 09:08

Assigned To: Cliff

Site: BLOUNT

Asset: API/400E/2341/WI-857CC9

Priority: High

Category: RoutineCheck

Profile: local Version: 2.13.252 Build: 2015.06.09.1 6/19/2015 09:09

Work Task Item Form, task can be entered by manager, and site users have a work form to log completions, along with notes and attachments as needed. Tasks can automatically repeat or be 'one shot' items. Email notifications keep users and managers up to date on due / overdue items.

Completed items are automatically entered into the Site Logbook with the recorded completion date/time.

Like the Site Logbook, all items can be entered at the site PC and synchronized, or entered via Client to server, and are backed up and secured as part of the main AirVision database.

Some Example Asset / Work Item Reports *(other reports available)*

Current Site Asset Status (site inventory)

Current Date: 2/24/2021 12:46 PM

Asset Current Status Report

Site: 01_KNOX

<u>Asset Type</u>	<u>Parameter or Site</u>	<u>Mfr/Model</u>	<u>Serial #</u>	<u>Tag</u>	<u>Starting</u>	<u>Ending</u>
Analyzer	.CS_O3				13-Jan-2021	
Analyzer	01_O3	API T400	77342	WI-883AA3	13-Jan-2021	
Cal Standard		Dasibi 6020 O3 Standard	88948309	VA892u34	13-Jan-2020	
Unspecified		Dewalt Cordless Screwdriver			24-Jul-2020	

Parameter Asset History

Current Date: 2/24/2021 12:48 PM

Parameter History Report

Site: 01_KNOX
Parameter: 01_O3

<u>History:</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial #</u>	<u>Tag</u>	<u>Starting</u>	<u>Ending</u>
	API	T400	77342	WI-883AA3	10/01/2013	10/08/2013
	API	T400	77342	WI-883AA3	10/08/2013	11/12/2013
	API	400E	2341	WI-857CC9	10/08/2013	11/12/2013
	Met One	BAM-1020 PM10	837593	FL29034	11/19/2015	08/12/2016
	API	400E	2341	WI-857CC9	01/02/2018	07/15/2020
	API	T700	8483	HK78382	07/28/2018	01/14/2021
	API	400E	2341	WI-857CC9	07/24/2020	01/06/2021
	API	T400	77342	WI-883AA3	01/13/2021	

Completed Work Items

Completed Work Items

01_KNOX

Repeating Tasks

<u>Task Name</u>	<u>User</u>	<u>Asset Name</u>	<u>S/N</u>	<u>Tag</u>	<u>Due Date</u>	<u>Priority</u>	<u>Date Completed</u>
Replace BAM Tape at Big Piney	Admin				28-Jan-2021 15:59	Medium	26-Jan-2021 16:08
Time to do CO audit	Admin				24-Oct-2022 15:40	Medium	26-Jan-2021 10:30

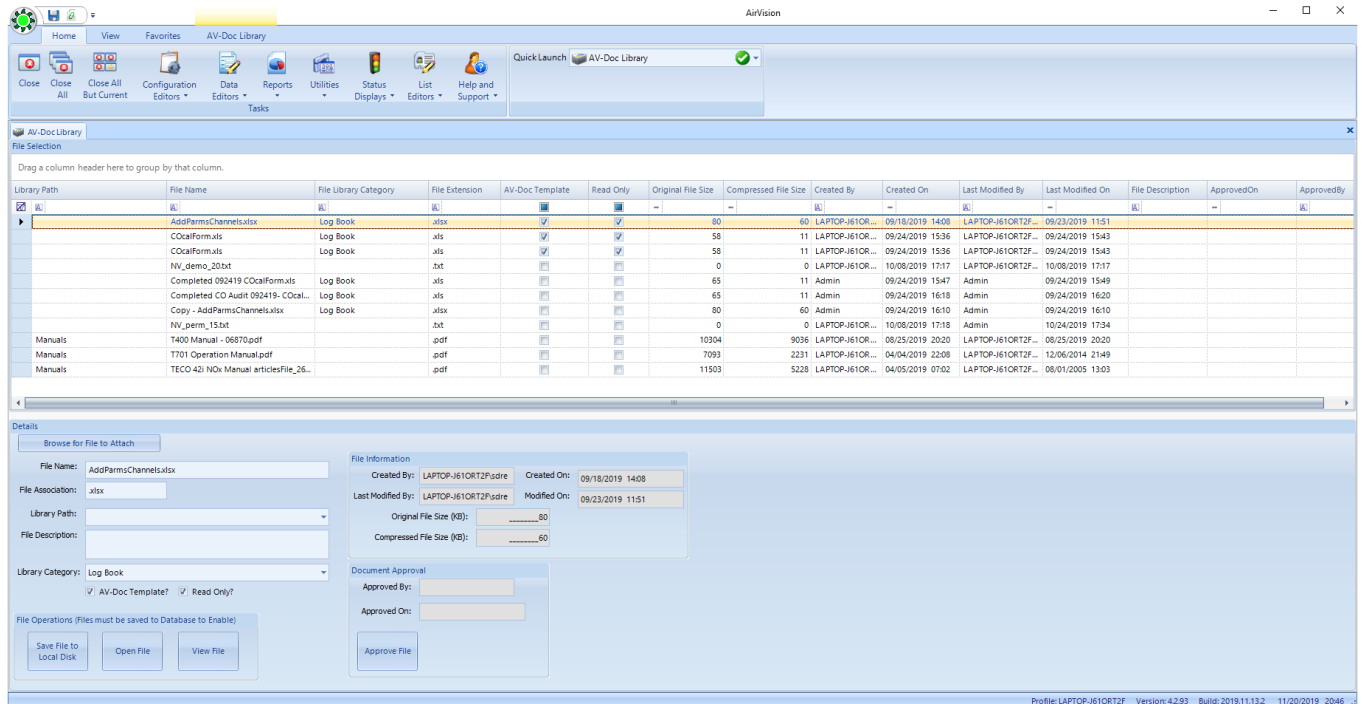
Completed Tasks

<u>Task Name</u>	<u>User</u>	<u>Asset Name</u>	<u>S/N</u>	<u>Tag</u>	<u>Due Date</u>	<u>Priority</u>	<u>Date Completed</u>
Change Filter	Cliff	API/T400/77342/WI- 883AA3	77342	WI-883AA3	17-Feb-2015 17:52	Medium	21-Oct-2015 09:47
Repair ozone at Knox	Cliff		2341	WI-857CC9	08-Jun-2016 21:50	High	05-Dec-2017 09:56
Repair ozone at Knox (2)	Admin				08-Jun-2016 21:50	High	05-Dec-2017 08:57
Repair Pump	Admin		2341	WI-857CC9	13-Jun-2019 11:02	High	13-Jun-2019 11:03

a. AV-Doc Electronic Document Management

As part of our continuous product improvement initiative, various points of the AirVision system were updated to support the AV-Doc Library and Document Management system. At its most basic level, AV-Doc allows the attachment of documents (Word, Excel, PDF, etc... any file) to be attached to the following entities:

- Electronic Logbook (notes, photos, worksheets in Excel or Word, etc)
- Assets (manuals, SOPs, etc)
- Work Items (completion forms, photos, worksheets, receipts, etc)



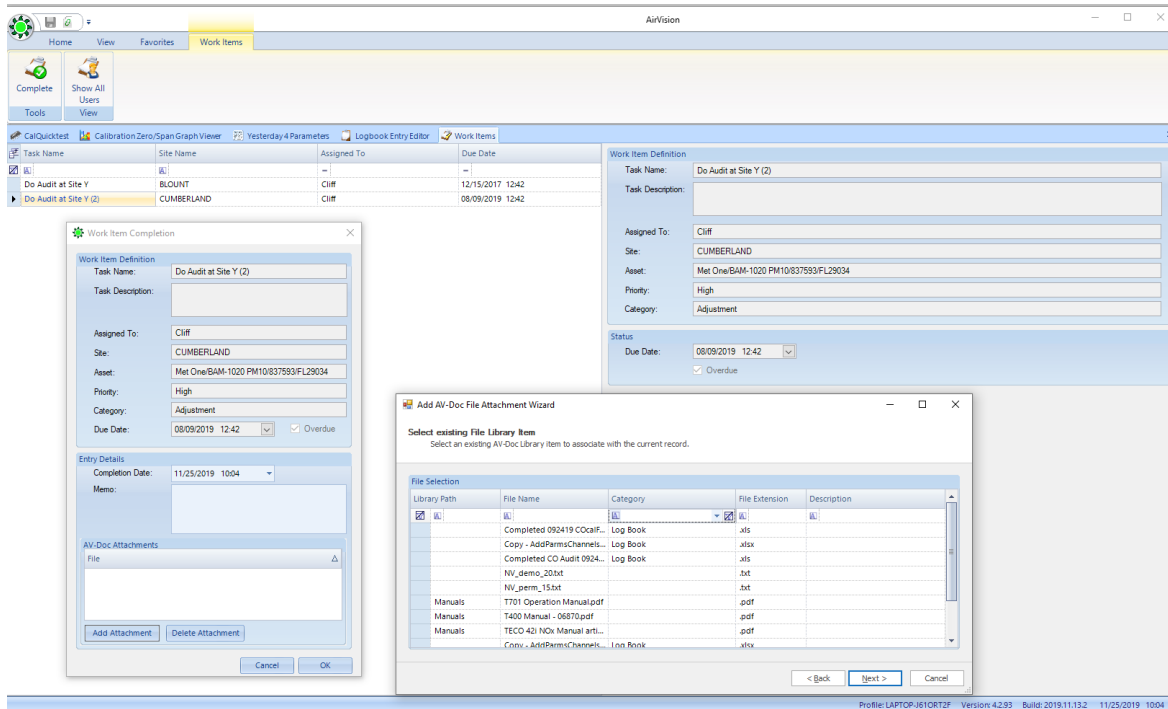
The documents can be later recalled and viewed or edited as needed, and become part of the database record, as they are stored in the SQL database, and not lost within the Windows file system, where they can be accidentally moved or deleted. Submitted work forms / records can also go through an review and approval process (see lower right of screen).

Enhancing this is the AV-Doc Template library, where template documents can be uploaded, and then used later to create new documents within one of the above types, using Word/Excel like editors build into the Client.

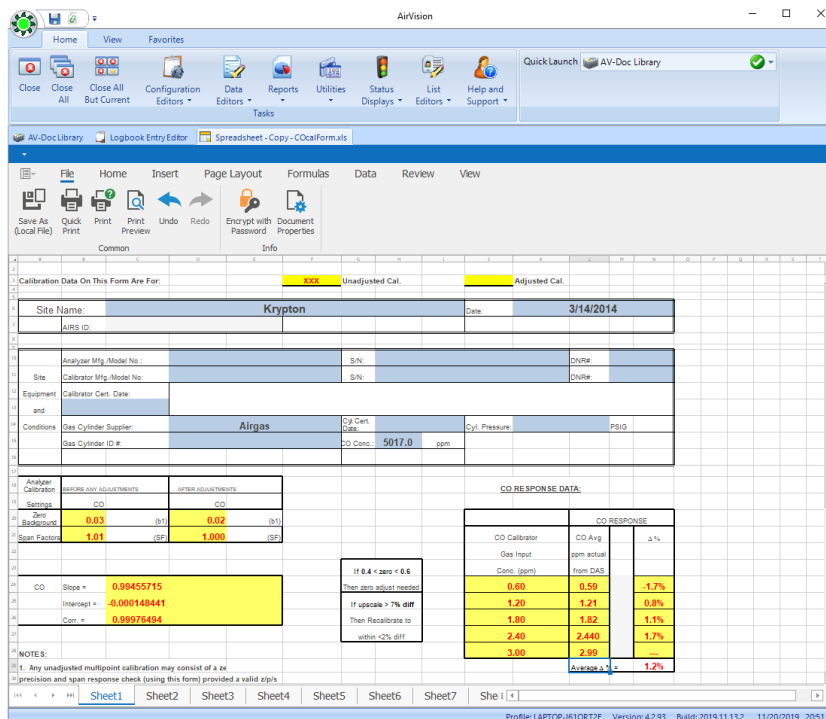
For example, a field operator has a quarterly audit / cal spreadsheet they must fill out for an ozone monitor. They can:

1. Get an email that their audit is due from the Work Item notification
2. Open their assigned work item
3. Open a template spreadsheet (blank) from the template library
4. Fill out the form in the Client (no need to leave the app)

5. Save and close, the document is automatically saved into the AV-Doc system.
6. Close the work item, and a Logbook entry is automatically generated as well.



As you can see, AirVision is designed for a high degree of automation, to remove the chances of operator error (forgot to attach the document, used the wrong form, or the file got lost somewhere on disk / put in the wrong folder).

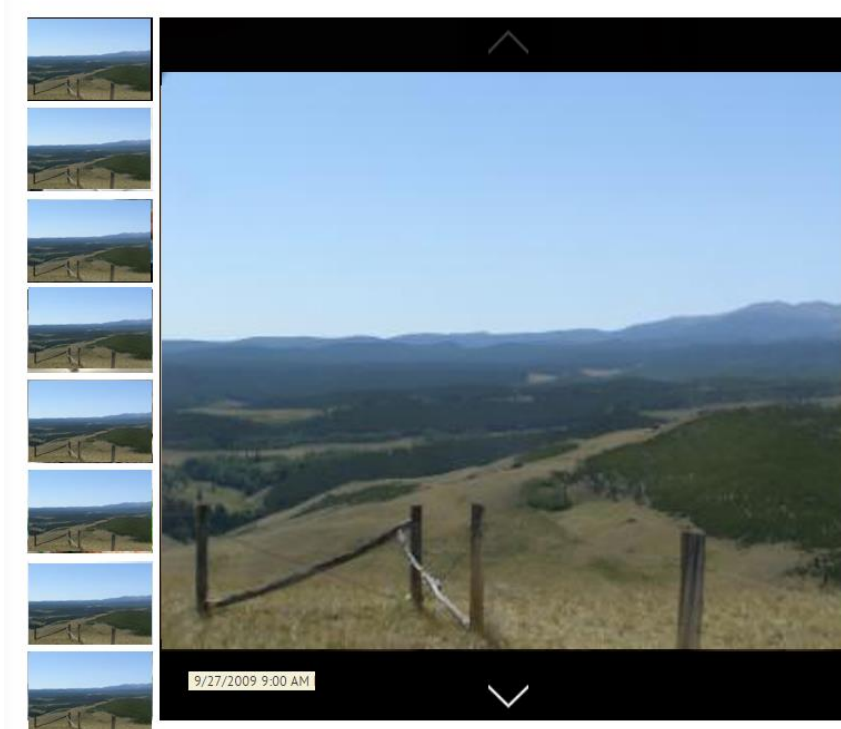


Site worksheet using built-in Excel editor/viewer

8. Camera Integration [optional, not quoted]

Images received via FTP/SFTP can be cataloged in the AV-Doc library, which supports a purge-by-date (e.g., “older than X”) capability. To manage long-term storage of the 9am/12pm/3pm images, those images will be double-imported into a separate AV-Doc folder, using a different purge time frame (e.g., 3 years per Q&A).

The Client or AgileWeb site can be enhanced with a ‘carousel’ viewer, where the user can select a site, which library folder (e.g., last 2 weeks of 15-minute images or the long-term 3-image-per-day folder), and then can use mouse scroll button, etc to quickly scroll through the images.



Date / time information will be presented as a ‘tag’ through the carousel.

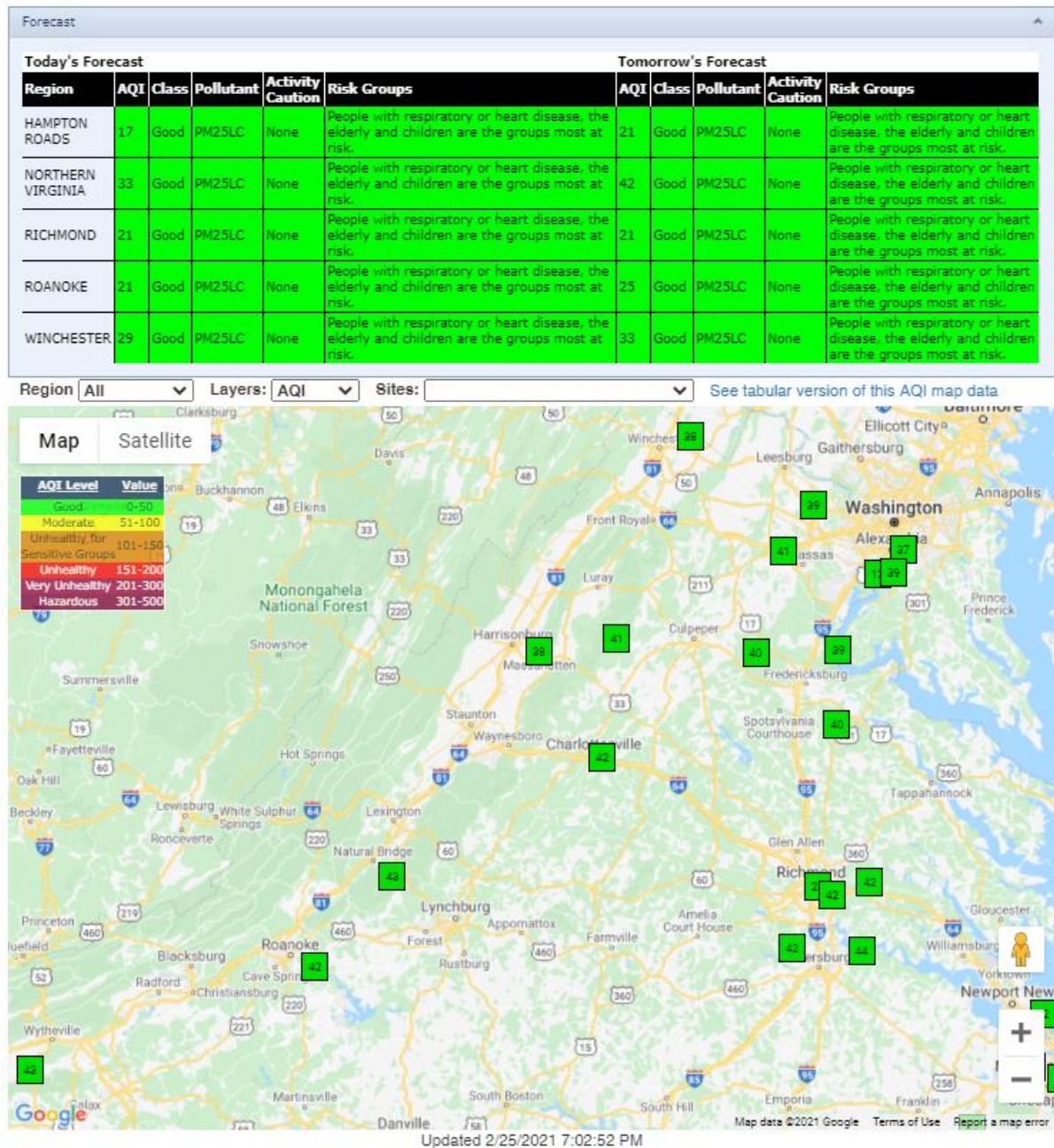
Camera viewer carousels can also optionally be integrated into the AgileWeb page to show current and recent camera images at each site.

Use of AV-Doc system also provides a consistent database-driven way of managing camera image files, ensuring that a **single backup** covers the entire system- average data, calibration data, and camera images, rather than presenting the risk of camera images kept on disk and somehow externally indexed are not backed up, or subverted by the server OS / file system.

Agilaire also has experience in customizations to roll up still frames to video / animations, which could be another way of archiving videos for easy review.

9. Public Information Web Site (Agile Web)

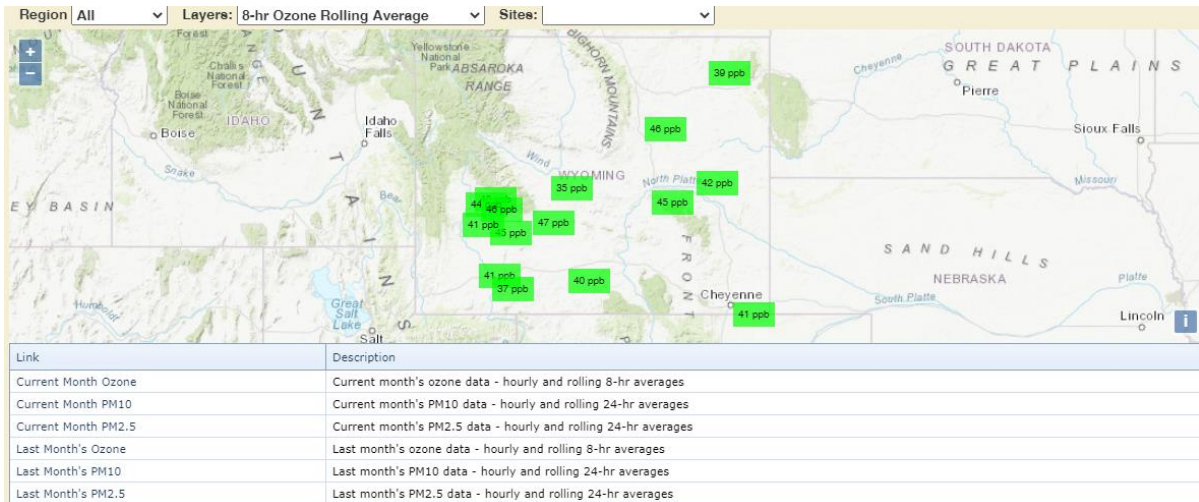
In AgileWeb, the visitor is presented with a map of the state and all sites as hover-over and clickable objects. The map is scrollable and zoomable, and can be based on Open Maps (no key required) or Google Maps, Bing Maps, using an API key (applied for and owned by the agency). OpenMaps is strongly preferred due to API key registration and potential usage costs with other keys. Fixed map images are also supported.



Note: an interpolated AQI (similar to AirNow) "heat map" is available as an option (OSM only),

The main AirVision control is placed in a frame with customer-provided branding (header banner), or can be integrated in with other content (e.g., information about pollutants, outreach program content, etc.) on a time and materials basis.

Web Favorites can be placed below the map for access to common data sets (e.g., last month's 8-hour ozone, this month's PM values, etc.). We have found that presenting data sets in this manner is easier and more meaningful for most casual users than presenting an open query system.



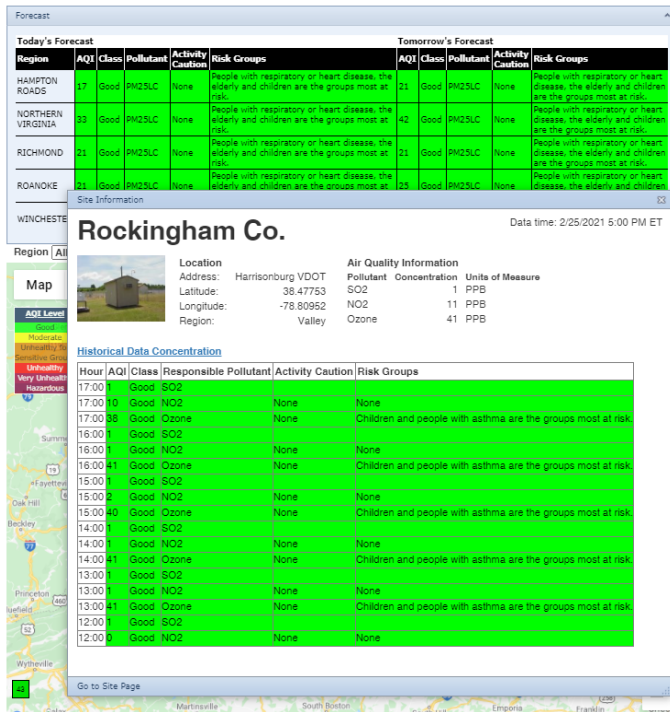
For more sophisticated users, agencies often elect to allow academics and other 'power users' email requests for limited report-only accounts to handle cases where someone might need an open query system. In this way, a site can't be brought down by anonymous users requesting absurdly large data sets (any misuse by a registered user can be tracked and the account can be disabled). However, 'open query' by a public user is still an option.

The map is zoomable, and in the case of a municipal area with multiple monitoring sites, a 'crowded' area on the map is resolved by using the highest AQI site value, until the user zooms in closer to that area, whereupon they can see all the monitoring sites.

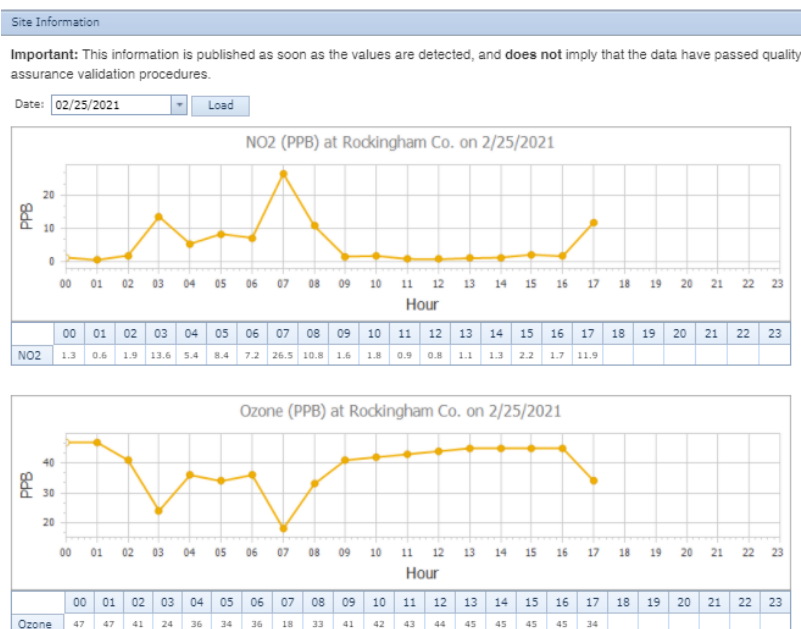
Hovering over a monitoring site will display site details, including AQI, responsible pollutant, and concentration of parameters (configured by the administrator for public display).



Links on the bottom allow the user to see AQI history for the site (as a popup or in the current window):



The “Historical Data Concentration” allows the visitor to select a graph of concentration data for the current day. The user is also given a selector to chart data for previous days as well, allowing a general public user to review historical data without the power to send a large query as an attempt to slow the server.



10. Database Connectivity and Data Interchange

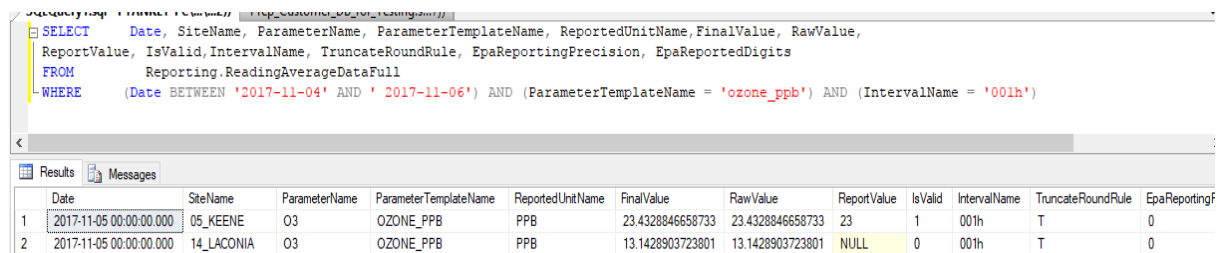
a. SQL Data Views ('flat table')

The AirVision database contains a number of SQL database Views that provide a 'flattened' table for querying that do not require knowledge of the ERD to use. For reporting, the most commonly used view is Reporting.ReadingAverageDataFull. This view contains extensive column options which the user can select from in their desired query.

```
SELECT TOP (200) Date, SystemStandardizedDate, DateOnly, DateOnlyString, SystemStandardizedDateOnly, TimeOnly, TimeOnlyString, Year, QuarterOfYear, MonthOfYear, MonthOfYearName, DayOfYear, DayOfMonth, WeekOfYear, WeekDay, WeekDayName, Hour, Minute, Second, Millisecond, FinalValue, RawValue, RawLoggerFlags, IsMissing, HasFlags, HasAnnotations, HasQualifierCodes, IsValid, ReportValue, AmbAqsNullCodeID, NullCode, NullCodeDescription, AqsMethodCode, ReadingAverageDataID, DataGrade, CreatedOn, CreatedBy, ModifiedOn, ModifiedBy, IsLocked, MappedNullCode, MappedNullCodeDescription, MappedAirNowCodeDescription, MappedAirNowCode, HighestFlag, HighestFlagDescription, HighestFlagBackColor, HighestFlagForeColor, HighestFlagInvalidatesData, MappedNullCodeID, AssignedAmbAqsNullCodeID, AssignedNullCode, AssignedNullCodeDescription, MappedAmbAqsNullCodeID, FlagCreatedOn, FlagModifiedOn, ReadingAverageDataTagID, ReadingAverageIntervalID, IntervalName, TimeInterval, IntervalDescription, DisplayOrder, LastPollTime, AqsDurationCode, AqsDurationDescription, SystemID, SystemName, SystemUtilityTimeZoneID, SystemEnabled, AgencyCode, SystemTimeZoneOffset, SystemTimeZoneDescription, SystemTimeZoneAbbreviation, SourceSiteID, SiteName, SiteAbbreviation, SiteDescription, SiteEnabled, SiteAirNowMnemonic, StreetAddress1, StreetAddress2, City, County, StateRegion, ZipCode, Latitude, Longitude, AqsSiteCode, SurrogateSlope, SurrogateOffset, SiteFileImportCode, SiteUtilityTimeZoneID, SiteTimeZoneOffset, SiteTimeZoneDescription, SiteTimeZoneAbbreviation, AmbAqsCountyTribalCodeID, AqsCountyTribalName, AqsCountyTribalCode, AqsIsTribalCode, AmbAqsStateCodeID, AqsStateName, AqsStateAbbreviation, AqsStateCode, SourceParameterID, ParameterName, ParameterEnabled, ParameterDescription, SourceParameterDataTypeId, DataTypeKey, DataTypeDescription, EnableAirNowReporting, TotalizeInReports, ParameterAirNowMnemonic, ReportedSourceParameterUnitID, ReportedUnitName, ReportedUnitDescription, AmbAqsParameterTypeID, AmbAqsParameterCategoryID, AqsParameterCategory, AqsParameterDescription, AqsParameterCode, AqsParameterAbbreviation, CasNumber, AmbAqsUnitCodeID, AqsUnitDescription, AqsUnitType, AqsUnitAbbreviation, AqsUnitCode, AqsParameterOccuranceCode, TruncateRoundRule, EpaReportingPrecision, EpaReportedDigits, ParameterGraphMinimum, ParameterGraphMaximum, ParameterCalibrationSpan, ParentSourceParameterID, SourceParameterTemplateID, ParameterTemplateName, MinimumDetectableLimit, InstrumentDetectionLimit, LimitOfQuantization, ParameterTemplateDescription, PracticalQuantizationLimit, ParameterAqsMethodCode, ParameterTemplateKey, ParameterOrder, MinimumInReports, ClaireParameterName, ClaireSiteName, TemplateOrder, QualifierCodes
FROM Reporting.ReadingAverageDataFull
```

The desired columns and ordering can be set and 'where' conditions can be used to restrict the returned data (e.g, parameter names, AQS codes, counties, site groups, etc). The 'where' condition columns do not necessarily have to be included in the 'select' columns that will be returned as query results.

Example:



The screenshot shows a SQL query editor with a query that filters for ozone data from two specific dates in 2017. Below the query, the 'Results' tab displays a table with 13 columns. The data is filtered to show only two rows corresponding to the dates specified in the WHERE clause.

```
SELECT Date, SiteName, ParameterName, ParameterTemplateName, ReportedUnitName, FinalValue, RawValue, ReportValue, IsValid, IntervalName, TruncateRoundRule, EpaReportingPrecision, EpaReportedDigits
FROM Reporting.ReadingAverageDataFull
WHERE (Date BETWEEN '2017-11-04' AND '2017-11-06') AND (ParameterTemplateName = 'ozone_ppb') AND (IntervalName = '001h')
```

	Date	SiteName	ParameterName	ParameterTemplateName	ReportedUnitName	FinalValue	RawValue	ReportValue	IsValid	IntervalName	TruncateRoundRule	EpaReporting
1	2017-11-05 00:00:00.000	05_KEENE	O3	OZONE_PPb	PPB	23.4328846658733	23.4328846658733	23	1	001h	T	0
2	2017-11-05 00:00:00.000	14_LACONIA	O3	OZONE_PPb	PPB	13.1428903723801	13.1428903723801	NULL	0	001h	T	0

Such an approach could be used to automate the export of data sets for analysis (e.g, "R") or other stakeholders. Other SQL reporting views exist for AQI values, calibration data, logbooks, etc. (see next page for a partial list).

		Reporting.AmbAqiCalculatedForecastDailyCombined
		Reporting.AmbAqiForecastData
		Reporting.AmbAqiForecastMaxDailyForSite
		Reporting.AmbAqiSiteHistory
		Reporting.AqiParameterMaxByDate
		Reporting.AqiSiteMaximumIndexForDate
		Reporting.AqiSiteProgramMaxByDate
		Reporting.AuditDataChanges
		Reporting.AverageAlarmConfigurationFull
		Reporting.CalibrationAlarmConfigurationFull
		Reporting.CalibrationAuditRunFull
		Reporting.CalibrationDataFull
		Reporting.CemReadingAverageDataFull
		Reporting.DatabaseModifications
		Reporting.DigitalAlarmInformation
		Reporting.DigitalLineState
		Reporting.LogAnalogOutputConfigurationFull
		Reporting.LogCalibrationConfigurationFull
		Reporting.LogCentralMessageDataFull
		Reporting.LogChannelConfigurationFull
		Reporting.LogChannelMemoDataFull
		Reporting.LogDigitalLineConfigurationFull
		Reporting.LoggerAlarmDataFull
		Reporting.LoggerConfigurationFull
		Reporting.LoggerDigitalLineDataFull
		Reporting.LoggerPowerFailureDataFull
		Reporting.LogGSIConfigurationFull
		Reporting.LogModbusInstrumentConfigurationFull
		Reporting.MostRecentParameterInstantReading
		Reporting.MostRecentTagReading
		Reporting.NotificationConfiguration
		Reporting.ParameterConfigurationFull
		Reporting.ParsAccuracyDataFull
		Reporting.ParsPrecisionDataFull
		Reporting.QaMonitorAssessmentFull
		Reporting.ReadingAverageDataFull
		Reporting.ReadingAverageDataTagConfigurationFull
		Reporting.ReadingCombinedDataFull
		Reporting.ReadingForecastDataFull
		Reporting.ReadingSampleDataFull
		Reporting.RegisteredFeatureDetail
		Reporting.SecurityEventFull
		Reporting.SecurityLoginSessionFull
		Reporting.SiteConfigurationFull
		Reporting.SnlStatusFull
		Reporting.SourceConfigurationFull
		Reporting.SourceLeakCheckResultFull
		Reporting.SourceLogBookEntryDataFull
		Reporting.SyncContractInformation
		Reporting.SystemConfigurationFull

b. Web APIs

AirVision provides two REST API interfaces that can be used to retrieve data from the database in a secure read-only method. One exists for AQI and Forecast data, and the second is for query of average data, requires authentication.

AgileWeb REST API

AgileWeb hosts a set of public API functions, which do not require authentication. These operate on the sites as configured for web display (in the Web Display Info Editor). These functions utilize the same data as shown on the AgileWeb map pages, and are affected by the web settings which drive those pages regarding which sites, parameters, AQI programs, and other elements are displayed. (see the AgileWeb configuration settings documentation for more information).

Forecast

GET forecast for all configured sites:

<http://localhost/AirVision/api/forecast>

GET specific forecast for a site using the site's unique identifier GUID:

<http://localhost/AirVision/api/forecast/ff26f5d4-22a4-4572-bd66-ab28c7127dd4>

AQI

GET AQI for all configured sites:

<http://localhost/AirVision/api/aqi>

Optionally, the dt parameter can be used to request a specific datetime:

<http://localhost/AirVision/api/aqi?dt=2019-03-26T00:00:00>

GET AQI for specific site using the unique identifier GUID

<http://localhost/AirVision/api/aqi/ff26f5d4-22a4-4572-bd66-ab28c7127dd4>

Optionally, the dt parameter can be used to request a specific datetime:

<http://localhost/AirVision/api/aqi/ff26f5d4-22a4-4572-bd66-ab28c7127dd4?dt=2019-03-26T00:00:00>

GET AQI for location using latitude and longitude using "lat" and "lon" parameters.

<http://localhost/AirVision/api/aqi?lat=36.105982&lon=-83.855652>

NOTE the search radius is configured via the web utility setting with key **AqiController_RadiusMeters**, specified in meters, or can be overridden in the request using the radius parameter

<http://localhost/AirVision.Web.Site/api/aqi?lat=35&lon=-84&radius=200000>

Optionally, the dt parameter can be used to request a specific datetime:

<http://localhost/AirVision/api/aqi?lat=36.105982&lon=-83.855652&dt=2019-03-26T00:00:00>

Protected REST API for AVServer and AgileWeb

This section applies to both the AVServer and the AgileWeb (protected) API, and supports authentication through either bearer tokens or API keys.

Available REST endpoints

Table GET (read only): **UtilityJournalMessage** – returns the most recent 100 journal messages.

View GET (read only): **SystemConfigurationFull, SiteConfigurationFull, ParameterConfigurationFull**

Data Query GET (read only): **AverageData, SampleData** – these return subsets of the ReadingAverageDataFull and ReadingSampleDataFull views, based on query parameters discussed elsewhere in this document.

Output Format

The API supports JSON and CSV output formats. This is controlled via a request header “Accept”. Set the value to either “text/csv” or “text/json”. If omitted, JSON is the default.

Accept:text/json

or

Accept:text/csv

Note that the JSON formatter may omit empty/null values, whereas the CSV formatter always includes all columns.

Average Data API

The **AverageData** endpoint has several arguments to filter the result.

- sites (string, optional, comma-separated list of site names)
- parameters (string, optional, comma-separated list of parameter names)
- readingaveragedatagids (optional, comma-separated list of tag GUIDs)
- interval (string, optional, defaults to 001h. Leading zeros required as shown in AirVision)
- start (date/time, in format YYYY-MM-ddTHH:mm:ss, defaults to TODAY at 00:00:00)
- end (date/time, in format YYYY-MM-ddTHH:mm:ss, defaults to TODAY at 11:59:59)

There is a cap of 10,000 total records allowed in the result set. If no arguments are used, all sites, all parameters, 001h interval data for TODAY is returned. Note that malformed date/time arguments are generally ignored, leaving the default values.

Note that some of the arguments may conflict. For example, if you specify tag IDs, that implies intervals since tag is configured for a specific interval, so in this case that overrides the interval argument.

Average Data returns the following fields:

<ul style="list-style-type: none">• ReadingAverageDataId• Date• SystemStandardizedDate• SystemName• SiteName• ParameterName• ReportedUnitName• IntervalName• IsValid• ReportValue• FinalValue• RawValue• RawLoggerFlags• HighestFlag• AqsDurationCode	<ul style="list-style-type: none">• SiteTimeZoneOffset• SiteTimeZoneAbbreviation• Latitude• Longitude• AqsSiteCode• ParameterDescription• DataTypeKey• AqsParameterCode• AqsUnitCode• ParameterTemplateName• ParameterTemplateKey• NullCode• NullCodeDescription• QualifierCodes• FlagString
---	--

The JSON format may omit null/empty fields, whereas CSV format includes all columns. The list of columns is subject to change in future versions.

Examples

Get all 1h average data for today:

<http://localhost/AirVision.Web.Site/api/averagedata>

Get average data using site names, parameter names, interval, and time range:

<http://localhost/AirVision.Web.Site/api/averagedata?sites=SiteA,SiteB¶meters=OZONE,PM25&interval=001h&start=2019-10-01T00:00:00&end=2019-10-02T23:59:59>

Sample Data API

The **SampleData** endpoint has several arguments to filter the result.

- sites (string, optional, comma-separated list of site names)
- parameters (string, optional, comma-separated list of parameter names)
- readingaveragedatagids (optional, comma-separated list of tag GUIDs)
- interval (string, optional, defaults to any sample data interval)
- start (date/time, in format YYYY-MM-ddTHH:mm:ss, defaults to TODAY at 00:00:00)
- end (date/time, in format YYYY-MM-ddTHH:mm:ss, defaults to TODAY at 11:59:59)

There is a cap of 10,000 total records allowed in the result set. If no arguments are used, all sites, all parameters, 001h interval data for TODAY is returned. Note that malformed date/time arguments are generally ignored, leaving the default values.

Note that some of the arguments may conflict. For example, if you specify tag IDs, that implies intervals since tag is configured for a specific interval, so in this case that overrides the interval argument.

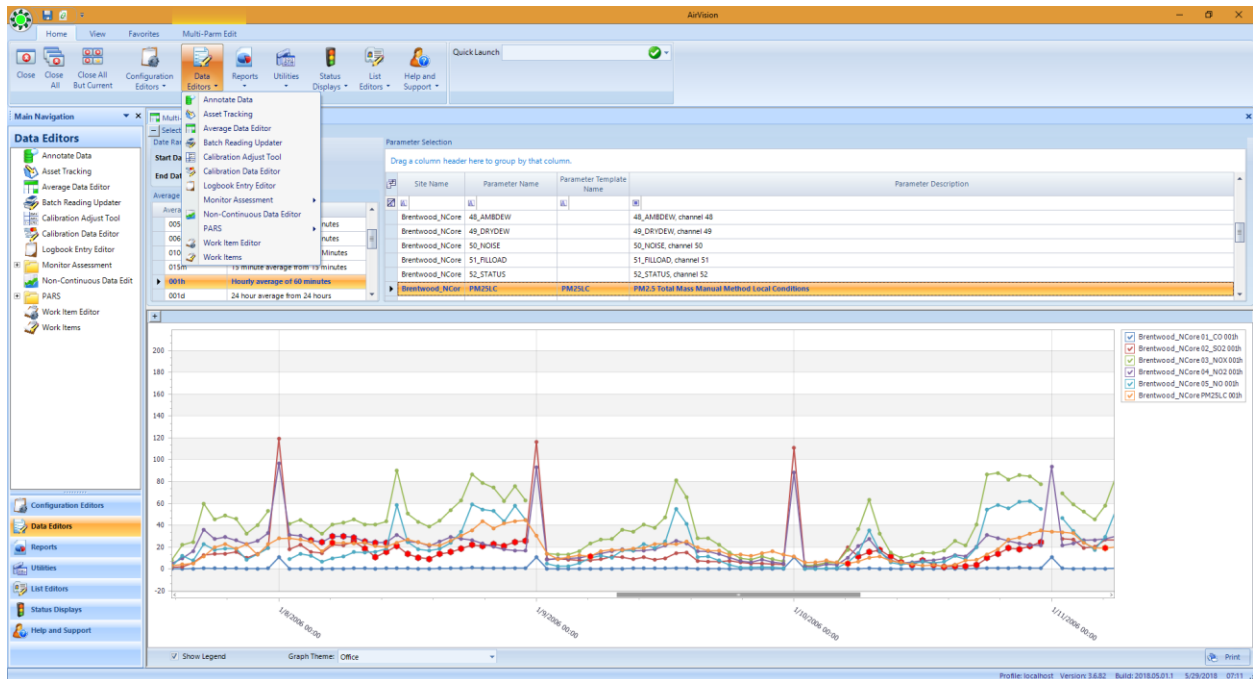
Sample Data returns the following fields:

<ul style="list-style-type: none">• ReadingSampleDataId• Date• SystemStandardizedDate• SampleTime• SystemName• SiteName• ParameterName• ReportedUnitName• IntervalName• IsValid• ReportValue• SampleValue• FinalValue• RawValue• RawLoggerFlags• HighestFlag• DurationCode• SiteTimeZoneOffset• SiteTimeZoneAbbreviation• Latitude• Longitude• AqsSiteCode• ParameterDescription• DataTypeKey• AqsParameterCode• AqsUnitCode• ParameterTemplateName	<ul style="list-style-type: none">• NullCode• NullCodeDescription• QualifierCodes• UncertaintyValue• SampleIdentifier• ExcludeFromReporting• BlankTypeCode• BlankTypeDescription• AmbAqsFrequencyCodeId• FrequencyDescription• CollectionFrequencyCode• CreditableSample• ScheduledSample• MinimumDetectableLimit• CanisterIdentifier• SampleEndTime• SampleRetrievedTime• SampleAnalysisTime• TareWeight• FinalWeight• SampleBarometricPress• SampleAmbientTemp• SampleTotalFlow• RetentionTime• PeakArea• FlagString
---	---

11. Client User Interface and Browser Client Options

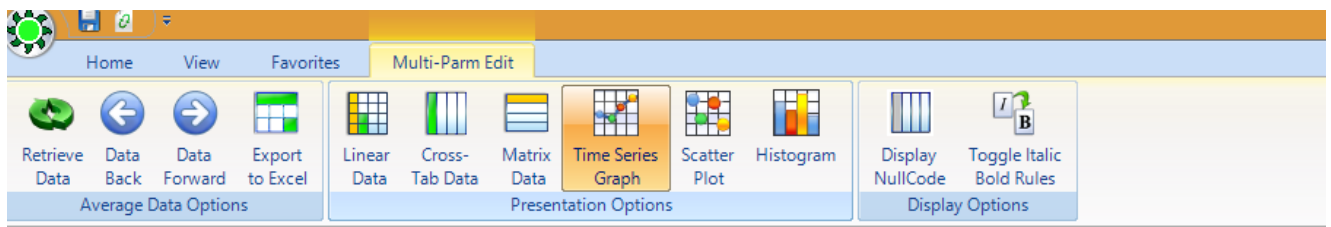
AirVision Client

The Client allows the user to either log into the primary data server and receive access based on their security credentials. After presenting credentials, the user is provided an interface based on Microsoft .NET application standards, with navigation available both as a sidebar or as vertical menu selections:



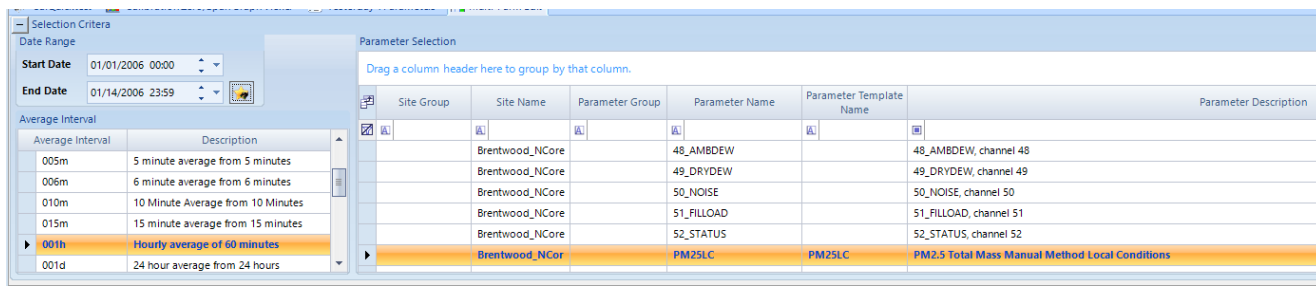
The menu that is presented is, of course, based on their security profile and group permissions.

Multiple forms may be opened at once (reports, data editors, configuration editors, etc.). The top horizontal ribbon changes context based on the user's active window.



For example, for the average data editor, the user is presented with selection for different ways of viewing the data, as well as scrolling functions and export functions.

Common to most editors and reports is the criteria panel, which allows the users to select the sites, parameters, time range, average interval(s) and other editor/report options as appropriate to the active form.

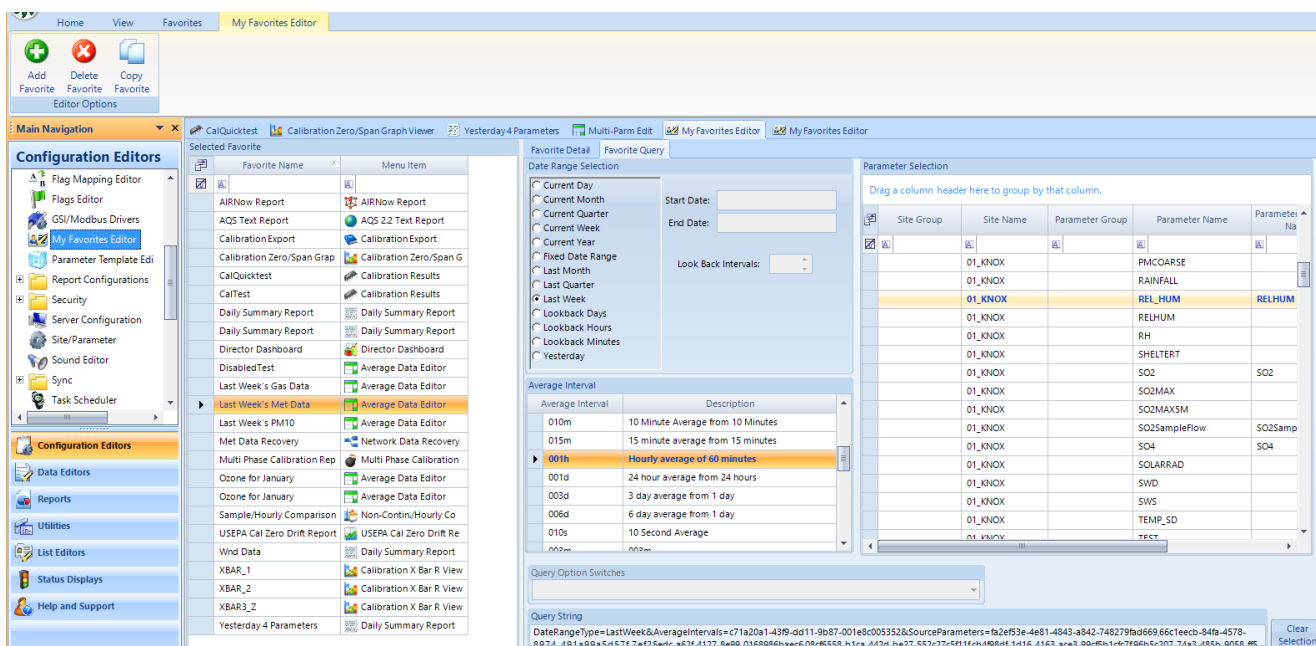


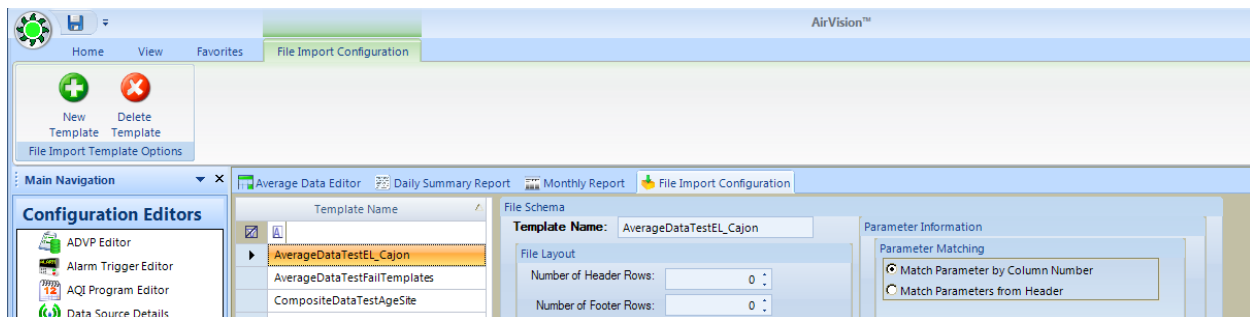
The top of each column is a filter field that can be used to quickly sort and find/include desired items (e.g., “every parameter that contains ‘ozone’ in its name”). Site Groups and Parameter groups can be optionally used as additional filtering/grouping criteria.

The site/parameter list supports standard Windows selection options (shift-select, CTRL-select).

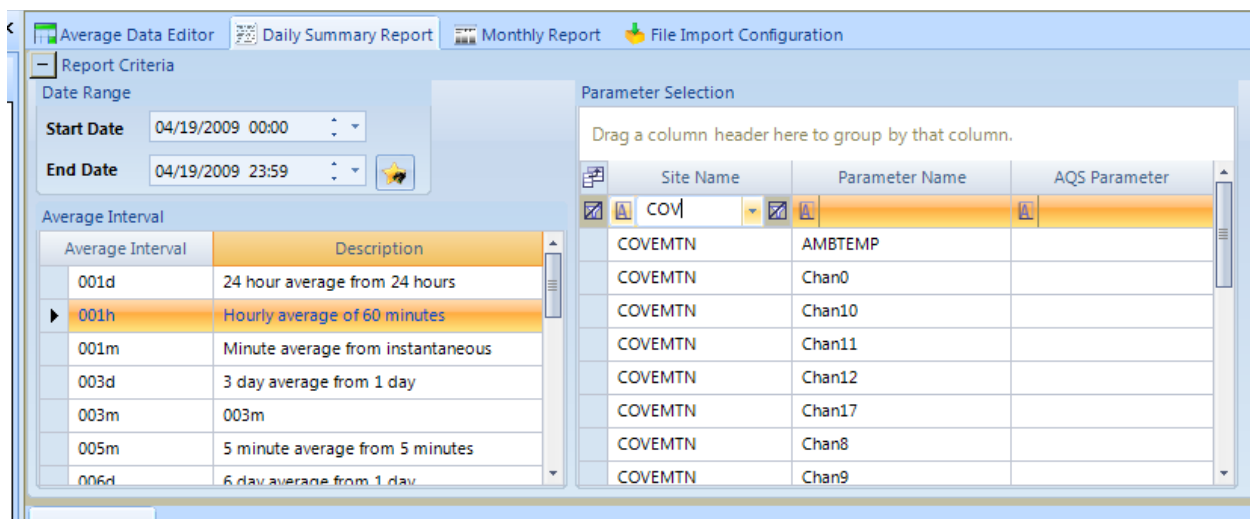
The date/time supports time entry via directly entered date and time, use of a calendar selection tool for dates, and the “star” tool allows for selection of relative time ranges (e.g., “this week”, “last month”, “this year”, “last quarter”, etc.)

A selection that will be used repeatedly can be saved as a “Favorite” for one-click recall. Favorites can also be set to auto-run when the user logs into the client. If needed, Favorites can be edited (e.g., if a new site or parameter is added and needs to be included in an existing Favorite). Favorites can also be copied and edited for easy ‘iterative’ Favorites.





Dynamic Toolbar, Tabbed windows, Left-Side Menu Panel.



Data Editors and Report Criteria support “Smart Filters” to narrow selections, including filtering for new Site Groups and Parameter Groups. Standard Windows conventions like CTRL-click, click-drag select, etc., are supported.

Report Criteria																			
Report Output																			
Site Name: COVEMTN		January 2007																	
Parameter: OZONE		Hours																	
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
01	40 <	37 C	36.02	35.02	33.02	33.02	31.02	30.02	31	440	57.8	56.75	56.75	50.45	49.4	49.4	27	21	21
02	19	18	17	17	17	17	21	36	46	49	49	50	42	44	34	35	40	37	37
03																	41	43	42
04	46	43	43	43	43	42	42	43	43	44	43	42					39	39	38

Ribbon in Report Viewer allow for save to various formats, scaling, watermarks, margins, email, etc.

Favorites

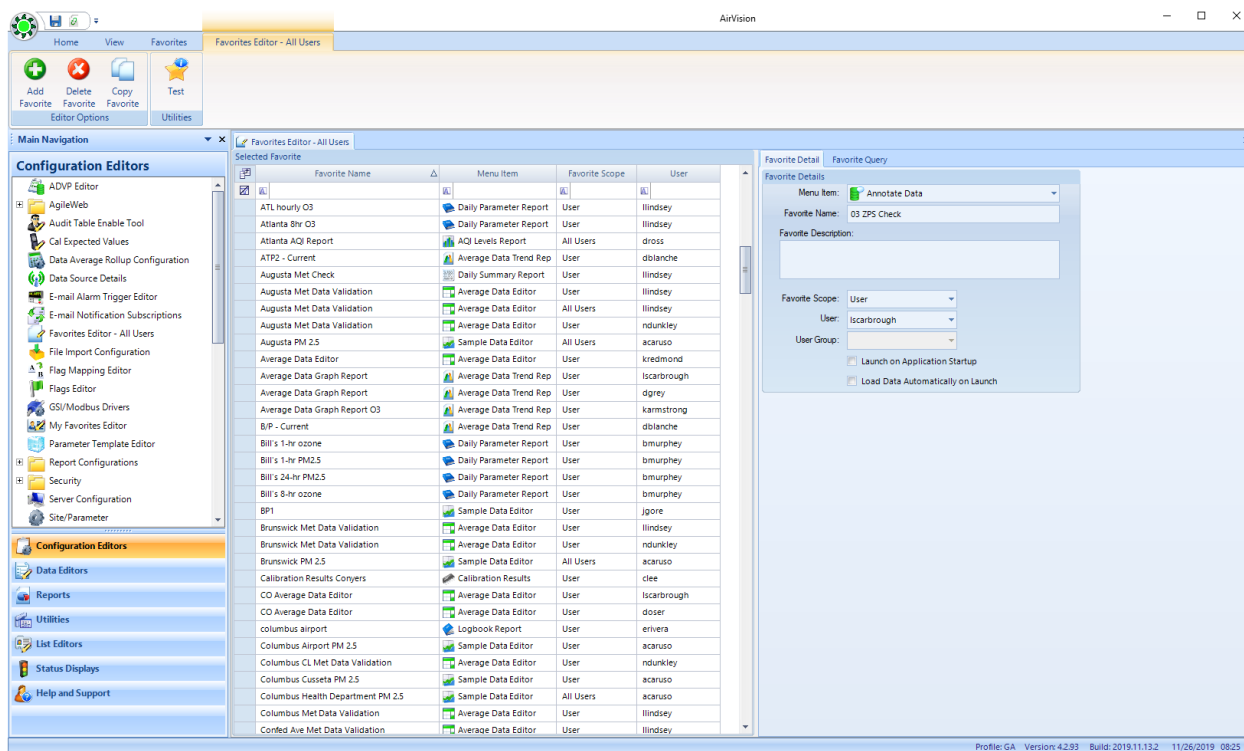
See Criteria Panel description on pg. 89. Filter fields on sites, site groups, parameter name, parameter groups, parameter templates (all with screening logic such as “includes”, “doesn’t include”, “starts with”, “contains”, etc) allow for the user to easily narrow down their desired measurements.

Date/Time ranges can be entered explicitly, using a calendar tools, or using relative time range selections (e.g., “this week”, “last month”, “NN days back”, etc).

Once the user has created a list and time range, they can be saved as a Favorite for easy recall (e.g., “Last Week’s PM25 Data” or “This Month’s Ozone Data”, etc).

The system is both easy to use and powerful, without requiring the user to know SQL, etc.

All reports support export to CSV, XLS, PDF, RTF, HTML, TXT, and image formats. The Average Data Editor supports export to Excel format, and presents the Excel file in the format chosen (e.g., linear mode, cross-tab, or matrix).

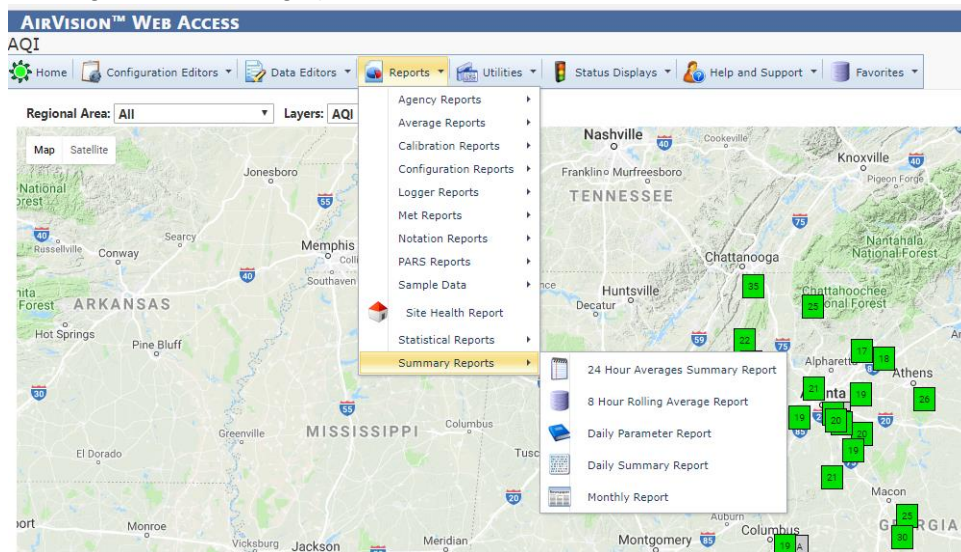


User favorites can be edited or adjusted later, either to ‘tweak’ or to add new parameters/instruments to an existing Favorite.

Private Web Site / Agency Interface

The Client provides a rich, full featured set of functions that are awkward to perform in web forms (see Average Data Editor functions in Section 5). The Client is also the window towards administrative functions, like the Task and site/logger configuration editors. For more casual users that need only access to reports, the Private Web Site / DEM-only web site provides access without needing a Client installation.

For this interface, the user still log on via their AirVision credentials, and are subject to the same group policy/permissions system as regular Client users (note: Client users can use the private web site interface using their same login).



The user has access to key AirVision reports (as limited by their group permissions), and can also be granted to some other basic utilities:

- Generic File Import Tool (for field/lab staff to upload files)
- Logbook Editor (site technicians could enter logbook entries via tablet)
- Monitor Assessment (QA Transaction) Data Editors for On-Point QC, Flow Rate Verification, and Semi-Annual Flow Rate Audit. (Auditors could use tablets).
- Access to an Average Data Editor, although this editor more limited than the Client-based editor, but still suitable for editing values, null coding data, adding qualifier codes, etc.

Site	Parameter	Average Interval	Date	Units	Raw Value	Value	AQS Method Code	AQS Null Code	Flags	Qualifier Codes
Athens	RP_FREQ	001h	05/30/2018 00:00:00	Hz						
Athens	RP_NOISE	001h	05/30/2018 00:00:00	PPH						
Athens	RP_MAINF	001h	05/30/2018 00:00:00	LPH						
Athens	RP_AUXF	001h	05/30/2018 00:00:00	LPH						
Albany	PMHR	001h	05/30/2018 00:00:00	UG/M3						
Athens	RP_FREQ	001h	05/30/2018 01:00:00	Hz						
Athens	RP_NOISE	001h	05/30/2018 01:00:00	PPH						
Athens	RP_MAINF	001h	05/30/2018 01:00:00	LPH						
Athens	RP_AUXF	001h	05/30/2018 01:00:00	LPH						
Albany	PMHR	001h	05/30/2018 01:00:00	UG/M3						
Athens	RP_FREQ	001h	05/30/2018 02:00:00	Hz						
Athens	RP_NOISE	001h	05/30/2018 02:00:00	PPH						
Athens	RP_MAINF	001h	05/30/2018 02:00:00	LPH						
Athens	RP_AUXF	001h	05/30/2018 02:00:00	LPH						
Albany	PMHR	001h	05/30/2018 02:00:00	UG/M3						
Athens	RP_FREQ	001h	05/30/2018 03:00:00	Hz						
Athens	RP_NOISE	001h	05/30/2018 03:00:00	PPH						
Athens	RP_MAINF	001h	05/30/2018 03:00:00	LPH						
Athens	RP_AUXF	001h	05/30/2018 03:00:00	LPH						
Albany	PMHR	001h	05/30/2018 03:00:00	UG/M3						
Athens	RP_FREQ	001h	05/30/2018 04:00:00	Hz						
Athens	RP_NOISE	001h	05/30/2018 04:00:00	PPH						

For reports, a selection criteria panel is also offered.

Selection Criteria

Start Date: 05/29/2018 00:00 End Date: 05/29/2018 23:59

Average Interval: 001h

Options: Boolean Switch Description

Parameter	Description	Value
RP_FREQ	PMHR, channel 4	PMHR
RP_NOISE	PUMP_PWM	PUMP_PWM
RP_MAINF	RP_AIRT, channel 47	RP_AIRT
RP_AUXF	RP_ALARM, channel 31	RPAlarm
RP_CAP_T	RP_AMBP, channel 43	RP_AMBP
RP_CASET	RP_AMBT, channel 42	RP_AMBT
RP_FREQ	RP_AUXF, channel 51	RP_AUXF
RP_MAINF	RP_CAP_T, channel 48	RP_CAP_T
RP_MC30M	RP_CASET, channel 46	RP_CASET
RP_MCSM	RP_FREQ, channel 44	RP_FREQ
RP_MC30M	RP_MAINF, channel 50	TEOM_FLOW
RP_MCSM	RP_MC30M, channel 37	RP_MC30M
RP_MC30M	RP_MCSM, channel 36	RP_MCSM
RP_MC30M	RP_MC30M, channel 39	RP_MC30M
RP_NOISE	RP_NOISE, channel 45	RP_NOISE

Once the report is run, it is displayed on the screen (HTML), and the user is given an option to download the file in PDF, XLS, CSV, RTF, or image format, just like in the Client.

Date Printed: 5/29/2018 07:51

Site: Albany

Daily Summary Report 5/30/2018

Hour	PMHR
00:00	UG/M3
01:00	

Download Options: PDF, XLS, XLSX, RTF, MHT, HTML, Text, CSV, Image

12. Database Self-Management and Disaster Recovery

Self-Managing Database

The AirVision server supports various kinds of scheduled tasks, including SQL tasks scheduled along with other application tasks (polling, scheduled reports, etc), allowing the application to manage scripts for automatic backups (multiple repositories) and any possible database tasks required (e.g., weekly re-indexing, if necessary). So, on a day to day and month to month basis, the end user does not need to interface with the SQL database at all. Regular supervisory checks of backups are managed by Agilaire in the SaaS model.

Easy Disaster Recovery

Case 1: Database Failure

In this case, a backup copy of the database within the last 24 hours will exist on the physical server or on an external backup, cloud backup etc, and can typically be restored within 5-30 minutes (for a database of moderate size) of notification of the failure. Backpolling of the sites will take place automatically when the database is restored. No action needs to be taken by agency personnel, and for Agilaire-hosted systems, key agency contacts (list supplied by agency) shall be notified by email when restoration is complete.

Case 2: Polling Server Failure

In this case, hardware replacement will be completed within 4 hours of notification, and transfer of the cloud SQL backup to the replacement server will take place during provisioning of the server application. Once the database transfer is completed, the database is restored, and all backpolling / backfill will commence based on the last stored successful poll time stored in the database backup. Maximum restoration time in this scenario should be < 24 hours, and generally less.

Redundancy / hot standby options are available for faster restoration, but not required by the RFQ, and thus not quoted here.

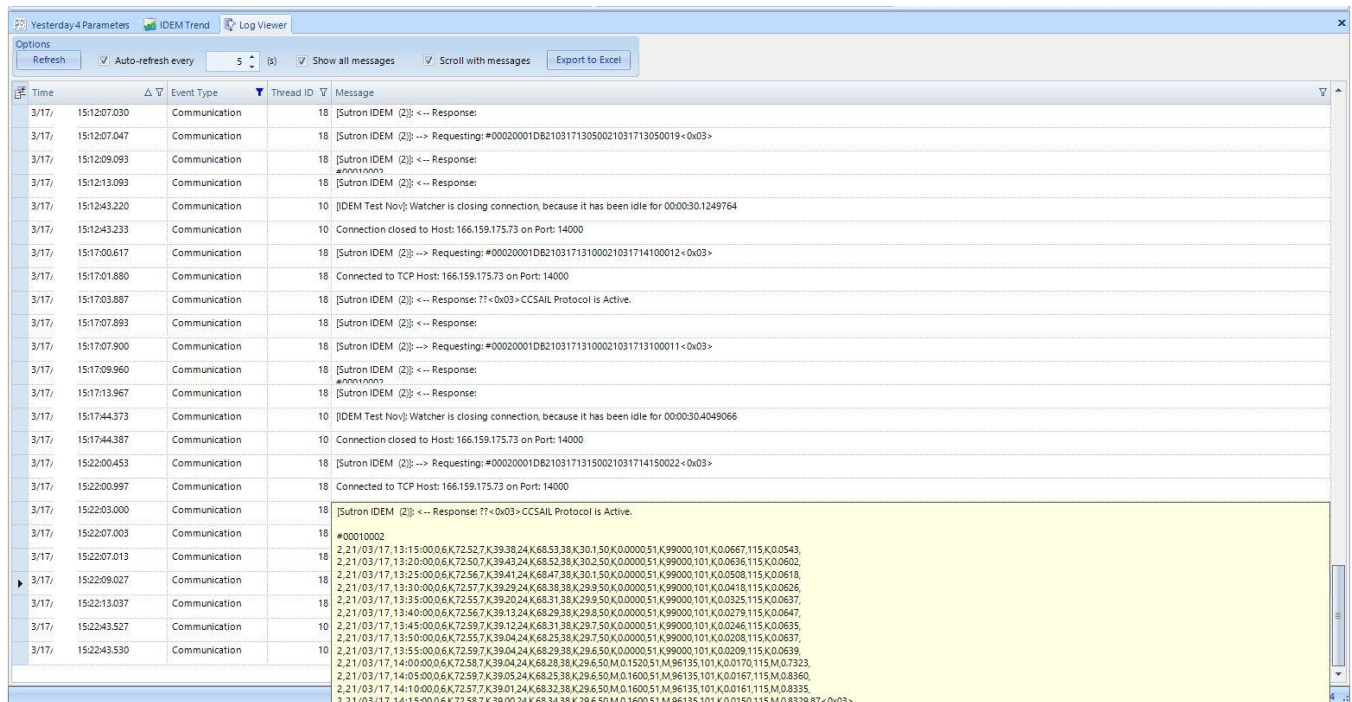
13. Project Support

a. Support Capabilities

Agilaire's key advantage over other DAS/DMS vendors has been historically its top-rated technical support capabilities. We focus on the metrics of Time To Response and Time To Resolution. To ensure the best performance, all staff has considerable experience with AirVision, air monitoring instrumentation, EPA regulations, etc. We do not utilize a system of low level support for initial inquiries that constantly has to be escalated- we recognize that the time of employees of air monitoring agencies is limited, so getting a response and (more importantly) getting to the right answer and resolution as quickly as possible is critical.

Visibility of information required for our staff to identify sources of issues is equally important., so AirVision is built with extensive logging and internal diagnostic capabilities, down to a byte-by-byte and millisecond-by-millisecond communication logging capability, and prompts to store detailed information in the event of an application error (files automatically created to email to our developers). We also have the ability to immediately create sandbox test environments with the customer's data.

Of course, any vendor can make claims about time to response and time to resolution, so we **strongly recommend discussion with references on this topic specifically.**



The screenshot shows the 'IDEM Trend Log Viewer' window. It has a menu bar with 'Yesterday 4 Parameters', 'IDEM Trend', and 'Log Viewer'. Below the menu is an 'Options' section with buttons for 'Refresh', 'Auto-refresh every' (set to 5 seconds), 'Show all messages', 'Scroll with messages', and 'Export to Excel'. The main area is a table with columns: Time, Event Type, Thread ID, and Message. The table contains a list of communication events, including requests, responses, and connection status updates. A yellow highlight is visible on the last few rows of the table.

Time	Event Type	Thread ID	Message
3/17/ 15:12:07.030	Communication	18	[Sutron IDEM (2)]: <-- Response:
3/17/ 15:12:07.047	Communication	18	[Sutron IDEM (2)]: --> Requesting: #00020001DB210317131050021031713050019<0x03>
3/17/ 15:12:09.093	Communication	18	[Sutron IDEM (2)]: <-- Response:
3/17/ 15:12:13.093	Communication	18	[Sutron IDEM (2)]: <-- Response:
3/17/ 15:12:43.220	Communication	10	[IDEM Test Nov]: Watcher is closing connection, because it has been idle for 00:00:30.1249764
3/17/ 15:12:43.233	Communication	10	Connection closed to Host: 166.159.175.73 on Port: 14000
3/17/ 15:17:00.617	Communication	18	[Sutron IDEM (2)]: --> Requesting: #00020001DB21031713100021031714100012<0x03>
3/17/ 15:17:01.880	Communication	18	Connected to TCP Host: 166.159.175.73 on Port: 14000
3/17/ 15:17:03.887	Communication	18	[Sutron IDEM (2)]: <-- Response: ??<0x03> CCSAIL Protocol is Active.
3/17/ 15:17:07.893	Communication	18	[Sutron IDEM (2)]: <-- Response:
3/17/ 15:17:07.900	Communication	18	[Sutron IDEM (2)]: --> Requesting: #00020001DB21031713100021031713100011<0x03>
3/17/ 15:17:09.960	Communication	18	[Sutron IDEM (2)]: <-- Response:
3/17/ 15:17:13.967	Communication	18	[Sutron IDEM (2)]: <-- Response:
3/17/ 15:17:44.373	Communication	10	[IDEM Test Nov]: Watcher is closing connection, because it has been idle for 00:00:30.4049066
3/17/ 15:17:44.387	Communication	10	Connection closed to Host: 166.159.175.73 on Port: 14000
3/17/ 15:22:00.453	Communication	18	[Sutron IDEM (2)]: --> Requesting: #00020001DB21031713150021031714150022<0x03>
3/17/ 15:22:00.997	Communication	18	Connected to TCP Host: 166.159.175.73 on Port: 14000
3/17/ 15:22:03.000	Communication	18	[Sutron IDEM (2)]: <-- Response: ??<0x03> CCSAIL Protocol is Active.
3/17/ 15:22:07.003	Communication	18	#00010002
3/17/ 15:22:07.013	Communication	18	2,21/03/17,13:15:00,0,6,K72,52,7,K39,38,24,K68,53,38,K30,1,50,K0,0000,51,K99000,101,K0,0667,115,K0,0543,2,21/03/17,13:20:00,0,6,K72,50,7,K39,43,24,K68,52,38,K30,2,50,K0,0000,51,K99000,101,K0,0636,115,K0,0602,2,21/03/17,13:25:00,0,6,K72,56,7,K39,41,24,K68,47,38,K30,1,50,K0,0000,51,K99000,101,K0,0508,115,K0,0618,2,21/03/17,13:30:00,0,6,K72,57,7,K39,29,24,K68,38,38,K29,9,50,K0,0000,51,K99000,101,K0,0418,115,K0,0626,2,21/03/17,13:35:00,0,6,K72,55,7,K39,20,24,K68,31,38,K29,9,50,K0,0000,51,K99000,101,K0,0325,115,K0,0637,2,21/03/17,13:40:00,0,6,K72,56,7,K39,13,24,K68,29,38,K29,8,50,K0,0000,51,K99000,101,K0,0279,115,K0,0647,2,21/03/17,13:45:00,0,6,K72,59,7,K39,12,24,K68,31,38,K29,7,50,K0,0000,51,K99000,101,K0,0246,115,K0,0635,2,21/03/17,13:50:00,0,6,K72,55,7,K39,04,24,K68,25,38,K29,7,50,K0,0000,51,K99000,101,K0,0208,115,K0,0637,2,21/03/17,13:55:00,0,6,K72,59,7,K39,04,24,K68,28,38,K29,6,50,K0,0000,51,K99000,101,K0,0209,115,K0,0639,2,21/03/17,14:00:00,0,6,K72,58,7,K39,04,24,K68,28,38,K29,6,50,M,0,1520,51,M,96135,101,K0,0170,115,M,0,7323,2,21/03/17,14:05:00,0,6,K72,59,7,K39,05,24,K68,25,38,K29,6,50,M,0,1600,51,M,96135,101,K0,0167,115,M,0,8360,2,21/03/17,14:10:00,0,6,K72,57,7,K39,01,24,K68,32,38,K29,6,50,M,0,1600,51,M,96135,101,K0,0161,115,M,0,8335,2,21/03/17,14:15:00,0,6,K72,58,7,K39,00,24,K68,34,38,K29,6,50,M,0,1600,51,M,96135,101,K0,0150,115,M,0,8329,87<0x03>

(example direct polling log)

b. User Acceptance Test (UAT)

The project is capped off with User Acceptance Testing (UAT), using either our standard or mutually modified UAT checklist, modified as needed for the specifics of the project. An example checklist (and the basis for our hourly estimates in our proposal) is as follows.

Sample Acceptance Testing Plan (Amended, No New Loggers)

Agilaire's proposal is based on the following acceptance criteria, as used for other projects, although additional test conditions can be discussed during finalization of the contract.

Note that failure of a single milestone shall not require all milestones to be retested, but only milestones that may be reasonably dependent on the retested milestone.

Site Installation Acceptance Milestones (Each Site)

- Confirm collection of minute, 5 minute, and hourly averages from site monitors.
- Confirm collection of QC check data and Site Logbook data
- Confirm ability to set time.
- ~~• Confirm proper invalidation of data when monitor disconnected.~~
- ~~• Confirm proper restoration of data acquisition when monitor reconnected.~~
- ~~• Confirm automated calibration operation for daily and weekly checks~~
- ~~• Confirm operation of manually initiated checks~~
- ~~• Confirm operation of real-time operator displays (tabular and graphical)~~
- ~~• Confirm configuration synchronization with central server.~~

~~*Site Software Acceptance Milestones (During Final Acceptance Test, Representative Site)*~~

- ~~• Confirm ability of operator to mark data in/out of maintenance~~
- ~~• Confirm ability of operator to mark data online/offline~~
- ~~• Confirm operation of local reports: Daily Summary, Monthly, Calibration Results, Calibration Trend, Power Failure, Line Status Change.~~
- ~~• Confirm restart of real-time functions after unanticipated shutdown of logger.~~
- ~~• Confirm restart of real-time functions after planned shutdown of logger~~
- ~~• Confirm operation of high / low / rate of change alarm flags to flag data.~~
- ~~• Backup and restore of database, verify data collection afterwards.~~
- ~~• Perform in-place upgrade of software, verify data collection afterwards.~~
- ~~• Confirm functionality of Interactive Cal (for audit calibration data collection).~~

Central Server Software Acceptance Milestones

- Confirm import of historical data
- Confirm automated collection of all averages / calibration records from the logger.
- Confirm there is no time delay / offset in any of the data and that values match.
- Confirm manual collection of average / calibration records from data loggers

- Simulate communications outage and automatic polling recovery without user intervention.
- Confirm visibility of data in data editor, daily report, monthly report with appropriate flags.
- Confirm ability to add/remove flags in Editor, and that changes are reflected in reports.
- Confirm ability to add null code in Editor, and that changes are reflected in reports/ export.
- Confirm ability to add qualifier code in Editor, and that changes are reflected in reports/ export.
- Confirm correct ability to approve / reset QA level data grade with editors.
- Confirm ability to recalculate hourly data from minute data.
- Confirm ability to restore data point(s) to original.
- Confirm automatic auditing of the above changes to data.
- Confirm auditing of configuration changes.
- ~~Confirm synchronization of configuration changes with logger.~~
- Confirm ability to add annotation and view annotation in editor (grid and graph) and in Annotations Report
- Confirm ability to modify numeric value in grid editor via direct edit.
- Confirm above editing functions using Batch Editor.
- Confirm ability to restore value from “raw” database
- Confirm creation of AQI report for AQI reported parameters
- Confirm operation of desired reports with additional configuration (wind/pollution rose, violation of standards, frequency/concentration distribution reports)
- Confirm ability to schedule and send report via email and to file on disk.
- Confirm external scheduled data transfers over 24 hours.
- Confirm ability to create users, groups, group permissions, and the proper application of permissions on at least 2 users groups and five users (at least one user with multi-group membership).
- Confirm ability of user to change their own password.
- Confirm ability of administrator to reset password.
- Confirm login ‘throttling’ after failed logins.
- Confirm ability to disable user account that that disabled account has not access.
- Confirm ability to define parameter-level security limit on a user group, and that users of that group are limited to the relevant functions on the permitted parameters.

AgileWeb Functionality Milestones

- Confirm presentation of map with accurate, timely AQI values (within 5 minutes of poll)
- Confirm drill-down functions at sites (AQI, concentration graphs)
- Confirm presentation of forecast data for five regions.
- Confirm ability to add notice page.
- Confirm presentation of data on phone or tablet (matching current Georgia functionality).

Other Functionality Milestones

- Confirm operation of scheduled backups
- Confirm results of first vulnerability scans and that all critical issues are addressed and resolved.
- Perform in-place version upgrade and verify polling, user login, and client remote access to 5+ key functions (e.g., data editor, a report, manual poll, etc.) after upgrade.

c. Training

The contract typically includes N days of on-site or virtual (as required for COVID safety) training sessions for AirVision and the loggers, but for this project would be extended to several weeks to assist with the initial site integrations until agency staff is comfortable and enjoys true “ownership” of the system and its capabilities. If needed, additional regional / satellite office trainings can be provided as additional scoped work.

Training Outline

For a quick summary, the general training for AirVision covers topics such as:

OVERVIEW

- o Requirements
- o Installation and Network/Security Issues
- o Data and Configuration Translation

INSTALLATION AND INITIAL SETUP

- o Installation
- o Initial Login

USER INTERFACE

- o Navigation
- o Toolbars
- o Query Controls
- o Using Favorites

CONFIGURATION

- o Site / Parameter
- o Calibration and Control Sequence Configurations
- o AQI Setup
- o AirNow and Report Setups
- o Task Manager Configuration

GRAPHICAL DATA REVIEW TOOL / EDITOR

- o Retrieving Data Sets
- o Graphical Review
- o Grid Editors & Right-Click Options
- o Batch Editing
- o Data Archive / Backup

REPORTS

- o General Usage
- o Data / Summary Reports

- o Calibration / QC Check Reports
- o Compliance Reports
- o Statistical Reports
- o AQS Reports
- o Internal / Diagnostic Reports

ADVANCED OPTIONS

- o File Import Tool
- o Automatic Data Validation Processor
- o Asset Tracking / Work Items

COMMUNICATION UTILITIES

- o Configuration Sync
- o Manual Poll
- o Direct Instrument Polling

SYSTEM ADMINISTRATION

- o Setting Up Groups and Users and Access Rights
- o E-mail Subscriptions
- o Server Configuration
- o Task Scheduler
- o E-mail Alerts of Task / Communication Errors
- o Adding New Sites, Parameters
- o Data Lock / Unlock
- o Purge, Data Archive

SYSTEM ADMINISTRATION / TROUBLESHOOTING

- o Server Management
- o Database Backups
- o Disaster Recovery / COO
- o Client/Server Disconnections
- o Log Files

d. Key Personnel Resumes

Staffers Name:

STEVE DREVIK

Staffers Role on DAS Project:

Contract Management, Requirements

Technical Qualifications	Years of Experience
DAS server database design	
State government experience	35
DAS server customized programming	
DAS server database configuration	33
DAS server installation and implementation	33
Data migration into DASs	31
Technical writing and documentation	33
Air monitoring equipment use and communications	33
EPA air monitoring reporting requirements	33
SQL	15

Steve Drevik - has over 29 years of experience with ambient data management systems, ranging from low-level firmware development, instrument protocols, software development management, development of requirements, installation of small and complex million-dollar projects. Has managed Agilaire as a hands-on technical president from its founding in 2005. Previously filled a number of management, project, and software roles at Environmental Systems Corporation (ESC). Holds an MSEE from the University of Tennessee.

Recent Projects

- Clark Co, NV (Requirements, Project Management)
- Wyoming DEQ (Requirements, Project Management)
- (Commonwealth of Virginia DEQ (Requirements, Project Management)
- Georgia DNR APCD (Requirements, Project Engineering)
- State of Arizona DEQ (Requirements)
- San Joaquin APCD (Requirements, Pilot Project Deployment)
- Bay Area AQMD Model 8872 Customization Requirements
- Al-Kahair Network, Saudi Arabia (Requirements, Project Engineering, Deployment)
- USEPA Region V Custom Interface for Real-Time PM Metals Monitor (Requirements, Project Engineering, Deployment)
- U.S. Marine Corps Air Ground Combat Center, 29 Palms, CA (Requirements, Project Engineering, Deployment, including providing wireless communication service to very remote locations.)
- Abu Dhabi National Oil Company (Requirements, Project Engineering)

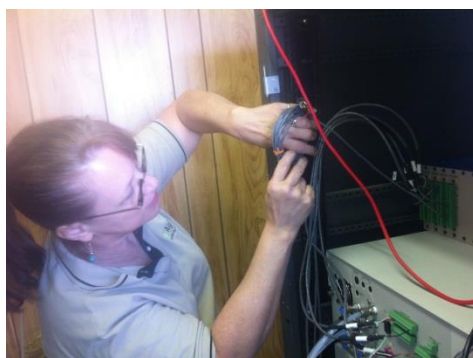
Staffers Name: DEBRA GREY
Staffers Role on DAS Project: Project Director

Technical Qualifications	Years of Experience
DAS server database design	
State government experience	16
DAS server customized programming	
DAS server database configuration	20
DAS server installation and implementation	20
Data migration into DASs	20
Technical writing and documentation	20
Air monitoring equipment use and communications	20
EPA air monitoring reporting requirements	20
SQL	11

Debra Grey – Has over 15 years of experience with managing the implementation, deployment, and training on over 100 air quality monitoring projects, with strong expertise in various deployment environments (hosting, wireless communications networks, as well as variations in internal operational procedures and organizational differences) and tailoring the outcome of each project and end-user training to individual customer needs. Major conversions of AirVision and E-DAS systems include the Commonwealth of Virginia, State of Georgia, State of Louisiana, City of Philadelphia, City of San Diego (with AgileWeb implementation) and Mojave Desert AQMD. Worked with Agilaire since its founding in 2005, previously with Environmental Systems Corporation. Bachelor's of Science in Electrical Engineering, University of TN. Joined Agilaire at its founding in 2005.

Recent Projects

- Clark Co, NV (Project Engineering, Remote Deployment Support due to COVID-19)
- Commonwealth of Virginia DEQ (Project Engineering, Deployments)
- Georgia DNR Upgrade (Deployment, Data Conversion, Training)
- State of Louisiana AirVision Upgrade (Deployment, Data Conversion, Training)
- Freeport McMoran AirVision Ambient / CEM (Project Engineering, Deployment, Training)
- Siemens CEM, Sidney, AU (Project Engineering, Deployment, Training)
- Imperial County, CA (Project Engineering, Deployment, Data Conversion, Training)
- City of Philadelphia (Project Engineering, Remote Deployment, Data Conversion, Training).



Debra diligently rewiring a rat's nest.

Staffers Name: Randy Brown
Staffers Role on DAS Project: Development Director

Technical Qualifications	Years of Experience
DAS server database design	21
State government experience	15
DAS server customized programming	20
DAS server database configuration	20
DAS server installation and implementation	
Data migration into DASs	18
Technical writing and documentation	
Air monitoring equipment use and communications	
EPA air monitoring reporting requirements	
SQL	22

Randy Brown – Software Architect with strong experience in .NET, C#, ASP.NET, C++, Javascript, WCF, and a highly experienced system architect. Randy focuses on development items related to configuration forms and validation rules, data communications, data import functions, and specialized business logic. Randy is also the architect for AgileWeb and develops custom web site implementations, like the recent project for the State of Georgia. Randy came to Agilaire in 2008, and previously worked in software development at ESC and EdSouth. Bachelor of Science, University of TN.

Development Certifications:

MCPD - Enterprise Application Developer
MCPD - Web Developer
MCTS - Distributed Applications
MCTS - Windows Applications
MCTS/MSCD - Web Applications

Recent Key Development Work

- Clark Co, NV (Application Customizations)
- Wyoming DEQ (Web Site Customizations)
- Commonwealth of Virginia DEQ (Web Site Customizations)
- Georgia DNR (Customized Forms, Web Site Customizations)
- AgileWeb Upgrades (new data layers, contour mapping module)
- Freeport McMoran (custom web site)
- MyAQI Mobile (iOS, Android) Application
- Addition of Site Categories and Parameter Categories for users to easily group sites (e.g., “urban”, “rural”, “IMPROVE”, etc) and parameters (“Gases”, “Met”, “PAMS”, etc).

Staffers Name: Scott Wood
Staffers Role on DAS Project: Senior System Architect

Technical Qualifications	Years of Experience
DAS server database design	21
State government experience	17
DAS server customized programming	21
DAS server database configuration	11
DAS server installation and implementation	11
Data migration into DASs	11
Technical writing and documentation	
Air monitoring equipment use and communications	
EPA air monitoring reporting requirements	
SQL	24
Oracle	7

Scott Wood – Our second system architect with strong experience in .NET, C#, ASP.NET, and Oracle, Scott's work focuses on database design and schema management, data processing functions like ADVP, the data validation and QA tools. ASIT from Pellissippi State. Scott came to Agilaire in 2007, and previously worked in software development at ESC and TeamHealth, working on system architecture, database design, web applications, AirVision's NEIN Interface, testing, and time-critical customized data interfaces.

Development Certifications:
MCPD - Enterprise Application Developer

Recent Key Development Work

- Clark Co, NV (Application Customizations)
- Commonwealth of Virginia DEQ (Application Customizations)
- AV-Doc Development
- Configuration Change Auditing System
- AgileWeb (conversion of all reports to web-based reporting, updated Data Editor)
- Sample Data Editor Enhancements
- Asset Tracking Module

Staffers Name: Paul Yankey
Staffers Role on DAS Project: Project Support / Hosting Manager

Technical Qualifications	Years of Experience
DAS server database design	
State government experience	9
DAS server customized programming	
DAS server database configuration	14
DAS server installation and implementation	14
Data migration into DASs	14
Technical writing and documentation	11
Air monitoring equipment use and communications	11
EPA air monitoring reporting requirements	10
SQL	14

Paul Yankey – Came to Agilaire from ESC in 2012 to expand our project support and to take over management of the software and database schema release process from Development. Paul assists project staff and customers with data conversions, database-related issues, hosting / security issues, and disaster recovery. He assists customers remotely in the management of over 55 AirVision and Agile Web servers. Paul also manages component and release testing for new customizations, enhancements, and fixes, and assists Agilaire customers with integrating AgileWeb into their existing web sites. Bachelor of Science from Valparasio University.

Recent Projects

- Clark Co, NV (remote installation support, AgileWeb)
- Wyoming DEQ (Hosting conversion, AgileWeb, acceptance testing)
- Commonwealth of Virginia DEQ (Hosting conversion, AgileWeb, acceptance testing)
- Maricopa County (Convert self-hosted to hosted)
- Georgia DNR Upgrade (Hosting Deployment and Management)
- San Joaquin APCD (Server Deployment, Backup Methodology, Customized Data Import Scripts)
- Colville Tribe (Hosting / Web Site Deployment and Management)

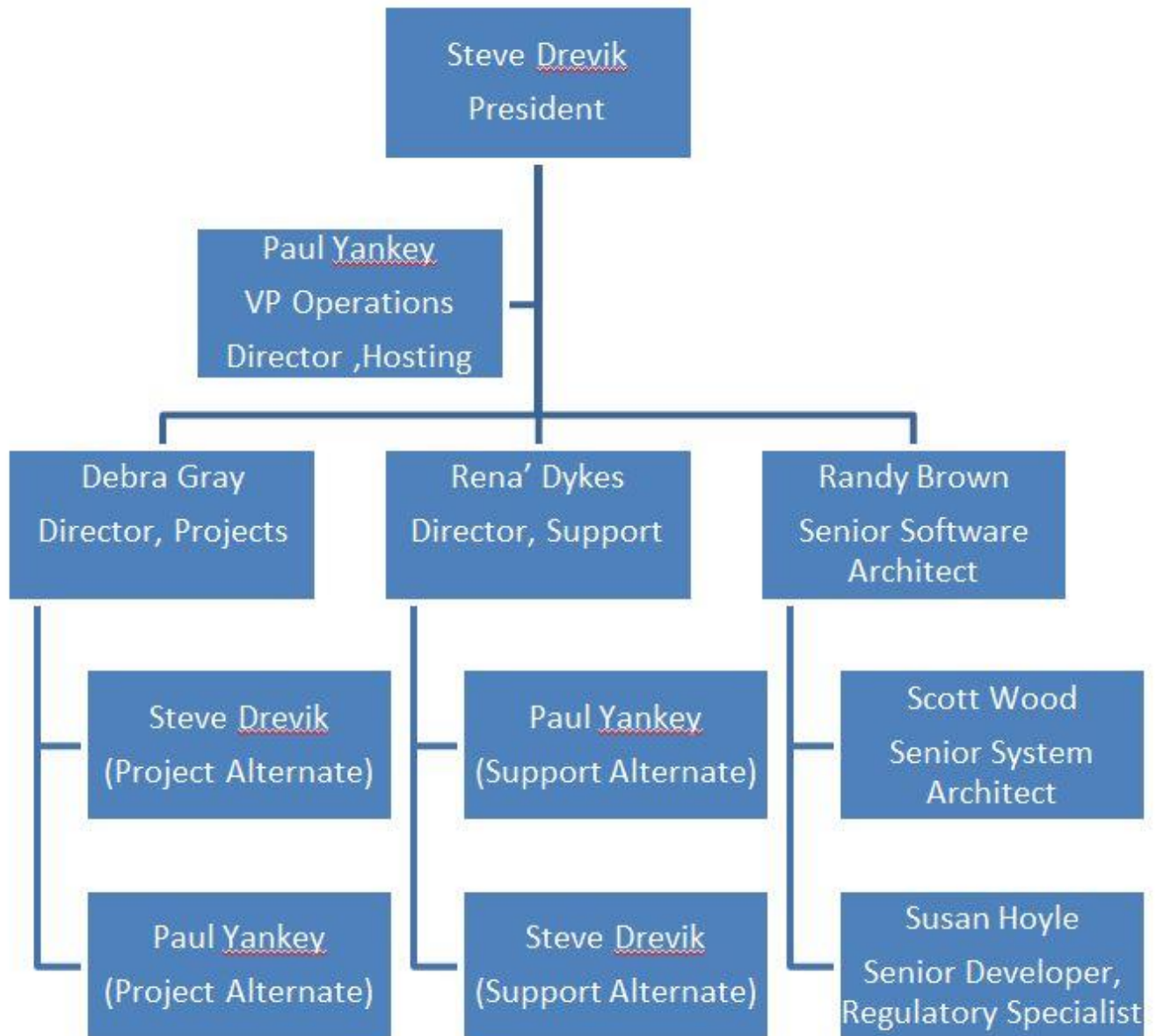
Staffers Name: Rena' Dykes
Staffers Role on DAS Project: Support Director

Technical Qualifications	Years of Experience
DAS server database design	
State government experience	23
DAS server customized programming	
DAS server database configuration	23
DAS server installation and implementation	23
Data migration into DASs	23
Technical writing and documentation	21
Air monitoring equipment use and communications	
EPA air monitoring reporting requirements	23
SQL	9

Rena Dykes – A software support position is normally one of burnout and high turnover. Rarely does anyone persist in that role more than 5-10 years. Rena', however, represents a true professional in this role, having supported AirVision and its predecessor (E-DAS) since 1996. Through that period, she has become the most highly trained support person in this industry, with knowledge of loggers, field instrumentation, NAAQS, AQS, and troubleshooting numerous communication technologies, providing quality and experience that cannot be met by any other vendor in this industry. Rena's knowledge and experience means faster resolution of issues, less missing data, and less time wasted waiting for an answer. Rena' holds an EEIT degree from ITT Technical.

13.d.1 – Agile Organization Chart

Agilaire utilizes cross functionality and depth of knowledge among all team members to provide resiliency in cases of high support or project implementation demand. We have also automated much of the project implementation (eg., insert scripts from Excel spreadsheets of customer AQS codes, site names, etc) to quickly move from Phase 0 to Phase 1.



14. Change Management Process

We consider AirVision to be a dynamic product, driven by continuous improvement. The driving force and process for enhancements can take one of several forms:

Customer Suggestion

These commonly represent improvements to the user interface, or some other usage capability that improves workflow or functionality of the existing application. These suggestions are ranked based on their usefulness (the value of the improvement) and the applicability (what % of users are likely to experience the improvement). Suggestions that rank high on both measurements tend to go to the top of the development queue. Suggestions that rank low on one or both scales will remain in the queue, but at a lower priority. Examples of customers suggestions that have resulted in enhancements in regular releases include:

- Director Dashboard Report (see Appendix B)
- Report to compare FRM vs 24-hour continuous monitor data
- More keyboard shortcuts in Data Editor (e.g., for scrolling left/right in data sets for keyboard-oriented users, accessibility requirements)
- Ability to set precision in calibration reports different from regular data averages for that parameter.
- Addition of Site Categories and Parameter Categories for users to easily group sites (e.g., “urban”, “rural”, “IMPROVE”, etc) and parameters (“Gases”, “Met”, “PAMS”, etc).
- Charting option to chart “edited” vs “raw” numerical value
- Option for 95th percentile line on chart for PAMs data

Internal Agilaire Suggestion

Similar to Customer Suggestions, but these are generated by Agilaire staff ideas, but are evaluated using the same method.

Strategic Development (New Optional Module)

These represent significant development projects that are not required, and generally offer a new workflow or significant capability to the AirVision system not necessarily applicable to all users. The significant development costs are offset by offering these modules at an additional cost. Users under an active support agreement receive a discount for purchase, as opposed to customers not under support agreements. The most recent new module was the Component and Activity Tracking System (CATS) module. As new modules come out, they still remain open to customer improvement suggestions to add capabilities to the module.

Customer Requirement

This development generally takes the form of a customer need that is often very specific to the customer (e.g., it ranks low on the value/applicability rating), and the customer has a particular deadline and cannot wait for the timeline offered under a regular Customer Suggestion. In this case, Agilaire can quote development cost as a fixed cost calculated from estimated hours, if the requirements are

clearly defined, or as a time and materials basis if the requirements are unclear at the beginning. Contracted development takes priority over all other development tasks, other than perhaps EPA requirements, depending on the deadlines involved.

Fixes

Issues identified by Agilaire customer support or in QA testing receive top priority over any other development. In many cases, an interim (non-major) release is made available to resolve critical issues, and offered to affected customers.

Change Notification (Release Notes)

All new features and fixes are documented in release notes published on the public web site (www.agilaire.com), and notification takes place via monthly / bi-monthly email newsletters sent to key software contacts and any other agency staff that requests to be added.

Critical issues that present themselves may involve more direct email notifications to key software contacts (all customers or those affected by the issue), and notification as to when an interim release is available.

Internal Tracking – Enhancements, Fixes, and Issues

All fixes and enhancements are created, assigned, and tracked through their lifecycle (including QA testing and 'resolved' status) through Agilaire's internal cloud-based tracking system, available to all project, development, and support staff. Items related to a particular customer (suggestion or fix) are tracked with the issue, so they can be individually notified when the applicable release is ready.

Major cases (external technical support requests or internally developed cases) are tracked through our cloud-based CRM, so management staff can identify any issue that remains unresolved after a significant time.

Supplemental Policy Documents Available Upon Request For Review:

- Security Gap Audit and Hosting SOC 2 Report
- Software Development and Testing Policies
- Hosted System Management Policies
- Hosting Automated Security Management and Sample Vulnerability Reports
- AirVision Self-Auditing Capabilities
- Example Completed Server Acceptance Test Results

Executive Auto Restart Improvement

Project: [General AirVision/AVTrend/8872 Dev](#) Area: [Misc](#)

Milestone: [Undecided](#)



Opened by [Randy Brown](#)



09/19/2019 5:27 PM

Recently had a customer report suspicious auto restarts. Specifically, it said that 0 records were changed, and it happened during a cal. So I proposed two changes:

1. Postpone autorestart if a calibration is currently active.
2. Save snapshots of the before/after config dump. This lets us manually inspect the xml file to see the changes and could help solve some of these mysterious restarts.



Assigned to [Paul Yankey](#) by [Randy Brown](#)



09/19/2019 6:14 PM

Updated code as described.

1. When an auto restart change is detected, if a calibration is currently active, then postpone the restart until after the calibration. It will log a message indicating this and a message shows up in the lower left message area of the av client form. This can be disabled if needed via a setting key (DelayAutoRestartDuringCalibration), but hopefully that will never be necessary, so I would not advise putting that into a db by default.

2. Snapshots of the xml file dump are stored under the server folder at C:\ProgramData\Agilaire\AirVision\Server\ConfigurationCache\ConfigurationChange. Each file gets a datetime stamp and a .before or .after in the name. Each time this happens it deletes any files in that folder older than 7 days. So in future cases where we have mysterious restarts, we can grab these files and inspect them.

Ready for test in next build. **NOTE:** I recommend a good test through of the restart logic before making the release broadly available.



Resolved (Fixed) and assigned to [Randy Brown](#) by [Paul Yankey](#)



Status changed from 'Active' to 'Resolved (Fixed)'.

10/07/2019 12:24 PM

Tested successfully in build 2019.10.01.3

Tested with multiple changes during cals (and without cals running) including changes to the cal seq that was running.

Appendix B – Sample Reports

Current Date: 3/1/2010 10:47 AM
 Site Name: Blount_S
 Parameter: 01_OZONE

Monthly Report
 January 2006

Avg Interval: 1 hour
 Units: PPB

	Hours																											
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Summary			
																									Avg	Max	RDS	
01	Hold	18.4	17.2	18.7	18.2	16.5	14.4	13.6	13.9	14	15.7	15.5	16.2	15.8	15.3	13.5	10.4	7.7	6.4	5.4	3.9	1.2	1.6	.6 E	114.2	429.6	40	
02	18.4	.9	1.6	.6	.6	.6 E	.7	1.6	3.6	8.1	9.7	11.4	11.7	9.9	8.8	8.6	4.7	4.1	6.6	7.8	9.1	9.7	10.5	7.7	6	11.7	23	
03	18.4	7.2	5.8	6.8	10.6	14.6	16.8	19.1	24.1	24.4	26	27.4	30.4	30.9	32.3	32.2	32.1	30.8	29.8	29	27.2	20.4	16.6	19.8	22.4	32.3	23	
04	18.4	22	23.1	24.3	16.2	17.8	14.2	11.3	16.2	26	26.6	30.5	29.9	30.9	29.3	28.4	27.1	22.6	24.9	40.9	38.9	37.1	35.2	33.8	26.4	40.9	23	
05	18.4	21.3	24.2	23	21.7	22.1	19.2	16.7	15.3	14.8	13.7	11.9	10	9.4	5.9	4.4	1.6	.6 E	.6 E	.6 E	.6 E	.6 E	4.1	9.3	10.9	24.2	23	
06	18.4	17	18.5	19.5	20.1	19.4	18.6	18.1	17.6	16.8	17.9	19.8	22.4	22.2	22.8	22.5	26.8	31.2	27.3	22.8	27.7	28.5	27.9	27.7	22.3	31.2	23	
07	18.4	26.7	25.3	24	22.9	30.2	31.9	32.3	33.4	35.5	36.1	36.8	38.2	38.7	38.9	38.5	33.2	26.1	26.6	25.7	29.5	28.9	27.2	30.4	31.2	38.9	23	
08	18.4	29.1	27.3	24.6	22.2	19.6	17.4	15.3	13.9	14.4	15	14.4	15.2	18.7	19	16	11.4	10.2	9	10.7	11.9	15.4	16.5	15.1	16.6	29.1	23	
09	18.4	13.8	13.3	13.7	16.4	17.1	16.9	17	19.3	20	20.1	19.5	21.3	26.1	21.3	13	13	13	12.5 P	0 E	15.7	17.8	20.4	20.8	16.9	26.1	21	
10	18.4	19	21.5	24.1	26.9	28.6	28.4	28.6	29.2	31.7	31	28.4	28.1	28.1	30.4	31.2	27.7	13.9	16.2	18.4	20	17	19	20.7	24.7	31.7	23	
11	18.4	14.3	13.7	14.8	11.5	9.4	8.9	12	20.7	24.9	30.3	35.3	36.1	35.4	34	32.3	31.5	28.3	25.6	28.1	26.5	28.9	23.8	15.2	23.5	36.1	23	
12	18.4	23.8	22.7	19.9	15.8	13.7	13.7	13.6	14.5	14.9	16.2	17.5	18.3	33.7	36.9	24.5	23.6	13.2	5	5.7	10.4	9.3	8.8	8.9	4	14.3	24.5	21
13	18.4	4.1	4.7	5.6	4.5	4.6	3.5	2.6	6.9	10.1	12.2	18.3	33.7	36.9	34.7	32.2	31.9	33.1	28.1	32.1	33.6	30.7	30.1	32.1	20.3	36.9	23	
14	18.4	34.3	34.2	33	32.3	32.6	34.2	35.4	34	33.9	38.2	35.2	34.9	33	29.6	25.3	17.1	12.3	14.7	20.9	25.4	26.6	30.5	34.4	29.7	38.2	23	
15	18.4	33.7	33.3	32.7	33.3	34.4	35	35.7	37.2	38.4	39.1	39.2	39.2	39.1	39.5	39.7	39.6	38.7	38	38	37.1	37	36.4	35.8	37	39.7	23	
16	18.4	34.6	34	32.2	30	29.7	27.9	25.9	29.1	32.4	33.3	34	34.8	35.4	34.8	33.6	30.3	26.8	21.5	20.3	17.4	16.5	18.1	18.4	28.3	35.4	23	
17	18.4	18.8	19.6	16	15.9	9.6	7	5.6	12.2	23.6	23.5	26.1	29.1	29.4	31	28.6	32.6 P	13	13	13	32.6	30	30.8	33.6	22.8	33.6	20	
18	18.4	38.6	38.6	37.7	38.2	38.4	38.4	37.4	36.1	35.3	35.5	39.5	41.4	40	19.2	1.6	3.7	9.4	11.4	10.6	13.2	16.1	20.3	25.2	27.2	41.4	23	
19	18.4	29.2	29.2	29.1	28.7	27.8	27.2	26.1	27	27.4	27.7	27.3	27.8	29.3	29.5	28	21.9	9.3	14	23.8	21.2	20	18.5	18.9	24.7	29.5	23	
20	18.4	20.6	18.5	13.9	12	12	10.1	8.6	8.6	16.9	12.6	14.9	10	12.4	9.5	5.9	6.1	4.1	4.4	4.7	6	8	10	8.5	10.4	20.6	23	
21	18.4	14.9	16	17	23.2	30.2	28.9	29.8	31.1	28.4	28.1	31.5	29.6	29.8	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	15	
22	18.4	33.4	33.2	34.2	36.7	36.7	34.9	32.7	32	34.1	34.7	36.3	37.4	38.6	39.1	38.1	32.9	22.7	17	23.9	18.9	17.8	19.1	20.7	30.7	39.1	23	
23	18.4	26	32.4	33	33	31.7	33.8	34.9	36	35.2	35.5	32.4	28.7	28	28.5	28.3	24.1	21.5	19.6	20.9	19.9	19.8	22.6	22.2	28.2	36	23	
24	18.4	17.9	16.6	15.9	14.5	9.6	5.2	8.8	10.6	20.7	27.6	30.3	31.8	33	33	32.5	27.8	30.9	32.2	29.3	28.5	28.5	26.7	21.2	23.2	33	23	
25	18.4	14.9	12.6	9.2	7.3	6.1	10.7	12.8	10	16.7	23	21.3	18.4	20.1	20.9	20.2	18.6	16.6	15.1	17.1	24.1	26.6	26	25.7	17.1	26.6	23	
26	18.4	24.3	25.3	26.3	26.6	26.6	26.8	26	25.7	26.6	27.5	28.6	29.6	31.6	34.2	26.5	27.8	27.6	27.6	27.5	27.6	27.8	27.7	28.1	27.6	27	28.6	21
27	18.4	25.6	24.5	22.4	19.7	15.8	15.5	11.4	14.9	20	25.1	28.3	29.4	31.6	34.2	33.6	26.5	16.9	16.1	22.4	19.1	13.5	13.5	13.8	21.5	34.2	23	
28	18.4	12.3	14.3	14.5	14.4	15.2	13.6	12.5	13.2	16.6	24.8	28.5	26.7	26.4	25.5	23.5	21.5	20.8	21	19.7	15.3	15.3	12.8	10.2	18.2	28.5	23	
29	18.4	5.8	6.6	4.9	4.9	3.4	3.7	2.4	7.4	9.6	12.7	15.4	21.1	28.7	28.5	25.3	25.3	24.2	20.3	18.2	20.2	21.5	14.9	12.6	14.7	28.7	23	
30	18.4	12.5	13.6	13.3	13.7	11.2	7.9	8.3	10.3	14.8	15.5	24.2	26.6	28	26.1	23	21.6	21.5	21.6	22	22.2	23.2	23.8	25.3	18.7	28	23	
31	18.4	25.2	27.2	27.3	27	27	26.4	26.7	26.9	26.8	27.4	24.5	24	24.7	23.8	22.7	22.9	22.4	21.3	19	16.2	15.2	21.9	24.1	23.9	27.4	23	
Max		429.6	38.6	38.6	37.7	38.2	38.4	38.4	37.4	37.2	38.4	39.1	39.5	41.4	40	39.5	39.7	39.6	38.7	38	40.9	38.9	37.1	36.4	35.8	429.6	429.6	429.6
Average		204.6	20.7	20.9	20.4	20	19.7	19.1	18.8	20.4	23	24.6	25.9	27	27.9	26.5	24.5	22.5	19.3	18.4	19.7	20.8	20.3	20.9	20.9	28.4	28.4	28.4
Count		26	31	31	31	31	31	31	31	31	31	31	31	29	29	30	30	29	28	29	29	30	30	31	31	722	722	722

Daily Summary Report

Current Time: 7:57 AM

Daily Summary Report

Site: OAKRIDGE

2/6/2006

Interval: 001h

	01_CO	02_SO2	03_NOX	04_NO2	05_NO	06_PM25_MC	12_AMB_TEMP	14_RAINFALL	16_BAROMETR
Hour	PPM	PPB	PPB	PPB	PPB	UG/M3	None	None	None
00:00	<	<	<	<	<	.9	.2	.08	734.5
01:00	.1	1.0	2.9	1.3	.5	1.0 W	-.3	.08	734.9
02:00	.1	1.0	2.2	1.0	.4	3.9	-.7	.08	735.3
03:00	.1	1.0	3.9	2.1	.7	2.5 W	-1.1	.08	735.8
04:00	.1	1.3	8.3	3.3	3.9	.4 W	-1.2	.08	736.1
05:00	.1	1.2	10.0	4.1	4.8	2.1	-1.0	.08	736.4
06:00	.1	1.0	3.7	2.0	.8	3.1	-1.1	.08	736.7
07:00	.3	1.0	11.5	5.1	5.5	1.8	-1.5	.08	737.1
08:00	.2	1.0	11.6	5.8	4.8	3.4	-1.3	.08	737.5
09:00	.3	1.0	9.9	4.7	4.3	3.8	-.8	.08	737.7
10:00	.3	1.0	10.2	4.6	4.6	4.1	-.5	.08	737.7
11:00	.2	1.0	6.2	3.1	2.2	2.1	-.5	.08	737.7
12:00	.2	1.0	8.1	3.7	3.5	3.8	-.6	.08	737.8
13:00	.2	1.0	7.7	4.3	2.4	5.1	.0	.08	737.7
14:00	.2	1.0	11.3	5.6	4.7	3.2	-1.2	.08	738.1
15:00	.2	1.0	22.9	10.7	11.2	3.2	-1.8	.08	738.4
16:00	.3	1.0	12.4	7.2	4.2	7.9	-1.1	.08	738.7
17:00	.3	1.0	13.4	6.8	5.4	5.2	-1.1	.08	739.1
18:00	.2	1.0	9.7	5.2	3.4	3.2	-1.4	.08	739.4
19:00	.2	1.0	5.9	3.6	1.2	5.7	-1.6	.08	739.4
20:00	.2	1.0	7.7	4.1	2.5	3.0	-1.8	.08	739.4
21:00	.1	1.0	8.5	4.7	2.7	3.9	-1.7	.08	739.4
22:00	.1	1.0	3.6	2.3	.4	5.6	-1.7	.08	739.1
23:00	.1	1.0	3.3	2.3	.4	2.5	-1.7	.08	739.4
Average	0.1	1	8.4	4.2	3.2	3.3	-1.0	0.08	737.6
Max	.3	1.3	22.9	10.7	11.2	7.9	.2	.08	739.4
Min	.1	1.0	2.2	1.0	.4	.4	-1.8	.08	734.5
Count	23	23	23	23	23	24	24	24	24

AQI Reports

AQI Monthly Matrix / Group Report*

Current Date: 04/03/2014 10:58 AM

AQI Monthly Group Report April 2011

Sites: ALSIP, BRAIDWD

Hours

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Highest Daily AQI		
Day																									Peak	Pollutant	Site
01	58	58	57	57	56	55	55	56	55	55	55	54	52	52	54	55	55	56	55	54	54	54	55	54	58	PM25C	ALSIP
02	53	52	52	52	53	53	53	53	53	54	54	54	55	57	61	61	62	63	64	65	65	66	65	90	90	PM25C	ALSIP
03	68	63	58	51	52	52	53	53	54	55	55	83	62	140	62	55	55	56	57	36	35	33	31	52	140	PM25C	ALSIP
04	50	48	46	45	44	42	41	38	35	31	28	26	27	28	29	29	54	52	50	47	45	41	36	31	54	PM25C	ALSIP
05	29	29	29	27	28	30	32	35	36	38	39	39	38	38	40	40	41	41	39	36	36	36	37	39	41	OZONE	BRAIDWD
06	42	44	47	51	53	56	58	60	61	62	62	63	64	65	65	66	67	67	69	71	72	74	75	75	75	PM25C	ALSIP
07	75	76	77	76	75	73	72	70	69	67	67	68	70	69	69	69	70	70	70	68	69	69	68	70	77	PM25C	ALSIP
08	72	73	74	73	73	71	68	64	61	59	60	61	62	64	65	68	69	70	71	72	73	75	78	79	79	PM25C	ALSIP
09	80	81	81	81	81	82	83	73	67	65	63	63	76	77	104	87	85	94	70	91	108	117	114	83	117	PM25C	ALSIP
10	85	87	90	19	22	24	26	29	31	31	31	30	30	32	33	33	33	31	27	24	37	38	38	38	90	PM25C	ALSIP
11	38	37	37	35	36	37	35	35	35	35	35	38	37	36	35	35	36	36	36	35	35	33	32	32	38	PM25C	ALSIP
12	31	31	31	31	32	31	33	34	36	36	38	37	37	38	40	41	43	44	43	44	45	46	47	48	48	PM25C	ALSIP
13	51	51	52	53	54	54	54	54	53	52	51	48	48	48	47	46	45	46	45	44	46	46	46	43	54	PM25C	ALSIP
14	42	41	44	47	46	46	45	43	43	41	41	41	40	37	35	35	35	58	61	62	62	62	63	63	63	PM25C	ALSIP
15	63	64	65	66	66	77	101	122	119	119	124	122	119	119	119	119	119	116	116	116	116	116	116	124	OZONE	BRAIDWD	
16	116	116	119	116	116	116	116	116	116	116	116	116	116	116	119	119	119	119	119	119	119	119	119	119	119	OZONE	BRAIDWD
17	119	119	119	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	119	119	OZONE	BRAIDWD
18	116	114	114	114	114	114	114	114	114	114	114	114	111	111	111	111	111	111	111	111	111	109	109	109	116	OZONE	BRAIDWD
19	106	101	100	93	90	90	90	80	49	41	40	41	40	38	37	36	36	37	35	36	34	33	33	34	106	OZONE	BRAIDWD
20	35	36	36	40	42	44	46	47	49	51	52	53	53	54	53	52	52	52	51	51	51	51	51	50	54	PM25C	ALSIP
21	51	52	50	48	48	48	47	46	46	47	49	48	49	49	48	47	48	49	51	51	51	50	50	51	52	PM25C	ALSIP
22	52	52	52	52	51	48	48	47	46	45	46	46	45	44	44	43	44	44	43	42	41	41	41	41	52	PM25C	ALSIP
23	42	42	40	39	39	37	33	33	32	33	34	34	35	36	36	35	33	33	35	38	40	41	42	42	42	PM25C	ALSIP
24	42	42	41	41	41	42	42	43	43	44	43	43	42	41	42	43	44	46	46	47	47	48	48	50	50	PM25C	ALSIP
25	51	51	52	52	52	51	50	50	48	47	46	47	46	46	46	44	42	41	43	44	45	46	47	47	52	PM25C	ALSIP
26	48	49	48	46	44	42	40	37	37	37	36	35	33	33	36	34	35	36	33	34	35	36	37	38	49	PM25C	ALSIP
27	36	36	36	37	37	37	36	36	34	34	34	33	33	33	32	32	32	32	32	32	33	33	31	31	38	PM25C	ALSIP
28	30	28	28	27	27	28	29	29	28	29	29	29	29	29	28	27	26	25	24	23	22	22	22	23	30	PM25C	ALSIP
29	25	25	27	28	29	31	34	36	38	39	40	39	38	40	40	43	45	46	45	46	46	45	45	44	46	PM25C	ALSIP
30	43	44	44	44	44	44	44	44	44	42	41	41	41	40	42	42	43	42	40	39	40	42	42	40	44	PM25C	ALSIP
Max	119	119	119	116	116	116	116	122	119	119	124	122	119	140	119	119	119	119	119	119	119	119	119	119	140	PM25C	ALSIP

(Can be run on one site or the entire network. This report makes a good published web p.on the web site)

AQI Levels Report

Current Date : 5/30/2014

Current Time : 6:51 AM

AQI Levels Report

Highest daily AQI levels for the period 01-May-2014 00:00 to 30-May-2014 23:00

Total Days

Site Name	Good	Moderate	USG	Unhealthy	Very unhealthy	Hazardous
47th Street	4	0	21	0	0	0
Brentwood_NCore	8	1	20	1	0	0
Brentwood_Roadside	7	0	23	0	0	0
MainStreet	0	0	30	0	0	0
Paisley	5	0	24	1	0	0
Palani	7	0	22	1	0	0
Park Street	8	17	5	0	0	0
SouthStreet	15	0	15	0	0	0
Tilahani	19	0	11	0	0	0
Network	0	0	28	2	0	0

Shows AQI categories over any user-defined time period, as well as a statewide summary of number of days in each category.

Violation of Standards Report

(Basic limit – NAAQS versions of the report also provide Design Value information).

Current Date : 1/14/2016

Current Time : 2:17 PM

Violation of Standards Report

Ozone 8 Hour

01-Jan-2006 00:00 - 31-Dec-2006 03:59

Site: 01_KNOX

Parameter: 01_O3

Avg Interval: 8 hour

Units: PPB

Average Type: Forward rolling

Violation Limit: 75

<u>Rank</u>	<u>Average</u>	<u>Date</u>	<u>Hour</u>
1	108	2/22/2006	9
2	84	1/23/2006	0
3	80	2/21/2006	23
4	80	2/22/2006	18
5	78	6/8/2006	17
6	77	3/2/2006	0
7	77	3/2/2006	9
8	77	3/2/2006	18
9	77	3/3/2006	3
10	77	3/3/2006	12
11	77	3/3/2006	21
12	77	3/4/2006	6
13	77	3/4/2006	15
14	77	3/5/2006	0
15	77	5/25/2006	3
16	77	7/30/2006	4
17	76	5/1/2006	8

Maximum Hourly Values Report

Current Date : 1/14/2016

Current Time : 2:19 PM



Maximum Hourly Averages Report

01-Jan-2006 - 17-Jan-2006

Site: 01_KNOX

Avg Interval: 8 Hour

Parameter: 01_O3

Units: PPB

Avg Type: Forward

<u>Rank</u>	<u>Average</u>	<u>Date</u>	<u>Hour</u>
1	38	1/15/2006	7
2	35	1/7/2006	7
3	34	1/14/2006	4
4	33	1/16/2006	8
5	32	1/4/2006	16
6	32	1/11/2006	9
7	32	1/13/2006	12
8	30	1/3/2006	11
9	29	1/10/2006	7
10	27	1/6/2006	17

Frequency Distribution Report

Current Date : 1/25/2016

Current Time : 11:52 AM



Frequency Distribution Report

01-Jan-2006 - 01-Apr-2006

Avg Interval: 001h

Maximum Samples: 2160

Site - Parameter	Samples	Min.	10	20	30	40	50	90	95	98	99	Max.	Arith. Mean	Geo. Mean	Geo. Dev.
ROANE-01_OZONE	1357	0.3	22	26.2	29.2	32	34.4	40.6	41.8	43.4	45.6	116.6	32.5	31.1	1.4
01_KNOXVILLE- 01_OZONE	1448	0.6	10.2	15.9	20.3	25.3	29	48.7	77	95.1	109.9	250.1	31.5	25.0	2.1

Note: percentile breakpoints can be configured for each parameter type.

2.G Concentration Distribution Report

Current Date : 1/25/2016

Current Time : 11:53 AM



Concentration Distribution Report

01-Jan-2006 - 31-Mar-2006

Avg Interval: 001h

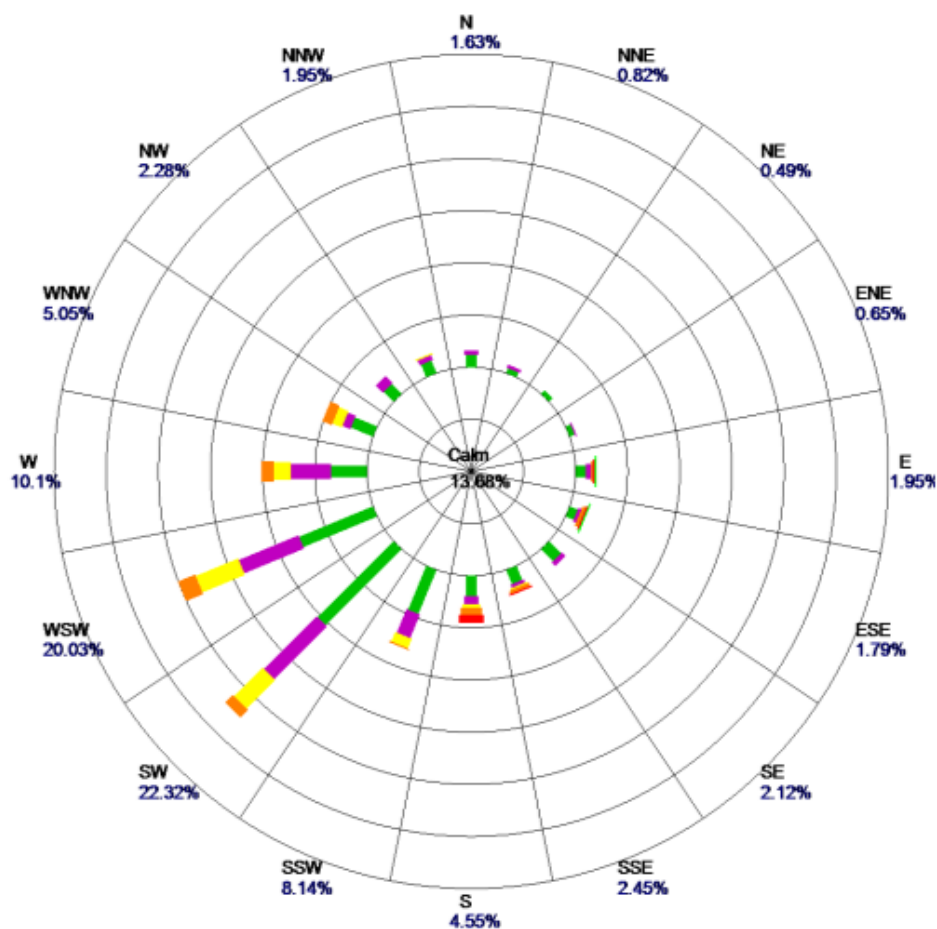
Maximum Samples: 2160

Site - Parameter	Samples	Min.	10	20	30	40	50	60	70	80	>80	Max.	Arith. Mean	Geo. Mean	Geo. Dev.
ROANE-01_OZONE	1357	0.3	13	79	362	717	182	2	1	0	1	116.6	32.5	31.1	1.4
01_KNOXVILLE- 01_OZONE	1448	0.6	140	285	336	436	108	14	10	80	39	250.1	31.5	25.0	2.1

Note: concentration breakpoints can be configured for each parameter type.

Wind / Pollution Rose Report.

Site: ROANE
Parameter: 09_WS
Units: None



Period: 1/1/2006-3/31/2006

Power Failure Report

Logger Power Failure Report

Site Name

Site Description

Logger Name

Logger Identifier

17

Failure Time

11-Dec-2015 06:25

Restored Time

11-Dec-2015 06:54

Duration (Days hh:mm)

00:29

Line Status (Status Control) Changes Report

Line Status Report

Site Name |

Logger Name

Logger Identifier 17

Line Number	Line Name	Line State	Time Of Change	Line Description
13	Output Line 13	<input checked="" type="checkbox"/>	1/25/2016 2:50:00 AM	
16	04_PREC2	<input checked="" type="checkbox"/>	1/25/2016 2:50:01 AM	O3 PREC, 700
13	Output Line 13	<input type="checkbox"/>	1/25/2016 2:50:05 AM	
15	03_LOGPT	<input checked="" type="checkbox"/>	1/25/2016 3:09:00 AM	NO2-LoGPT, 700
16	04_PREC2	<input type="checkbox"/>	1/25/2016 3:09:00 AM	O3 PREC, 700
18	06_SPAN1	<input checked="" type="checkbox"/>	1/25/2016 3:09:00 AM	all SPAN (No O3), 700
17	05_PURG1	<input checked="" type="checkbox"/>	1/25/2016 3:24:00 AM	Purge all, 700
18	06_SPAN1	<input type="checkbox"/>	1/25/2016 3:24:00 AM	all SPAN (No O3), 700
17	05_PURG1	<input type="checkbox"/>	1/25/2016 3:39:00 AM	Purge all, 700
19	07_HIGPT	<input checked="" type="checkbox"/>	1/25/2016 3:39:00 AM	NO2-HiGPT, 700
13	01_ZERO1	<input checked="" type="checkbox"/>	1/25/2016 3:54:02 AM	First zero all gas, 700

Alarms Report (Logger)

Logger Alarm Journal Report

Site Name CUMBERLAND

Logger Identifier⁰¹ Logger Name Test8864

Channel Number	Channel Name	Alarm Program Name	Alarm Start Time	Alarm End Time	Reason Code	Flag Triggering
11	O3SAMPFL	LOW_FLOW	1/5/2018 3:00:00 AM	1/5/2018 6:00:00 AM		L

Sunday, June 17, 2018 6:06 PM Page 1 of 1

Operator Comments Report:

Logger Central Message Report

Site Name 01_KNOX

Site Description

Logger IdentifierRD Logger Name RD

Message Time	Message Text
7/26/2010 12:29:01 PM	THIS IS A TEST CENTRAL MESSAGE 1
7/26/2010 12:29:08 PM	THIS IS TEST MESSAG 2 FOR CENTRAL
7/30/2010 11:39:37 AM	THIS IS A THIRD MESSAGE
1/22/2014 12:00:00 AM	test3
4/30/2015 12:00:00 AM	TEST4
5/13/2016 12:00:00 AM	test5

Site Name ASME_Test

Site Description

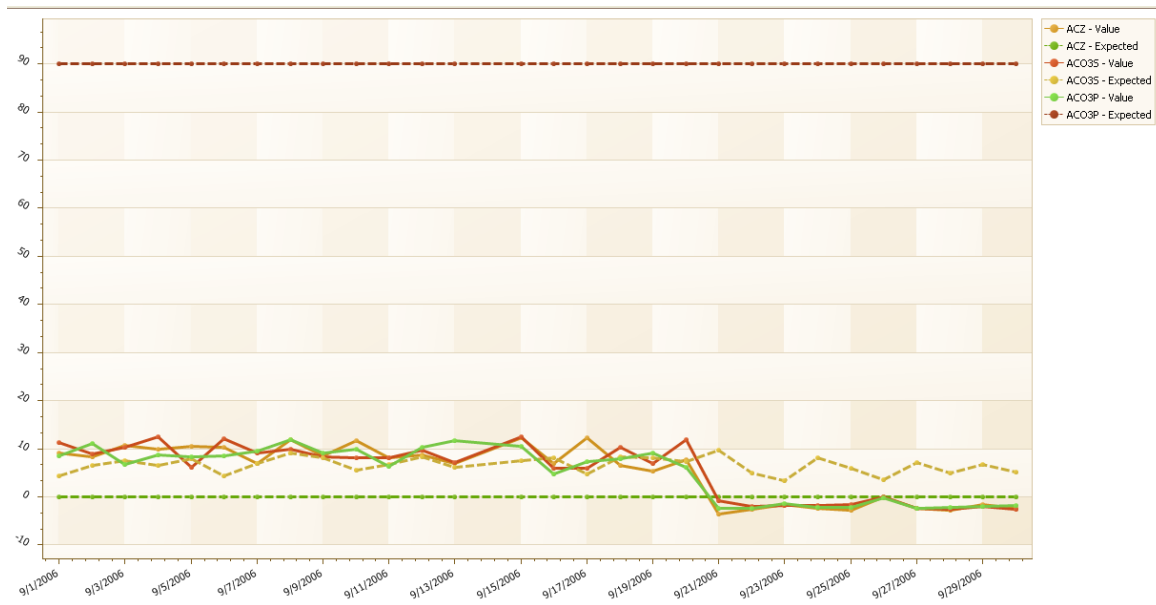
Logger Identifier¹¹ Logger Name ASME 11

Message Time	Message Text
3/12/2014 1:41:59 AM	I
3/12/2014 1:42:07 AM	I CHANGED THE PUMP

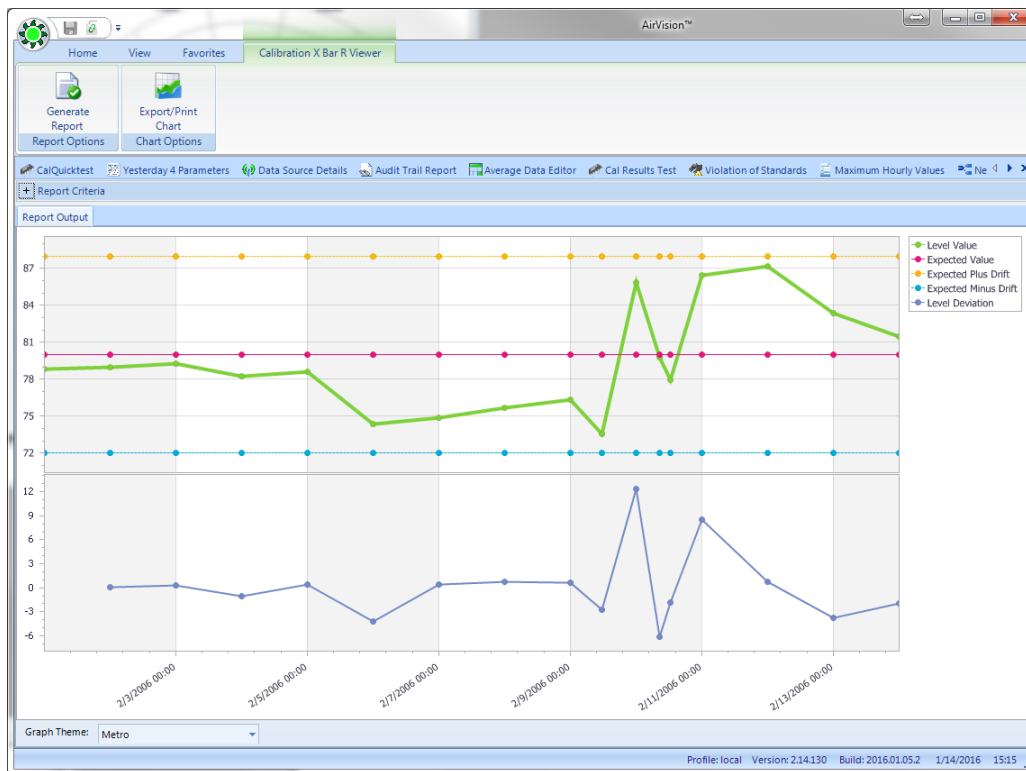
Sunday, June 17, 2018 6:04 PM

Page 1 of 1

Control Charts (Zero/Span/Precision)



Cal Drift Report- tracks long term drift over days, months



X-Bar-R Chart and Zero/Span Plots show 'close in' changes in check value changes.

ZSP Reports (Tabular) with % Difference

Date Printed: 01/14/2016 02:16



Calibration Report

15-Feb-2006

Site	Parameter	Sequence	Phase	Start Time	End Time	Value	Expected Value	Error	Drift Warning Limit
BLOUNT3	01_CO	ZEROSPAN	ZERO	15-Feb-2006 00:03:00	00:18:00	0.1	0	.13	
			SPAN	15-Feb-2006 00:03:00	00:33:00	37.3	37.9	1.54%	
	03_NOX		ZERO	15-Feb-2006 00:03:00	00:18:00	0.4	0	.49	
			SPAN	15-Feb-2006 00:03:00	00:33:00	395.7	400	1.07%	
	04_NO2		GPT	15-Feb-2006 00:03:00	00:48:00	395.2	400	1.18%	
			ZERO	15-Feb-2006 00:03:00	00:18:00	0.5	0	.54	
			SPAN	15-Feb-2006 00:03:00	00:33:00	1.4	0	1.42	
			GPT	15-Feb-2006 00:03:00	00:48:00	322.5	310	4.04%	
	05_NO		ZERO	15-Feb-2006 00:03:00	00:18:00	0.1	0	.11	
			SPAN	15-Feb-2006 00:03:00	00:33:00	394.2	400	1.43%	
			GPT	15-Feb-2006 00:03:00	00:48:00	72.7	90	19.21%	

* - Drift limit exceeded

** - Out of control limit exceeded

Converter Efficiency Report (NOx, NOY versions available)

AirVision

Home

View

Favorites

NOy Converter Efficiency Precision Report

Generate Report

PDF

Excel

RTF

CSV

Image

HTML

Textfile

Page Width

Text Width

Whole Page

Search Report

Report Options

Export Options

Zoom Options

Navigation

Calibration Data Editor

Site/Parameter

NO2 Converter Efficiency Span Report

Calibration Data Editor

Site/Parameter

Calibration Data Editor

NOy Converter Efficiency Precision Report

Report Criteria

Report Output

Date Printed: 03/29/2021 09:26

Converter Efficiency Precision Report

NOY Test Site

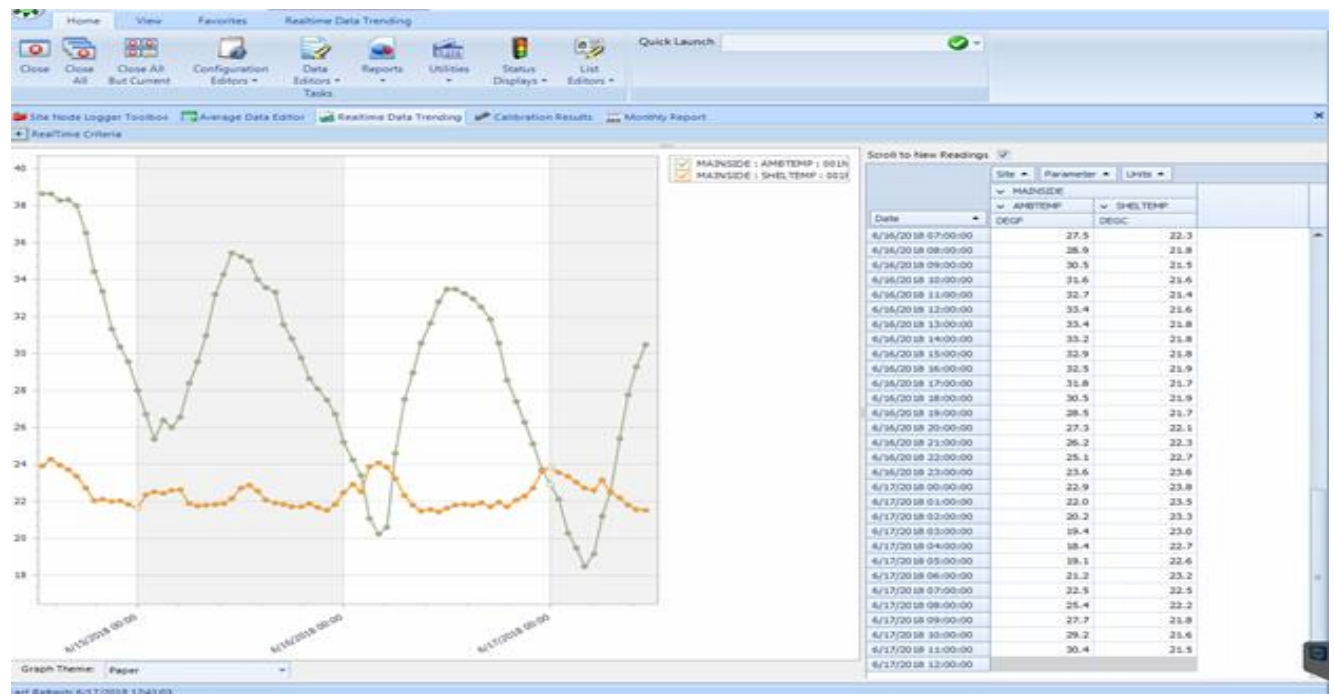
Date	NO Input				Precision			Zero			Corrected Prec Response		GPT			Corrected GPT Response		Cal Diff Input	Diff Delta %	Converter Efficiency %
	NO Resp.	% Diff	NOy Resp.	% Diff	NO Resp.	NOy Resp.	Diff Resp.	NO Resp.	NOy Resp.	Diff Resp.	NO	NOy	NO Resp.	Diff Resp.	NOy Resp.	NO	NOy			
05/14/20 00:00	21	19	-9.524	18	-14.29	0	1	1	21	19.83	9	8	17	9.947	18.67	11.05	-27.6	89.44		

Page 1 of 1

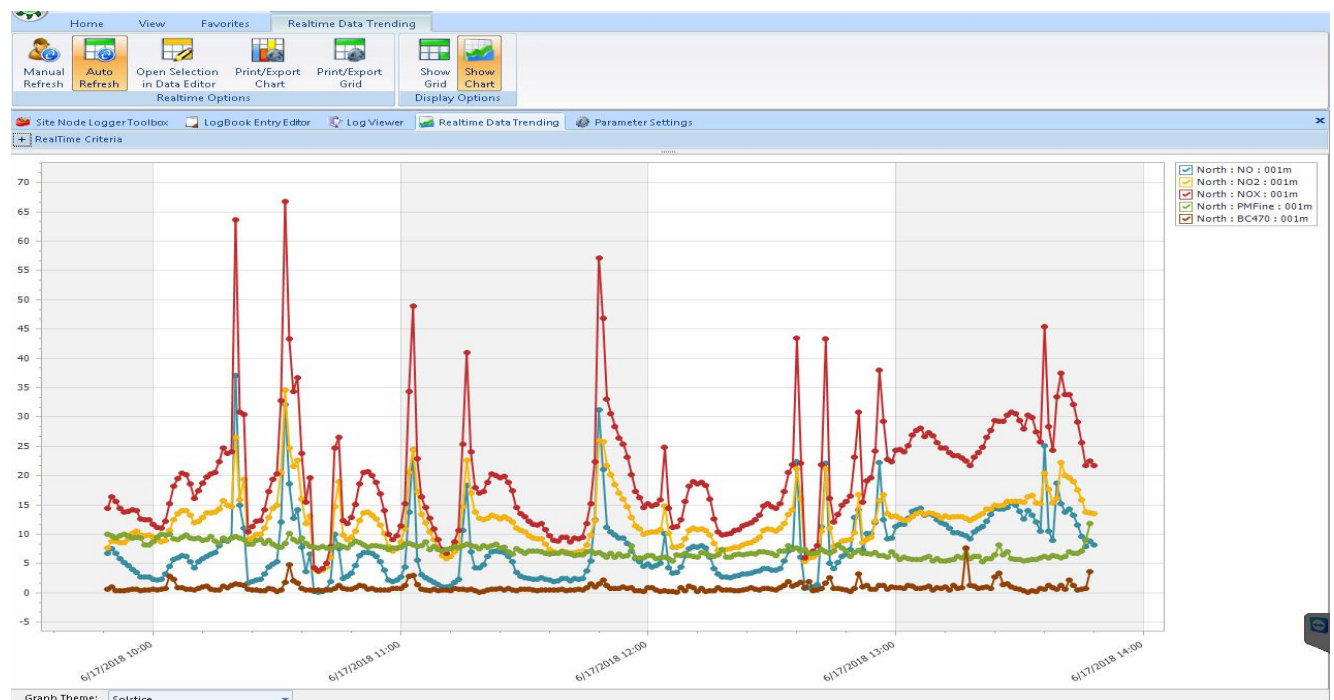
100%

Starting NOy Converter Efficiency Precision Report... User: Admin Profile: LAPTOP-0B063TN6 Version: 4.3.424 Build: 2021.03.08.2 3/29/2021 21:26

Real-Time Data Trend (AV-Trend / 8872)



Example 1: Hourly chart of Site vs. Outdoor Temp. Note that sets of user-define charts can be set to 'autostart' on login to AV-Trend/8872. Charts can retain the tabular data on the right, or just be set to show the graphical chart (as in the next example), or just the tabular display, which is useful when displaying lots of parameters.

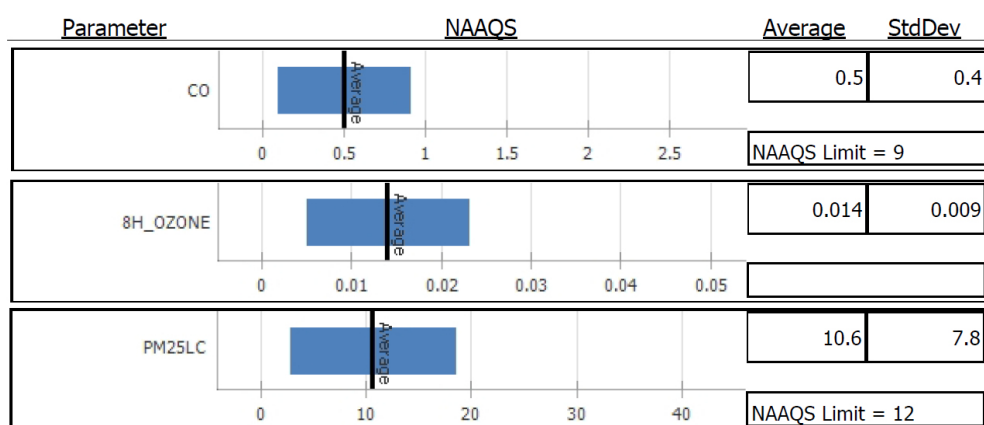


Dashboard Report

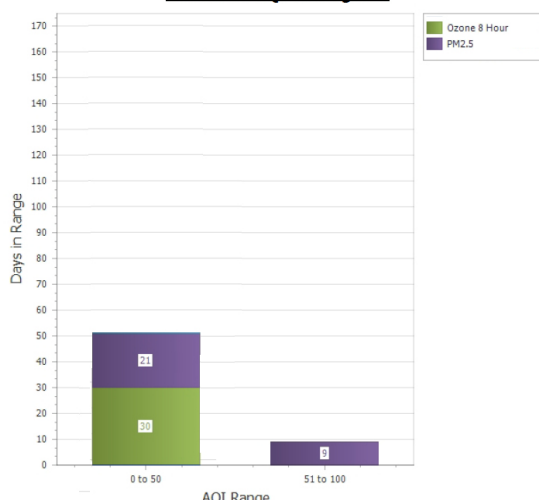
Data Capture

Parameter	Availability (Percent)	Most Common Flag
CO	77.62	< - Logger Invalid
8H_OZONE	100	D - Channel Disabled
PM25LC	99.93	D - Channel Disabled

Concentrations

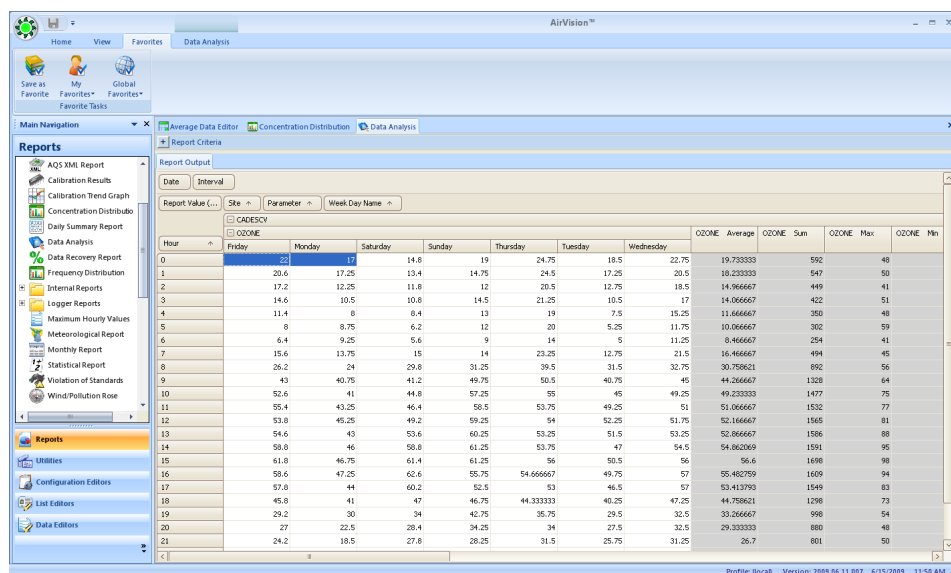


Network AQI Histogram

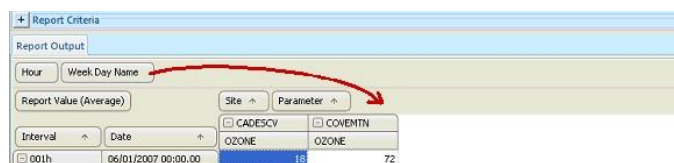


This report presents an overview of system operation, including monitor availability, by parameter for the whole network, ranges of concentrations in the network in relation to the NAAQS, and a breakdown of AQI values both by occurrence in range and by responsible pollutant in one easy to understand report.

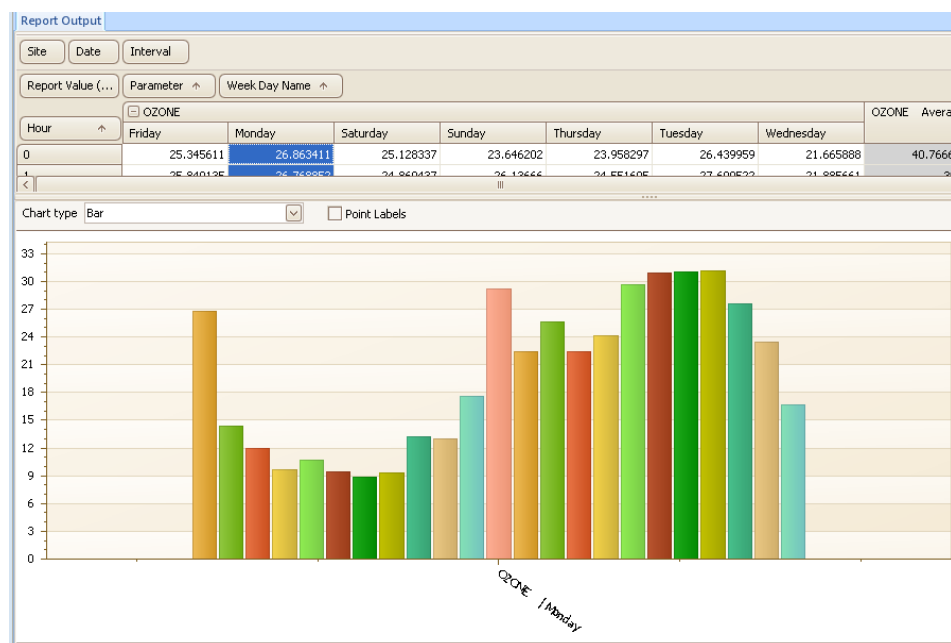
Data Analysis Tool For Ad –Hoc Reports



The Ad-Hoc Report Tool is designed to allow the user to take data sets and easily group and sort by various database columns and derived properties (e.g., day of week) with simple 'drag and drop'



To create charts (bar, pie, line, etc) of newly categorized data (e.g., average ozone values for each day of the week for a particular time range).



Site Health Report

The Site health report provides an easy-to-understand single report of analyzer ranges, diagnostic parameter ranges over any user-defined period. Calibration reports and logbook entries for the time range are also attached so that the user can print and review or store the report as a complete record of the site operation for the time range (week, month, etc).

Site Health Report

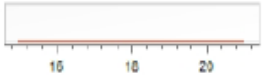


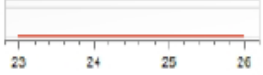

Site Name: 01_KNOX
Address: 2904 Tazewell Pike

Starting Date: 15-Feb-2006 00:00
Ending Date: 15-Feb-2006 23:59

Primary Measurements:

<u>Parameter</u>	<u>Max</u>	<u>Min</u>	<u>Average</u>
01_O3	44.7	8.5	24.1
02_PM10_Contn	30	13	18
08_TEMP	23	21	22
13_RAINFALL	0.05	0.05	0.05
14_SOL_RAD	554	-2	133
15_BAROMETR	746	742	743
41_WSVEC	2	0	0
43_WDVEC	353	2	206
45_SIGMA_TH	36	9	20
PM25_FRM	-999	-999	-999
PM25LC	30	13	18
REL_HUM	78	26	52
SO2	-999	-999	-999
SO4	-999	-999	-999
WD	353	2	207
WS	3	0	0

Secondary Measurements:

<u>Parameter</u>	<u>Max</u>	<u>Min</u>	<u>Average</u>	
PM25LC:24_AMBDEW	21	15	18	
PM25LC:25_DRYDEW	-999	-999	-999	
PM25LC:26_NOISE	1.5	0.89	1.171	
PM25LC:27_FILLOAD	26	23	23	
PM25LC:28_STATUS	1	0	0	

Multi-Step Cal Report

This report is designed for 5-point checks, and can record diagnostic values of the instrument during the check, as well as calculate slope and intercept values.

AIRS ID Number 17 095 0014	Site Name and Location BLOUNT3	Date 06/17/2018 05:26	Prev Cal/Verif Date 2/28/2006 12:00:00 AM
Analyzer Model/Serial # 2234	FSP/OTS Serial Number	FSP/OTS Cert Date	FSP Serial Number

Diagnostics	Pre	Post	Photo Display	Expected	Response	Delta	% Diff	>2%	COMMENTS
NOX_SampPres		35.8	ZERO	0	-0.879	-0.8			
NOX_SampFL		0.667	SPAN	40	39.58	-0.4	1.05		
NOX_SampTemp		37.2	GPT	80	79.746	-0.2	.32		
			GPT	120	120.03	0	.03		
			GPT	160	159.7	-0.3	.19		

Sample Line Changed? [] Yes [] No

Slope:	1.0040	
Intercept:	-.6861	
Correl Coeff:	1.0000	

FSP Cert Data
Slope:
Intercept:

Audit Trail Report

Current Date : 1/14/2016
Current Time : 2:14 PM

Data Audit Trail

Site: 01_KNOX
Parameter: 01_O3

07-Jan-2006 - 07-Jan-2006

Interval: 001h

<u>TimeStamp</u>	<u>Raw Value</u>	<u>Final Value</u>	<u>Flags</u>	<u>Time Modified</u>	<u>Modified By</u>	<u>Annotation</u>
01/07/2006 00:00	70	69	C	01/14/2016 14:12	Admin	adjusted for incorrect output range
01/07/2006 00:00	70	69	C	01/14/2016 14:14	Admin	Reading Value Changed from: 70.2298431396484 to: 68.8252462768555
01/07/2006 01:00	27	26	E	01/14/2016 14:12	Admin	adjusted for incorrect output range
01/07/2006 01:00	27	26	E	01/14/2016 14:14	Admin	Reading Value Changed from: 26.7877292633057 to: 26.2519746780395
01/07/2006 02:00	25	25	E	01/14/2016 14:12	Admin	adjusted for incorrect output range
01/07/2006 02:00	25	25	E	01/14/2016 14:14	Admin	Reading Value Changed from: 25.3613834381104 to: 24.8541557693481
01/07/2006 03:00	24	24	E	01/14/2016 14:12	Admin	adjusted for incorrect output range
01/07/2006 03:00	24	24	E	01/14/2016 14:14	Admin	Reading Value Changed from: 24.0940246582031 to: 23.6121441650391
01/07/2006 04:00	23	23	E	01/14/2016 14:12	Admin	adjusted for incorrect output range
01/07/2006 04:00	23	23	E	01/14/2016 14:14	Admin	Reading Value Changed from: 22.9853363037109 to: 22.5256295776367
01/07/2006 05:00	30	30	E	01/14/2016 14:12	Admin	adjusted for incorrect output range
01/07/2006 05:00	30	30	E	01/14/2016 14:14	Admin	Reading Value Changed from: 30.2498321533203 to: 29.6448355102539
01/07/2006 06:00	32	31	E	01/14/2016 14:12	Admin	adjusted for incorrect output range
01/07/2006 06:00	32	31	E	01/14/2016 14:14	Admin	Reading Value Changed from: 31.9362678527832 to: 31.2975424957275
01/07/2006 07:00	32	32	E	01/14/2016 14:12	Admin	adjusted for incorrect output range
01/07/2006 07:00	32	32	E	01/14/2016 14:14	Admin	Reading Value Changed from: 32.3619728088379 to: 31.7147333526611

Data Annotation Report

Date Printed: 03/17/2021 04:32

Annotation Report

01-Jan-2006 00:00 - 31-Jan-2006 23:59

Site: 01_KNOX
Parameter: 01_O3

<u>Site</u>	<u>Parameter</u>	<u>Category</u>	<u>Date Annotated</u>	<u>User Name</u>	<u>Start</u>	<u>End</u>	<u>Annotation</u>
							Reading Value Changed from: 9999 to: 9.97102451324463
01_KNOX	01_O3	Audit	02-Oct-17 12:43	Admin	02-Jan-06 13:00	02-Jan-06 13:00	Removed Flag: < - Logger Invalid
01_KNOX	01_O3	Audit	02-Oct-17 12:43	Admin	02-Jan-06 14:00	02-Jan-06 14:00	Reading Null Code Changed from: AS - Poor Quality Assurance Results to: Not Specified, Reading Value Changed from: 9999 to: 8.85539245605469
01_KNOX	01_O3	Audit	02-Oct-17 12:43	Admin	02-Jan-06 14:00	02-Jan-06 14:00	Removed Flag: < - Logger Invalid
01_KNOX	01_O3	Audit	02-Oct-17 12:43	Admin	02-Jan-06 15:00	02-Jan-06 15:00	Reading Null Code Changed from: AS - Poor Quality Assurance Results to: Not Specified, Reading Value Changed from: 9999 to: 8.68288612365723
01_KNOX	01_O3	Audit	02-Oct-17 12:43	Admin	02-Jan-06 15:00	02-Jan-06 15:00	Removed Flag: < - Logger Invalid
01_KNOX	01_O3	Audit	02-Oct-17 12:43	Admin	02-Jan-06 16:00	02-Jan-06 16:00	Reading Null Code Changed from: AS - Poor Quality Assurance Results to: Not Specified, Reading Value Changed from: 9999 to: 4.78011131286621
01_KNOX	01_O3	Audit	02-Oct-17 12:43	Admin	02-Jan-06 16:00	02-Jan-06 16:00	Removed Flag: < - Logger Invalid
01_KNOX	01_O3	Audit	02-Oct-17 12:43	Admin	02-Jan-06 17:00	02-Jan-06 17:00	Reading Null Code Changed from: AS - Poor Quality Assurance Results to: Not Specified, Reading Value Changed from: 9999 to: 4.18308591842651
01_KNOX	01_O3	Audit	02-Oct-17 12:43	Admin	02-Jan-06 17:00	02-Jan-06 17:00	Removed Flag: < - Logger Invalid

Network Data Recovery Report Report

Network Data Recovery Report

01-Jul-2015 - 31-Jul-2015

Site	NO_PPB	OZONE	PMCOARSE	PMHR	SOLRAD	TEMP	VWDR	VWSP
North				0.00%				
Urban		83.60%		98.52%		100.00%		
Calhoun		99.46%		98.79%		100.00%	100.00%	100.00%
Winston		98.92%				100.00%	100.00%	100.00%
Elk Hill		75.27%		75.40%		76.21%		
Coronado						100.00%	99.73%	99.73%
Bowie		99.19%		98.25%		100.00%	99.73%	99.73%
Karlow	97.72%	98.92%			100.00%	100.00%	100.00%	100.00%
South Bend		91.13%				90.32%	90.19%	90.19%
Pinnacle		98.66%				100.00%	100.00%	100.00%
Blaso		99.19%				100.00%	100.00%	100.00%
Fort Rekker		99.46%				100.00%	99.60%	99.19%
MLK				88.44%				
University						100.00%	100.00%	100.00%
Forsest		99.19%		97.31%		100.00%		
Perido		99.33%				100.00%		
Medical Center		99.19%				100.00%		
I-444		99.46%		85.48%		100.00%	100.00%	100.00%
Benton		98.92%		99.60%		100.00%		
Silo		83.20%		91.67%		100.00%	100.00%	100.00%
Near Road North	97.85%					100.00%		
Near Road South	96.91%					99.73%	99.73%	99.73%
Pike Place		99.73%				100.00%		
Venice				0.00%		100.00%		
Andover				99.60%				
Savannah EP		97.85%				99.73%	99.33%	99.33%
Savannah L&A				99.60%		100.00%	100.00%	100.00%
South DeKalb	97.85%	98.52%	99.33%	99.33%		100.00%	99.33%	99.33%
Nightside		99.06%				100.00%		
ArmyBase				99.87%				
Yorktown	95.43%	99.33%		99.46%	99.60%	100.00%	99.60%	99.60%
AVERAGE	97.15%	96.08%	99.33%	78.31%	99.80%	98.74%	99.25%	99.23%

Daily Parameter Report

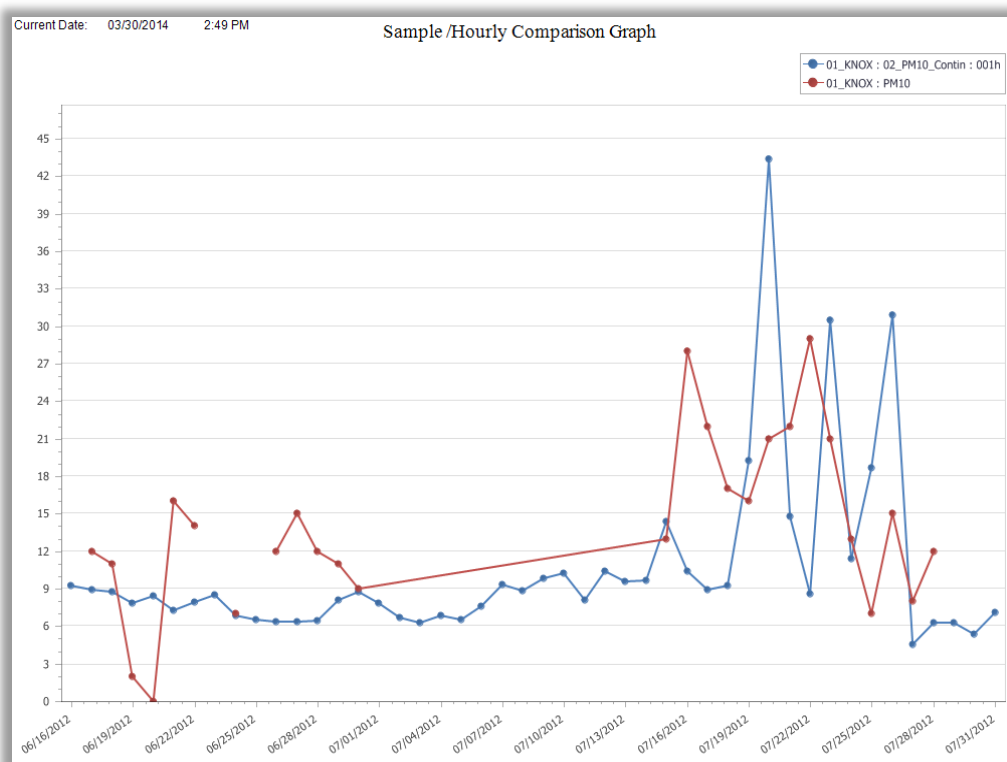
Current Date: 3/1/2010 10:45 AM

Daily Parameter Report

1/2/2006

Parameter	SiteName	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Summary		
																										Avg	Max	RDS
AMBTMP	Blount2	-4.8	-3.9	-3.9	-4.6	-4.6	-4.5	-4.3	-4.2	-3.7	-2.2	0	1	1.7	2.1	1.7	0	-1.8	-2.3	-2.7	-3.1	-3.1	-3.3	-3.6	-3.8	-2.4	2.1	24
	Roane_Y																									0	0	0
	Union	-5	-4.2	-3.3	-3.1	-3.1	-3.1	-2.9	-3	-2.3	-1	-2	.5	1.8	2.3	2.1	-.8	-2.3	-3.2	-3	-2.8	-2.5	-3	-2.7	-2.7	-2	2.3	24
BARPRESS	Blount3	18	24.6	25.4	20.9	21.3	19.3	21.5	18.6	24.1	27.2	33.3	30.6	25.4	24.4	23.7	24.1	25.1	29.2	29.1	28.6	26.8	31.3	30.1	32.8	25.6	33.3	24
	Roane_Y																									0	0	0
	Union	727.7	727.8	728.3	728.4	728.5	728.7	728.8	728.9	729.1	729.3	729.4	729.3	729	728.9	728.7	728.7	728.4	728.4	728.7	728.7	728.4	728.1	727.9	727.6	728.6	729.4	24
CO	Blount3		.7	.8	.7	.7	.7	.7	.7	.8	1	1	.9	.8	.9	1.1	1	1	1	.8	.8	.9	.7	.7	.7	.8	1.1	23
	Roane_Y		1.1	1	.9	.9	.9	.9	1.3	1.4	1.1	.8	.7	.6	.6	.6	.7	.8	.8	.7	.8	.9	.8	.8	.8	.9	1.4	23
NO	Blount3		3.7	7.5	3.1	2.1	3.5	5.9	3.9	8.6	23.1	36.8	28	19.1	21.3	24.1	17.9	9.5	13.9	4	4.2	4	3.6	3.5	3.7	11.1	36.8	23
	Roane_Y		49	41.3	41.3	53	55.5	51.5	85.7	109.4	93	46.3	22.8	9.5	8.8	7.4	8.5	12.6	25.4	12.4	15.2	19.5	19.8	20.2	17.2	35.9	109.4	23
NO2	Blount3		20.8	21.7	19.2	16.2	19.4	24.2	19	24.6	26.2	25.2	21.6	18.9	18.4	21.3	26.1	29.8	29.5	21.6	20.6	19.1	16	14.5	15.7	21.3	29.8	23
	Roane_Y		22.1	21	19	21.6	17	16.7	18.6	20.6	25.1	19.7	14.3	9.9	10.7	10.1	14.5	19.6	20.5	19	18.6	17.2	17.1	15.3	15.5	17.6	25.1	23
NOX	Blount3		24.5	29.1	22.3	18.3	22.8	30.1	22.9	33.2	49.3	61.9	49.6	38	39.7	45.4	44	39.3	43.4	25.6	24.8	23.1	19.5	18	19.4	32.4	61.9	23
	Roane_Y		71.5	62.6	60.6	75	72.8	68.1	103.7	129.4	117.6	65.4	36.5	18.8	19	17	22.6	32	46.4	31.9	34.3	37.2	37.6	35.9	33.2	53.4	129.4	23
OZONE_PPB	Blount_S		.9	1.6	.6	.6	.6	.7	1.6	3.6	8.1	9.7	11.4	11.7	9.9	8.8	8.6	4.7	4.1	6.6	7.8	9.1	9.7	10.5	7.7	6	11.7	23
	Union		13	13	14	13	14	19	19	22	24	24	25	27	28	28	25	24	24	25	26	27	26	22	18	22	28	23
PM25LC	Blount_S	23.3	28	22.3	20.4	20.7	20.4	18.3	18.6	20.1	20.6	10.5	10.1	8.1	8.2	9.5	10.8	7.7	7.1	8.1	10.5	9.3	8.4	6.2	7.8	14	28	24
	Blount3	27.6	26.5	28.6	28.7	27.4	25.9			28.2	30.3	36.5	41	34.5	32	32.5	32.5	32.7	34.1	36	37.4	36.2	38.1	40.8	42.4	33.2	42.4	22
	Roane_Y	39.2	51.5	58.7	49.5	43.5	40.6	39.6		41.9	49.4	34.5	23.5	16.6	13	10.8	9.9	20.3	27.1	27.9	28	29.8	30.8	34.3	30.7	32.7	58.7	23
RAINFALL	Blount2	.26	.26	.26	.26	.26	.26	.26	.26	.26	.26	.26	.26	.28	.31	.34	.36	.36	.36	.36	.36	.36	.36	.36	.36	.3	.36	24
	Blount3	4.95	5.01	5.22	5.3	5.33	5.42	5.62	5.72	5.99	6.88	8.29	9.09	9.41	9.94	10.74	11.38	11.65	12.1	12.11	12.21	12.03	11.55	11.26	11.13	8.68	12.21	24
	Roane_Y																									0	0	0
RELHUM	Union	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.04	.04	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.03	.05	24
	Roane_Y																									0	0	0
	Union	87.7	87.9	86.7	86.3	86.1	85.7	83.4	84.9	81.9	77.7	75	70.7	64.8	62.2	62.2	76.5	84.3	86	85.1	82.8	79.7	81.9	81.8	83.8	80.2	87.9	24
SIGTHETA	Union	24.7	17.6	13.9	20.6	15.3	9.3	23.5	19.2	18.3	28.1	33.4	24.6	28.1	27.7	27.4	28.5	15.1	11.6	16.5	20.6	12.1	23.3	20.4	25.3	21	33.4	24
SO2	Roane_Y		22.7	20.6	19.4	18.2	25.6	20.5	29.8	35.9	22.3	13.4	8.2	8.5	6	5	5.8	7.1	6.2	7.1	7.7	5.8	9.5	7.1	8	13.9	35.9	23
	Union																									0	0	0
SOLARRAD	Roane_Y																									0	0	0
VWDR	Blount_S																									0	0	0
	Blount2	64	118.3	21.5	13.2	21.2	13.8	10.4	25.7	23.3	17.7	98.5	224.8	221.8	239	244.7	355.5	14.9	357.8	13.3	19.4	8.2	4.4	352.8	6.2	103.8	357.8	24
	Union	161.5	127	111.7	31.6	42.6	87.8	41.2	124.3	86.7	7.9	342	315.1	323.4	210.4	317.4	349.2	28.9	51.5	58.9	68.3	38.5	52.8	30.6	22.1	128.3	349.2	24
VWSP	Blount_S																									0	0	0
	Blount2	1.1	.8	.6	1.1	1	.6	.4	.8	.6	.4	0	1	.8	.7	.6	.3	.8	.5	.9	1.1	.7	.7	.6	1	.7	1.1	24
	Roane_Y																									0	0	0
VWSP	Union	.3	1.1	.6	.3	.6	.5	.4	.3	.5	.4	.4	.7	.8	.5	.3	.7	.5	.7	.6	.4	.8	.5	.6	.6	.5	1.1	24

The FRM / Continuous PM Comparison Graph / Reports compare 24-hour FRM samples with “roll ups” of hourly continuous (TEOM, BAM, etc) particulate data.



Current Date: 03/30/2014 2:50 PM

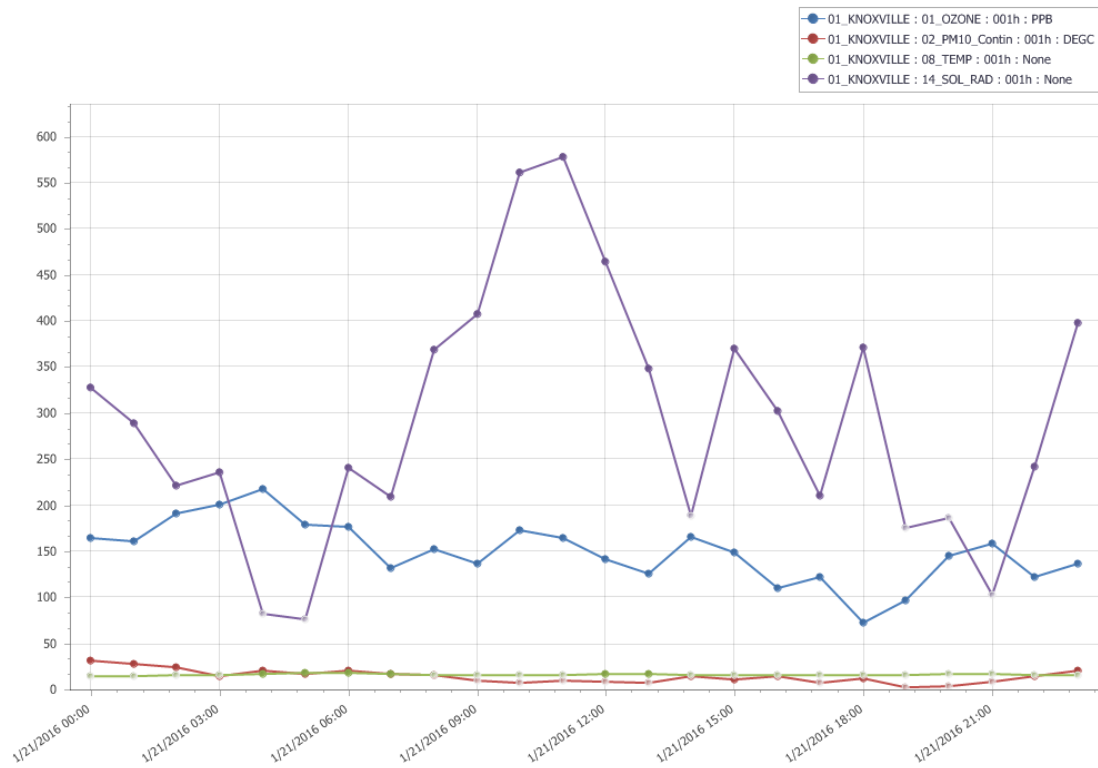
Sample/Hourly Daily Comparison

Date	01_KNOX	
	02_PM10_Contin	PM10
06/16/2012	9.2	
06/17/2012	8.9	12
06/18/2012	8.7	11
06/19/2012	7.8	2
06/20/2012	8.4	0
06/21/2012	7.2	16
06/22/2012	7.9	14
06/23/2012	8.5	
06/24/2012	6.8	7
06/25/2012	6.5	
06/26/2012	6.3	12
06/27/2012	6.3	15
06/28/2012	6.4	12
06/29/2012	8.1	11
06/30/2012	8.7	9
07/01/2012	7.8	

Average Data Trend Report

Current Date: 1/25/2016 11:35 AM

Average Data Trend Report



Note that fixed or dynamic Y-axis scaling is supported. Invalid data points can be shown with their value, or as a gap.

Average Data Export (CSV Imported into Excel)

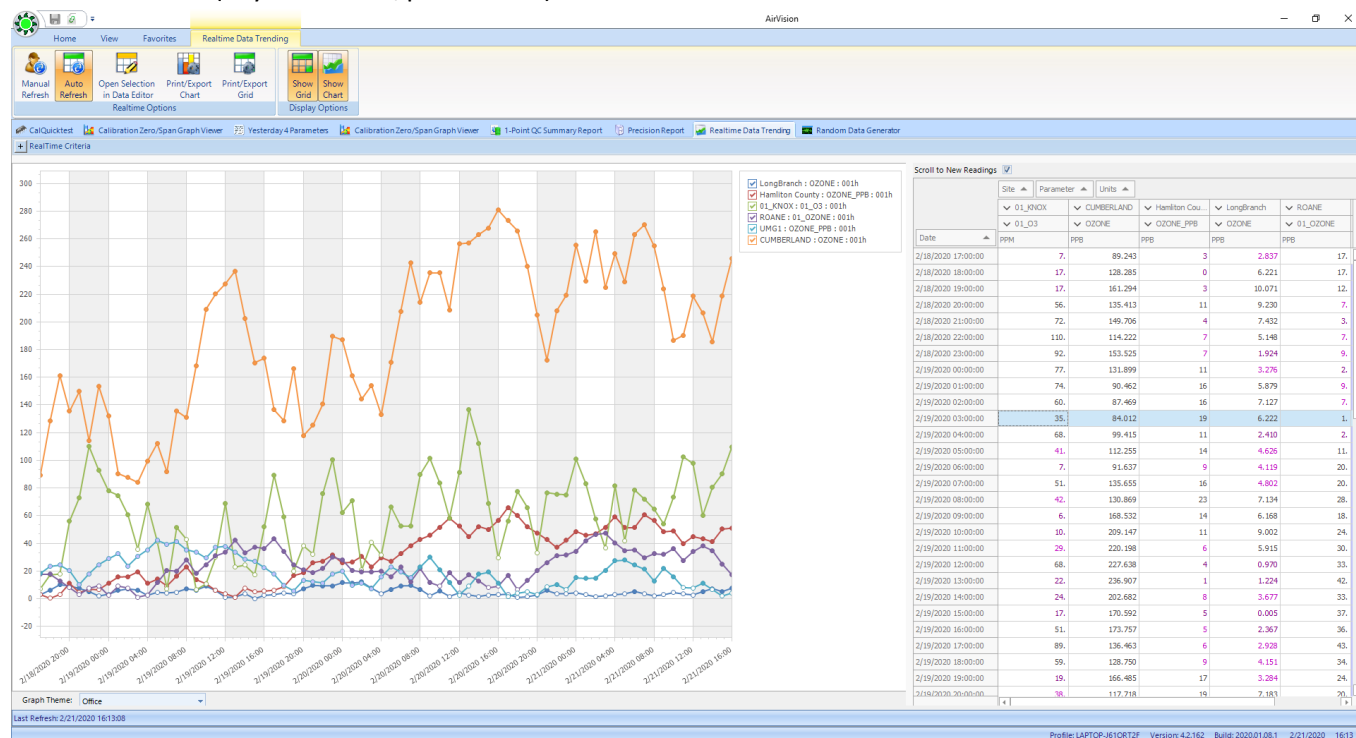
	A	B	C	D	E	F	G	H	I	J	K	L	M
1		01_KNOXVILLE	OAKRIDGE	OAKRIDGE	OAKRIDGE	OAKRIDGE	OAKRIDGE	OAKRIDGE					
2		01_OZONE	01_CO	02_SO2	03_NOX	04_NO2	05_NO	PM25LC					
3	Date												
4	1/1/2006 0:00	65.5						130.5					
5	1/1/2006 1:00				12.3	10.9	1	18.2					
6	1/1/2006 2:00			5.4	13.1	55							
7	1/1/2006 3:00							19.9					
8	1/1/2006 4:00			6.8	33.5	14.1	2.1	21					
9	1/1/2006 5:00	16.5		5.7	32.5	13.6	2.3						
10	1/1/2006 6:00	14.4		9.2	35.5	15.7	1.6	21.5					
11	1/1/2006 7:00	13.6		10.6	40.4	17.3	3.1	21.6					
12	1/1/2006 8:00	13.9		8.5	35.6	14.5	4.1	23.5					
13	1/1/2006 9:00	14		6.3	52.5	17.3	9.2	25.1					
14	1/1/2006 10:00	15.7		17.3	113.6		32	30.3					
15	1/1/2006 11:00	15.5		10.1	53.8		11.6	29.8					
16	1/1/2006 12:00	16.2		5.7	55.3		12.7	25.9					
17	1/1/2006 13:00	15.8	0.806	12.3	58.4		11.9	25.3					
18	1/1/2006 14:00	15.3	0.745	6.4	50.9		9.1	27					
19	1/1/2006 15:00	13.5	0.779	8.3	60.5		9.6	24.8					
20	1/1/2006 16:00	10.4	0.864	11.2	43.2		15.8	28.3					
21	1/1/2006 17:00	7.7	0.895	9.9	46.3		20.2	33.5					
22	1/1/2006 18:00	6.4	0.934	10.9	51.3		25.7	33.2					
23	1/1/2006 19:00	5.4	1.018	12.4	51.4		26.4	35.4					
24	1/1/2006 20:00	3.9	1.038	16.5	62.8		37.6	39.6					
25	1/1/2006 21:00	1.2	0.981	15	74.4		45.3	43.6					
26	1/1/2006 22:00	1.6	1.061	18.4	78.8	29	49.4	47.6					
27	1/1/2006 23:00	0.6	0.9	12.8	53.1	25.4	27.3	45.8					
28	1/2/2006 0:00												
29	1/2/2006 1:00	0.9	1.104	22.8	71.5	22.1	49	51.5					
30	1/2/2006 2:00	1.6	1.04	20.7	62.6	21	41.3	58.7					
31	1/2/2006 3:00	0.6	0.959	19.5	60.6	19	41.3	49.5					
32	1/2/2006 4:00	0.6	0.934	18.2	75	21.6	53	43.5					

Calibration Export (CSV imported into Excel)

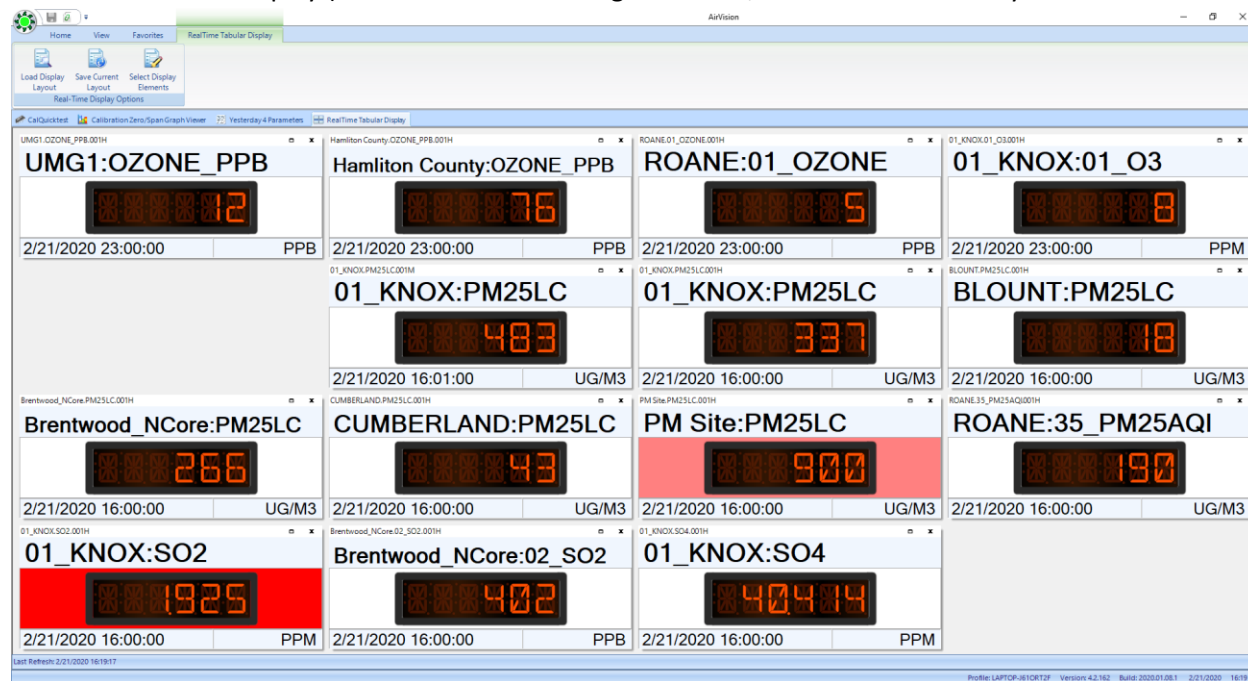
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Site	Parameter	Sequence	Phase	Start Time	End Time	Value	Expected Value	% Error	Drift Limit %			
2	01_KNOXVILLE	01_OZONE	O3ZROSPN	ZERO	1/1/2006 0:00	1/1/2006 0:15	526.4	0	526.5	5			
3	01_KNOXVILLE	01_OZONE	O3ZROSPN	SPAN	1/1/2006 0:00	1/1/2006 0:30	14.3	425	96.63	5			
4	OAKRIDGE	01_CO	ZEROSPAN	SPAN	1/1/2006 0:08	1/1/2006 0:23	0.259	0	0.26				
5	OAKRIDGE	01_CO	ZEROSPAN	SPAN	1/1/2006 0:08	1/1/2006 0:38	43.911	43.6	0.71				
6	OAKRIDGE	02_SO2	ZEROSPAN	ZERO	1/1/2006 0:08	1/1/2006 0:23	-0.3	0	-0.28				
7	OAKRIDGE	02_SO2	ZEROSPAN	SPAN	1/1/2006 0:08	1/1/2006 0:38	453.3	487	6.92				
8	OAKRIDGE	03_NOX	ZEROSPAN	ZERO	1/1/2006 0:08	1/1/2006 0:23	1	0	1.06				
9	OAKRIDGE	03_NOX	ZEROSPAN	SPAN	1/1/2006 0:08	1/1/2006 0:38	449.6	450	0.09				
10	OAKRIDGE	04_NO2	ZEROSPAN	ZERO	1/1/2006 0:08	1/1/2006 0:23	0.6	0	0.62				
11	OAKRIDGE	04_NO2	ZEROSPAN	GPT	1/1/2006 0:08	1/1/2006 0:53	345.6	357	3.17				
12	OAKRIDGE	05_NO	ZEROSPAN	ZERO	1/1/2006 0:08	1/1/2006 0:23	0.1	0	0.12				
13	OAKRIDGE	05_NO	ZEROSPAN	SPAN	1/1/2006 0:08	1/1/2006 0:38	449.2	450	0.17				
14	01_KNOXVILLE	01_OZONE	O3ZROSPN	ZERO	1/2/2006 0:00	1/2/2006 0:15	525.3	0	525.34	5			
15	01_KNOXVILLE	01_OZONE	O3ZROSPN	SPAN	1/2/2006 0:00	1/2/2006 0:30	9.1	425	97.84	5			
16	OAKRIDGE	01_CO	ZEROSPAN	ZERO	1/2/2006 0:08	1/2/2006 0:23	0.258	0	0.26				
17	OAKRIDGE	01_CO	ZEROSPAN	SPAN	1/2/2006 0:08	1/2/2006 0:38	43.815	43.6	0.49				
18	OAKRIDGE	02_SO2	ZEROSPAN	ZERO	1/2/2006 0:08	1/2/2006 0:23	0.6	0	0.62				
19	OAKRIDGE	02_SO2	ZEROSPAN	SPAN	1/2/2006 0:08	1/2/2006 0:38	455.1	487	6.55				
20	OAKRIDGE	03_NOX	ZEROSPAN	ZERO	1/2/2006 0:08	1/2/2006 0:23	2	0	2.05				
21	OAKRIDGE	03_NOX	ZEROSPAN	SPAN	1/2/2006 0:08	1/2/2006 0:38	449.9	450	0.01				
22	OAKRIDGE	04_NO2	ZEROSPAN	ZERO	1/2/2006 0:08	1/2/2006 0:23	1.3	0	1.35				
23	OAKRIDGE	04_NO2	ZEROSPAN	GPT	1/2/2006 0:08	1/2/2006 0:53	348	357	2.51				

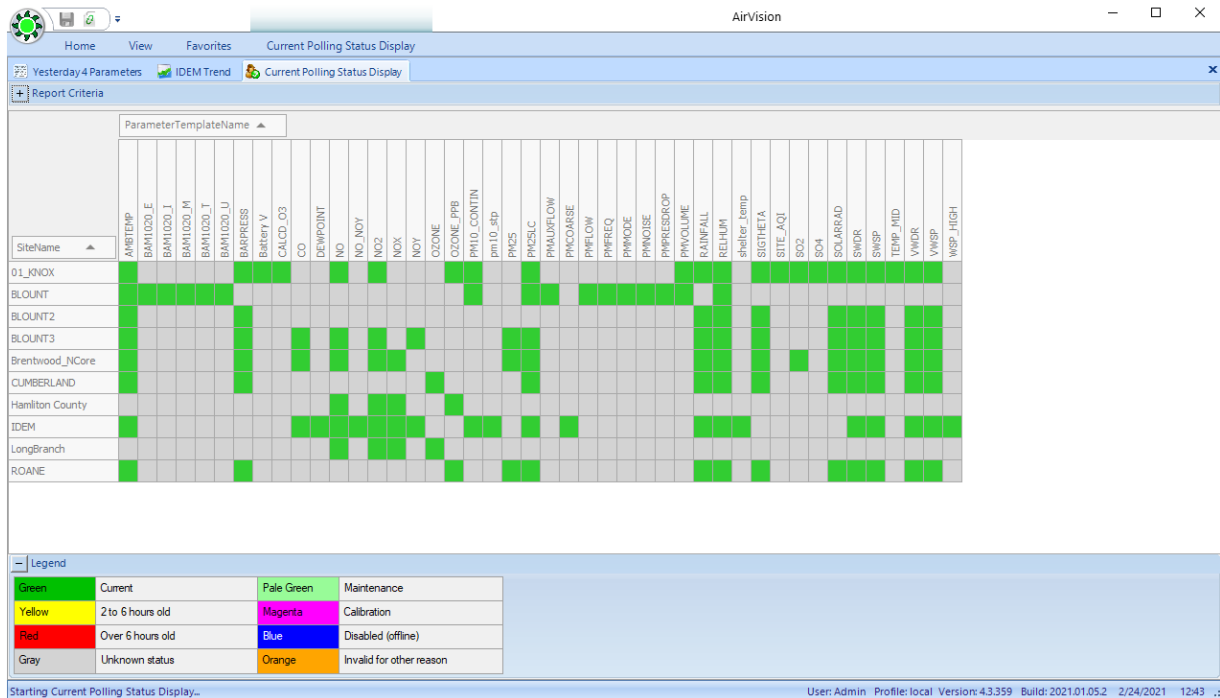
Real-Time Displays

Real-Time Trend (any mix of site/parameters)



Real-Time Tabular Display (can mix different average intervals, user control of tile layout):



[illegible]

Unusual Indicator Report

The unusual indicator report enhancement would summarize hourly data for a selected list of sites and parameters, based on logical tests listed below. The report would present the data as a single list, sorted by site name first (alphabetical), then by the order of the logical tests below, and then by parameter name (or report order) within those logical tests. No page break would be given site, so that data could be exported into CSV/Excel more easily.

Logical Tests:

1. The report searches all QC checks for that site, checking the start time configured in the server and repeat interval, to determine if (and how many) calibration sequence was to have occurred in the report period. Start times will be searched explicitly by minute (e.g., if supposed to have run at 12:45, the report will search for records from 12:45:00 to 12:45:59). If a check is missing, it will be reported as follows (*Start = expected start time*). *Unclear if we need to check different schedules for zero/span, zero/prec, and 5-point cal, or just that a check takes place each day.*

<u>Exception</u>	<u>Site</u>	<u>Parameter</u>	<u>Details</u>	<u>Start</u>	<u>End</u>	<u>Value</u>
QC Check Missing	North		DLY_PREC	12/17/20 01:45		

2. For each sequence that runs, the results of each parameter is checked against the Expected (target) value recorded in the calibration record, and the difference checked against the Drift Limit (either as a %, or an absolute difference, user-selectable). For each parameter/check that exceeds this limit, it will be reported as follows:

<u>Exception</u>	<u>Site</u>	<u>Parameter</u>	<u>Details</u>	<u>Start</u>	<u>End</u>	<u>Value</u>
QC Failed	North	SO2	DLY_PREC: ZERO	12/24/20 01:45	12/24/20 02:30	33.45

3. Instruments marked invalid by the logger (<) for any reason other than calibration (C) will have the outages grouped into based on the highest priority flag, and then sorted into consecutive hourly groups with that same flag. Each group will be listed as an event with a starting and ending time of the event.

e.g., if SO2 is marked as Overrange for hours 00-10, and also marked Maintenance for Hours 08-12, and Overrange is higher priority than Maintenance, the outages will be reported as follows (value is the average of the event):

<u>Exception</u>	<u>Site</u>	<u>Parameter</u>	<u>Details</u>	<u>Start</u>	<u>End</u>	<u>Value</u>
Invalid	North	SO2	Overrange	12/25/20 00:00	12:25:20 09:00	533.4
Invalid	North	SO2	Maintenance	12/25/20 10:00	12:25:20 12:00	33.1

4. Parameters with the parameter template SITE_TEMP will be checked for H (high) and L (low) flags (coming from the logger or ADVP), and consecutive groupings of hours with those flags are reported as follows (value is the average of the event):

<u>Exception</u>	<u>Site</u>	<u>Parameter</u>	<u>Details</u>	<u>Start</u>	<u>End</u>	<u>Value</u>
Invalid	North	Shelter Temp	High	12/25/20 00:00	12:25:20 09:00	29.7
Invalid	North	Shelter Temp	Low	12/25/20 10:00	12:25:20 12:00	12.1

5. Parameters with parameter template SWSP, WSDR, VWSP, or VWDR that report the same value (within 1%) for 2 or more consecutive hours are reported with the value (average of the event) as follows:

<u>Exception</u>	<u>Site</u>	<u>Parameter</u>	<u>Details</u>	<u>Start</u>	<u>End</u>	<u>Value</u>
Stagnant	North	VWSP	Sustained >= 2 hrs	12/25/20 00:00	12:25:20 09:00	0.0
Stagnant	North	VSDR	Sustained >= 2 hrs	12/25/20 00:00	12:25:20 12:00	180.0

6. Parameters with parameter template SWSP or VWSP that report an H flag for 2 or more consecutive hours are reported with the value (average of the event) as follows:

<u>Exception</u>	<u>Site</u>	<u>Parameter</u>	<u>Details</u>	<u>Start</u>	<u>End</u>	<u>Value</u>
Gust	North	VWSP	Sustained H >= 2 hrs	12/25/20 00:00	12:25:20 09:00	55.4
Gust	North	SWSP	Sustained H >= 2 hrs	12/25/20 00:00	12:25:20 12:00	52.1

7. All other data conditions would be managed by reporting data marked with the suspect (?) flag by the Automated Data Validation Processor during the report period, and are reported as follows:

<u>Exception</u>	<u>Site</u>	<u>Parameter</u>	<u>Details</u>	<u>Start</u>	<u>End</u>	<u>Value</u>
Suspect	North	NO2	Suspect by ADVP	12/25/20 00:00	12:25:20 09:00	11.7
Suspect	North	NO2	Suspect by ADVP	12/25/20 10:00	12:25:20 12:00	2.1

Example Report:

Unusual Indicator Report

12/21/2020 - 12/21/2020

Exception	Site	Parameter	Details	Start	End	Value
QC Check Missing	Right Side		DLYCOZS	12/21/20 22:35		
QC Check Missing	Right Side		DLYNO2ZS	12/21/20 09:35		
QC Check Missing	Right Side		DLYNOYZS	12/21/20 23:45		
QC Check Missing	Right Side		DLYO3ZS	12/21/20 10:35		
QC Check Missing	Right Side		DLYSO2ZS	12/21/20 11:35		
QC Failed	Right Side	CO	DLYCOZS:CO_M_SP	12/21/20 01:12	12/21/20 01:12	.12
QC Failed	Right Side	CO	DLYCOZS:CO_G_Z	12/21/20 01:12	12/21/20 01:12	.12
QC Failed	Right Side	CO	WKYCO3P:M_CO	12/21/20 23:12	12/21/20 23:12	.12
QC Failed	Right Side	CO	WKYCO3P:T_CO	12/21/20 23:12	12/21/20 23:12	.12
QC Failed	Right Side	CO	WKYCO3P:G_CO	12/21/20 23:12	12/22/20 00:12	.12
QC Failed	Right Side	OZONE	DLYO3ZS:O3_M_SP	12/21/20 06:12	12/21/20 06:12	-.03
QC Failed	Right Side	OZONE	QTYO35P:M_O3	12/21/20 02:12	12/21/20 02:12	-.04
QC Failed	Right Side	OZONE	QTYO35P:R_O3	12/21/20 02:12	12/21/20 02:12	-.03
QC Failed	Right Side	OZONE	QTYO35P:S_O3	12/21/20 02:12	12/21/20 03:12	-.02
QC Failed	Right Side	OZONE	QTYO35P:T_O3	12/21/20 02:12	12/21/20 03:12	-.01
QC Failed	Right Side	OZONE	WKYO33P:M_O3	12/21/20 04:12	12/21/20 05:12	-.03
QC Failed	Right Side	OZONE	WKYO33P:T_O3	12/21/20 04:12	12/21/20 05:12	.00
QC Failed	Right Side	TrueNO2	DLYNO2ZS:NO2_G_Z	12/21/20 11:12	12/21/20 11:12	.02
Invalid	Right Side	CO	Logger Invalid	12/21/20 07:00	12/21/20 08:00	0.0

Monday, March 1, 2021

Date Printed: 3/1/2021 12:56

Unusual Indicator Report

12/21/2020 - 12/21/2020

Exception	Site	Parameter	Details	Start	End	Value
Invalid	Right Side	SO2	Overrange	12/21/20 05:00	12/21/20 06:00	383.805
Invalid	Right Side	SO2	Overrange	12/21/20 09:00	12/21/20 10:00	405.268
Invalid	Right Side	SO2	Maintenance	12/21/20 07:00	12/21/20 08:00	355.592
Invalid	Right Side	TrueNO2	Low Alarm	12/21/20 05:00	12/21/20 05:00	25.92
Invalid	Right Side	TrueNO2	Out of Control	12/21/20 07:00	12/21/20 08:00	0.0
Suspect	Right Side	OZONE	Suspect by ADVP	12/21/20 06:00	12/21/20 07:00	17.33

Appendix C – References / Similar Projects

Agilaire has been providing enterprise level ambient data management systems since 2005, and most of its staff came from our predecessor company, ESC, with some employee experience going back to 1985. AirVision itself was released in 2009, and provided as a no-cost upgrade to customers on active support/upgrade agreements. AirVision is currently used by over 80 state and local monitoring agencies, as well as over a dozen tribal organizations, and over 70 other industrial customers, consultants, and other private organizations.

A list of users follows. Entities with most commonality to typical state agency requirements include:

- State of Wyoming (Hosted data server and web server, data coming in from other than Agilaire loggers)
- State of Georgia (hosted data server and web server, site PCs with existing loggers)
- State of Virginia (hosted data server and web server, site PCs as loggers)
- San Joaquin APCD (self-hosted, large system with > 200 sites, new loggers and third party loggers)
- Great Basin APCD (primarily direct poll instruments, hosted system, almost all Direct Poll devices).

Details on the State of Wyoming Project

Agilaire has recently completed implementation of a statewide data management system upgrade for the State of Wyoming, hosting the AirVision and public web site in the SaaS model.

Wyoming is unique in that their sites are generally managed by outside contractors that submit data via FTP / SFTP each hour. However, the similarity with the IDEM project is that the data sources involved in the project are not Agilaire-branded loggers, so specific functionality has been added to fill in gaps, including processing of data to convert units from data submissions different from what Wyoming DEQ wants to use for AQS reporting and the public web site. Additional enhancements offer the option to 'mark down' parameters, either on the fly or for a scheduled time window, to account for cases where the incoming data may not be appropriately flagged, but needs to be excluded.

Enhancements include a specially designed site section for the web page, custom framing and content porting from the existing site, and management of visibility camera images for each site. In addition, Agilaire had to implement enhancements to the File Import Tool to adapt to flag representations specific to the contractors existing data structures.

The project was implemented on schedule and on budget using a phased approach and regular project reports/meetings with the Wyoming project team.

Network Size: 41 Sites, 680 measured parameters, ~12 users

Contact Information:

Leif Paulson, Monitoring Group Manager	(307)777-7817	leif.paulson@wyo.gov
Cara Keslar, AQM Section Supervisor	(307) 777-8684	cara.keslar@wyo.gov

Details on the Commonwealth of Virginia Project

The Commonwealth of Virginia went through a year-long RFQ process starting in June of 2018, reviewing several vendors in detail before selecting Agilaire to upgrade their network of 25 monitoring sites. They elected to use our hosting services, as well as moving the hosting of their web site to Agilaire.

The project commenced in September of 2019, and all 25 sites (full hardware replacements and transition from analog to digital) were installed by fall of 2020, well ahead of the original 18 month delivery scheduled, despite a 2-month delay for COVID-19.

The project included a full AgileWeb implementation with some enhancements, as well as application enhancements (offset adjustments in loggers, 8872 display update rates), all delivered on time and on budget.

Virginia DEQ can also attest to the remote troubleshooting and protocol development capabilities, as this stage of the project also included a test system with new site sensors that had to demonstrate complete compatibility and reliability with the Commonwealth's extensive suite of sensors and instruments.

Network Size: 25 Active Sites ~400 measured parameters, will grow to 800+ parameters with the addition of instrument diagnostics.

Contact Information:

Chuck Turner, 804-527-5178,

Charles.turner@deq.virginia.gov

Details on the State of Georgia Project (Hosting with Digital Site Transition)

In 2014, Georgia DNR solicited bids from multiple vendors to modernize their old E-DAS system, including upgrading their web site for public information, as well as launching a new intranet web site for data editing, reporting, and field data entry. The field data entry requirement included a dozen new forms for entry of both calibration and run data for lead, metals, low-volume PM, high-volume PM, VOC, and PAH samplers. Each form was to include error checking of user entry, and importing of historical temp/pressure data and calibration information previously entered. Finally, the DNR requested that the site be completely hosted by the vendor.

Agilaire was selected from multiple vendor bids, including DR-DAS and Sutron / Metostar, and began work in January of 2015 on the project. The main server was quickly brought up and demonstrated reliable polling and data access to all the sites. A base web site was also quickly deployed, and a majority of the rest of the project was spent on customizations of the web site and developing the field data / sampler calibration entry forms. In a joint arrangement, the State agreed to discard the standard “work for hire” rights and allow the forms work to be potentially re-used by other agencies, to forward improvements for the air monitoring industry. Agilaire and DNR worked cooperatively in an ‘agile’ development environment, allowing the DNR to review initial versions of the customizations and provide feedback to ‘tweak’ all the customizations to their exact needs, demonstrating Agilaire’s ability to deliver customizations on schedule and meeting customer requirements.

During the process, the DNR elected to add the Direct Polling system for their BAM-1020 and Partisol samplers (and are currently transitioning to T640s). Agilaire did an initial proving of the communications system, and then DNR and Agilaire worked out the necessary change orders for the additional scope. During this process, the DNR also elected to upgrade all of their wireless modems (with new IPs), and Agilaire adjusted both the primary polling system and the direct polling system to correspond to the addresses. Historical data was imported from the E-DAS system (to include non-AQS parameters) with no data gaps. A performance issue was identified with some reports being run via the remote Client, but Agilaire was able to identify the bottleneck and issue a software resolution within two weeks.

Network Size: 46 Sites, 1913 measured parameters, 67 users

Contact Information:

Sid Stephens, Unit Manager	404-362-2750	sid.stephens@dnr.ga.gov
Deanna Oser, Program Manager	404-362-7004	deanna.oser@dnr.ga.gov

Details on the San Joaquin Project (DAS Replacement, Digital Upgrades)

In 2012, the San Joaquin APCD purchased a 'pilot' system DAS to evaluate the AirVision logger and to test transition of their system from analog to digital connections at their in-office monitoring site. The District also wanted to use AirVision's Data Validation Processor (ADVP) to streamline the data screening and QA process.

The test was successful, but it took two extra years for the APCD to fully fund the rollout to the remaining sites, including roughly 30 air monitoring sites and about 90 sites of source emission data, which are required to allow continuous monitoring by the APCD. This work provides a good example supporting third party data loggers and adapting to protocols that are not well documented.

The project included full digital connections to the APCD analyzers (other than met and site temperature), as well as direct polling to Partisols, API 602, and other new instruments.

The project had a fast timeline, with one year from execution of the contract to full deployment at all sites, including some required software customizations for interoperability with legacy air alert notification systems, and working out issues with communications with the ~ 90 CEM monitoring sites, for which most of the communication information was outdated.

The project was successfully completed within the scheduled time frame and budget.

Network Size: 129 Active Sites, ~2500 measured parameters

Contact Information:

Nathan Trevino,

(559) 230-5861

Nathan.Trevino@valleyair.org

Details on the Great Basin Project (Hosted, Digital Transition)

Great Basin's system is unique in that they have one NCore site, and the remaining sites are particulate only sites, mostly monitoring PM10.

Great Basin had previously worked with Envitech/DR-DAS to implement an upgrade from their previous system, but the system did not meet requirements. They contacted Agilaire, who indicated that a system based on Direct Polling of their TEOMs and API 640 could 'drop in' with their existing site communication hardware easily, and the changeover from the failing DR-DAS logger to an Agilaire logger at the NCore site could take place in a matter of days.

Great Basin also felt that having Agilaire host the data management server would be helpful to their organization, and this approach also sped up the project implementation. The entire switchover took roughly a month of preplanning, and one week on site.

Customization had been requested to import logbook data from a customer-built logbook system, and so that customization was specified out, built, and implemented as an add-on to the running DAS.

Network Size: 27 Active Sites, 676 measured parameters

Contact Information:

Kim Mitchell,

760-872-8211 ex 235

kmitchell@gbuapcd.org

Experience and Qualifications:

Agilaire has been providing enterprise level ambient data management systems since 2005, and most of its staff came from our predecessor company, ESC, with some employee experience going back to 1985. AirVision itself was released in 2009, and provided as a no-cost upgrade to customers on active support/upgrade agreements. AirVision is currently used by over 80 state and local monitoring agencies, as well as over a dozen tribal organizations, and over 70 other industrial customers, consultants, and other private organizations.

List of US Agency Users (most > 5 yrs) <ul style="list-style-type: none">• 29 Palms Tribe• Alabama, State of• Arizona State of• Arkansas, State of• Albuquerque, City of• Allegheny County• Aspen, City of• Bay Area Air Quality (San Francisco)• Broward County, FL• Cabazon Band of Mission Indians• California Air Resources Board• Chattanooga, City of• Cherokee Nation• Clark County, NV (Las Vegas)• Coeur D'Alene Tribe• Colorado, State of• Colville Reservation• Cook County, IL• DC Department of Environment• Denver, City of• EPA Region 4, Region 9, Region 1 Offices• Florida, State of• Forsyth County, NC• Georgia, State of• Gila River Indian Tribe• Great Basin AQMD• Hillsboro County, FL• Ho-Chunk Nation• Huntsville, City of• Illinois, State of• Imperial County, CA• Imperial Irrigation District (Salton Sea project)• Iowa, University Hygenics Lab & Bioterrorism	<ul style="list-style-type: none">• Pennsylvania, Commonwealth of• Philadelphia, City of• Pinal County, AZ• Pinellas County, FL• Placer County, CA• Polk County, IA• Ports of Los Angeles and Long Beach• Quapaw Tribe of OK• Rhode Island, State of• Sac and Fox• San Joaquin APCD• San Luis Obispo• Santa Barbara County• Santa Rosa Rancheria• Sarasota County, FL• Shasta County, CA West Virginia, State of• Shelby County, TN• Siskyou County APCD• South Carolina• South Coast AQMD• South Dakota• Southern Ute Tribe• Tennessee, State of• Utah, State of• Vermont, State of• Virginia, Commonwealth of• Wampanoag Tribe of Aquinnah• Washoe County, NV• Wyoming DEC• Yolo-Solano AQMD
--	---

<ul style="list-style-type: none"> • Jacksonville, FL • Jefferson County, AL • Kansas, State of • Kentucky, Commonwealth of • Kern County, CA • Knox County Air Quality • Louisiana, State of • Louisville KY Metro Gov't • Maine Dept of Environmental Protection • Manatee County, FL • Maricopa County, AZ • Massachusetts, Commonwealth of • Mecklenburg County • Mendocino County APCD • Miami Dade County • Mississippi, State of • Missouri, State of • Montana, State of • Mojave APCD • Morongo Band Minnesota, State of • Nashville Metro Gov't • Navajo Nation • Nevada, State of • New Hampshire, State of • Nebraska, State of / Douglas County • New Hampshire, State of • Nez Perce Tribe • North Dakota • Northern Sonoma APCD • Ohio EPA • Oklahoma, State of • Orange County, FL • Palm Beach County, FL • Passamaquoddy Tribal Government 	<p>International:</p> <ul style="list-style-type: none"> • Abu Dhabi National Oil Company (Ambient and CEM) • Ambiegest, Ecuador • Baja Air Quality, MX • DPC Power, Oman • Energia Azteca (CEM) • Fujairah Municipality • Guatemala Air Quality • Hong Kong Polytechnic University • Jamaica Public Air Quality • Jamaica Public Service Power Company • Malaysia Air Quality Network • Maaden Aluminum Company, KSA • Mexicali Air Quality, MX • Mexicali Power (CEM) • Mexico City, MX • Muscat Airport • Oman Cement • Oman LNG Project • PetroEcuador • PT Freeport Indonesia • Rabigh Power Plant, KSA • Quito Municipality, Ecuador • Ras-Al-Khair Network, KSA • Al-Medinah Network, KSA • Salalah Methanol, Oman • Saudi Electric Company • Raysut Cement, Oman • Fujairah Municipality • City of Santiago, Chile • Vintechs (Vietnam) • Yan Pet Refinery, Saudi Arabia
--	--

Appendix D – Hosting and Disaster Recovery Policies

1. Service Level Agreement (SLA)

Agilaire's standard hosted system SLA is as follows:

Agilaire will provide a DAS/DMS (Data Acquisition System/Data Management System) that is designed to function 24 hours a day, 7 days a week. This contract includes support services from Agilaire for a one (1) year period from the execution date of the contract. Agilaire shall perform services as specified below within the agreement term period.

- 1) **Hosting Services.** *Agilaire will provide a Tier 3 dedicated server environment for the AirVision application (Owned License), including MS-SQL license. Remote access by Agency staff and contractors via AirVision Client software to defined server destination. By default, server will only accept connections from IP ranges defined by Agency staff, but other IPs can be added to the access control list (e.g., to support connection from sites or personnel working from home).*

The hosting partner provides a highly reliably platform with:

- *Latest generation E3 Haswell / E5 Sandy Bridge processors.*
- *High speed (100 Mb / Gigabit burst) redundant data networks.*
- *No single point of failure across multiple data centers.*
- *Storage to accommodate the on line storage of a minimum three-and-a-half (3.5) years of data.*
- *AirVision server to poll 1, 5, 15 and 60 minute data samples from the 8832's or 8872's every 1 to 5 minutes.*
- *Server Hardware replacement in under 8 hours, 24/7.*
- *Server return to operation in under 48 hours, 24/7.*
- *Redundant power backup.*

- 2) **Support Services.** *Agilaire will provide the following support services during the term of the Support Agreement on the current version of the licensed software and hardware as supplied by Agilaire:*

- a) **Routine Server Checks.** *Agilaire will review server logs each week for errors or other conditions that need resolution on the server or needs to be brought to the attention of Agency personnel. Agilaire will also confirm success of the database maintenance tasks and backups (both local and offsite) and apply critical Windows updates as needed.*
- b) **Server Monitoring** *Agilaire also provides constant server performance and security monitoring through Trend Micro Deep Security, with reports available quarterly. Based on contract requirements, quarterly vulnerability testing (external probing) may also be part of the contract.*
- c) **Unlimited Telephone Support.** *Agilaire will respond to email and telephone inquiries and problems encountered that affect the use of the licensed software and hardware as well as provide support services for the licensed software 24 x 7 including all holidays. Agilaire's support may consist of any or all of the following, as Agilaire deems necessary:*
 - i) *Telephone consultation with Agency staff.*
 - ii) *Referring Agency staff to relevant manual provisions.*
 - iii) *Examination of system and programs as required.*
 - iv) *Modification or replacement of programs by program patches or updates.*
 - v) *Analysis of and response to the problem after a review of appropriate documentation submitted by*

Agency upon Agilaire's request.

Agilaire support assumes working with one or more primary contacts at Agency that have attended training on the covered product. Agency or its contract representative will fully cooperate with Agilaire's support staff in order to diagnose and resolve problems.

Routine requests for support will be resolved by Agilaire as outlined in this SLA. Emergency requests involving problems with data acquisition or recovery, shall be assigned the highest priority by Agilaire and resolved as outlined in this SLA.

Typical Time To Response / Time To Resolution are as follows:

Severity (Sample Problem)	Response Time (less than)	Target Resolution Time* (Fix/work-around within)
1 (Application down)	two (2) hours	six (6) hours
2 (certain processing interrupted or malfunctioning but Application is able to process)	eight (8) business hours	one (1) business day
3 (minor intermittent malfunctioning, Application able to process data)	two (2) business days	three (3) business days

- d) **Software Upgrades/Supplements.** *This contract includes upgrades to the standard product and any licensed modules. These upgrades generally provide both enhancements and may also contain fixes to issues encountered by Agency or other users of the product. Typically, these upgrades are furnished and applied to the server once or twice per year, and Agilaire would provide installation sets for the field Model 8872 data loggers to be applied by Agency staff.*

Agilaire will coordinate and apply critical version updates with the Agency. If the Agency desires the installation of a particular intermediate version, they should contact Agilaire to discuss

- 3) **Exclusions.** *The following are excluded from this service agreement:*
- a) *For significant amounts of time spent on other services and expenses for all other materials and parts that are not covered by this agreement, Agilaire may charge for additional and unusual effort at its current hourly billing rate plus reasonable travel expenses if applicable. However, this additional cost must first be communicated to Agency and approved in writing. Examples include:*
 - i) *Failures of hardware not covered under this agreement (e.g., modems)*
 - ii) *Lack of operator-level preventative maintenance.*
 - iii) *Lack of operator having attended standard training on the product.*
 - iv) *Accident, disaster, abuse, misuse, or operator error.*
 - v) *Alterations, modifications, attachments, parts or repairs not performed or provided by Agilaire or under Agilaire's direction.*

2. Hosting Policies –General

Introduction

This document covers policies and procedures for the management and security of customer AirVision and AgileWeb servers hosted by Agilaire.

Questions about this document should be directed to the Hosting Director and VP Operations (Paul Yankey), or in his absence in the event of an emergency, to the President (Steve Drevik).

Some sections of Agilaire IT Security Policies are repeated here for reference.

Base Server Configuration

Base servers are provided by our Hosting Partner with Windows OS installation only. Server configuration shall be based on a least privilege, minimum configuration without additional installations unless called for by the contract. All server setups are performed by or directly overseen by the Hosting Director, and performed by authorized Agilaire personnel only. Required configuration items include:

- Change of OS admin passwords to complex password (12 character minimum and special characters) or customer preference.
- Review of user accounts to ensure no additional unknown / unauthorized accounts.
- IP firewall restriction to limit RDT access to Agilaire office IP and hosting provider's IP (hosting provider access locked out unless temporarily needed for support assistance).
- RDP access for administrator account is disabled
- Installation of Agilaire standard or project-specific anti-virus software
- Configuration of Windows Defender or project specific firewall to block all but accesses required by the contract (AirVision client, FTP if required by the contract, outbound polling access ports, etc.).
- Installation of PA server monitoring software for automatic monitoring of:
 - Free Disk Space (<5% free on any disk)
 - CPU loading (>75% for 30 minutes)
 - Event Log
 - Service Monitor (AirVision, WWW, SQL)
 - Ping Monitor (>500ms for 40 consecutive requests)
- Configuration of automatic OS updates (see next section)
- Standard "blacklist" of blocked IPs set in firewall
- Installation of SQL Server (version as required by contract) and related service packs

- Installation of AirVision and, if required by contract, AgileWeb.
- SSL for AgileWeb, if applicable.
- Enable only AirVision-based web services required by contract (e.g., AQS Service for Exchange Network, etc.).
- Enable cloud backup services (Dropbox or as required by contract).
- TeamViewer (unless prohibited by contract). TeamViewer must be set to 'high security' mode for login credentials.
- Set time update mode based on standard Internet Time Server, or as per customer preference.

Other AirVision specific configurations may be required as part of the initial Project implementation or may be selected / configured by the customer, including:

- Users, Groups, and Group Permissions
- Password complexity
- Password expiration intervals
- Password 'throttling' for failed logins.

These standards are project-specific and implemented based on consultation with the customer, or as required by contract.

No Multi-Tenant, Physical Location

All hosting servers shall be separate physical machines for each Customer. No multi-tenant implementations with VMs shall be used, unless expressly authorized in the contract with the customer.

All hosting servers shall use US-based data centers for US public agency clients if required by contract. Other clients will be consulted for preference or requirements for data center locations, but all hosting shall be North American servers (e.g., US or Canada).

Windows OS Updates

Initial deployment of server must include current service packs for the operating system and SQL server. Update policies for the server must then be set to:

Critical OS patches are reviewed and installed during weekly system checks and when a server restart is needed to complete and update that event is scheduled with the customer (to avoid unscheduled reboots or system issues).

Installation of Additional Software

No additional software beyond the listed minimal configuration above may be installed without approval of the Hosting Director or President.

All installations, including third party components, shall be made from Agilaire's Software Library. No direct downloads from third party sites are allowed.

Remote Access Protections

Remote Desktop shall be limited by IP filtering in the Firewall to Agilaire IP and hosting provider support IP addresses only. Credentials for RDT and, if applicable, TeamViewer, shall be stored only on password-protected servers. Some contracts may require storage on a device or system with two-factor authentication or in encrypted form with a secondary password. Credentials shall never be stored in written form, or on unprotected devices.

Copies of credentials may be stored on mobile devices (e.g., phone or tablet 'notes' applications) only if they are protected with an additional password in the notes application (e.g., "protected" notes in iOS, etc.), and the mobile device is also protected with a 6+ character passcode and 'throttling' of failed login attempts. Even in this case, the credentials should not be stored with the server IP or customer name in the same note / storage area.

Physical Server Protections and Physical Access Protections

Protection of the server environment (backup power, redundant HVAC, redundant internet connections) are the responsibility of the hosting partner and described in their SOC 2 audit report. All servers shall be hosted in a Tier 3 environment.

Prohibition of Third Party Contractors

No third party contractors or other entities outside of Agilaire authorized personnel shall be allowed access to the Server OS environment or Customer Application Environment without the express written permission of the Customer and either the Hosting Director or the President. Such authorization shall be considered a highly unusual circumstance, highly limited in scope, and supervised by the Hosting Director.

Authorized Personnel and Credential Review/Revocation

Each hosted server may be assigned one person other than the Hosting Director for routine server checks. Only the Hosting Director and the assigned Server Check personnel shall access the server OS. The Project Manager may access the system, but only through the regular Client tools unless otherwise approved by the hosting manager (due to client version compatibility or similar issues).

If two-factor authentication or similar security precautions are required per the hosting contract, Agilaire provides the following barriers to server access:

- Remote Desktop to the servers is IP restricted to Agilaire's network and the hosting partner's support network (disabled unless a support ticket is open)
- TeamViewer access is white list restricted, requiring a user has a proper set of credentials in addition to the TeamViewer code and password for the server
- All logs of credentials are stored within a secured CRM system which requires authentication to access

Personnel access for each server shall be reviewed each year in January by the Hosting Director.

The Hosting Director or the President may, at any time, temporarily or permanently revoke the credentials of any employee at any time if their performance is in doubt, and shall revoke and revise or terminate the credentials of any employee upon their Termination of Employment.

Access to Customer Application Environment

Customers may request the Hosting Manager, Project Manager, or other Agilaire personnel approved by the Hosting Manager to access the AirVision system through regular client access for support or project related work unless otherwise approved by the hosting manager (due to client version compatibility or similar issues). Such access must use the 'AirVision' vendor account (unless the customer has assigned specific credentials to the Agilaire staff member, in which case those should be used). No access shall be made without written (email or letter) request from the customer, with a description of the scope of work to be done.

No customer reportable data shall be modified without the written consent of the customer AND approval of the Hosting Director or the President. The preference is always that customers should be directed as to procedures of how to change their own reportable data first, and having Agilaire modify reportable data is a special, unique, and rare circumstance.

Routine Server Check Procedure and Backup Verification

A single Agilaire employee (with one backup) is assigned access to each hosted server and performs weekly checks / verifications of the hosted servers.

- Check for any local disks are low on free disk space, if found escalate to Hosting Manager
- Check for / apply definition updates for antivirus program
- Check for / apply any critical operating system updates , escalate to Hosting Manager if system restart is required
- Review the scheduled task status via the AirVision client, note and follow up on any failures related to the maintenance of the hosted system
- Confirm backup existence / completion on the hosted server and cloud repository

General Disaster Recovery Procedure

General steps for the restoration of a complete server failure are as follows:

1. Notify hosting partner of failure and request replacement server (within one hour of confirmation of complete server failure).
2. Replacement server stood up by hosting partner within 4 hours of notification (< 5 hours from confirmation).
3. Begin transfer of SQL database backup from cloud / alternate server backup.
4. Provide estimated time for restoration to Key Customer Contact.
5. While awaiting transfer, complete server deployment steps per Base Server Configuration noted earlier in this document.
6. Restore SQL database from completed backup transfer.
7. Test and confirm polling functionality, remote client connectivity.
8. Notify customer of server restoration, with any required changes for Client connectivity.
9. Verify Client connectivity from customer.
10. Provide DR report via email to Key Customer Contact.

Annual Disaster Recovery Representative Testing

Recovery Point Objective (RPO) and Recovery Time Objective (RTO) times will be tested with an RPO goal of less than 12 hours, and an RTO time of less than 48 hours. Testing is performed with a Participating Customer as a full test of restoration of remote connectivity with remote monitoring sites, Client access, etc.

Test Procedure

1. The failure of the server will be simulated by having our hosting partner (Internap) commission a new server. However, the response time of a 'new purchase' web server and an 'emergency restore per SLA' are not the same, so the time to new server readiness will be assumed to be 4 hours, the maximum per Internap's SLA

(<https://iweb.com/legal/hardware-replacement>)

2. Because of licensing restrictions on SQL Server, we are unable to load the license used on the production server as part of the simulation (to use the existing SQL license in compliance we would have to take down the production server to perform the test and uninstall the current license, causing an undesirable outage). We instead will use a SQL license provided by the hosting provider, which will be preinstalled. Thus, the time to copy installation files and load SQL server on the test server will also be simulated and assumed to be 1 hour.
3. Agilaire will document the start time of the test with a screenshot showing the list of installed programs (showing that AirVision is not installed) and of the SQL databases list (showing only default SQL system databases are in place). From that point (with the RTO clock now at 5 hours), Agilaire staff will configure the server (load AirVision, configure SQL settings and access, restore the backup, test polling functionality). This process is expected to take 2-8 hours, mostly spent downloading the backup from the cloud server.
4. Concurrent to this work, we will send the new server IP and instructions on how to set the Client to log into the Recovery Test server, and we will test Client connectivity from our office (Note, during a normal, non-simulated restore, the replacement server should have the same IP, and no change would be required by Participating Customer staff).
5. Before the Recovery Test server is fully enabled, the AirVision service on the production server will be temporarily stopped to avoid polling 'collisions' on the modems / loggers.
6. Once the restore is complete and verified, we will issue an email to Participating Customer staff that the server is ready for login. That point in time will mark the end of the test and the RTO measured. Participating Customer staff should at that point, or within an hour, verify Client login.
7. Backpolling of data from the sites will be verified to confirm RPO goals (backpolling expected to take < 2 hours). Backpolling will be documented with a % availability reporting showing full data capture during the outage. Note that any sites/parameters that were not being collected before the test will be excluded from consideration, and that the RPO excludes any QA / user data edits that took place on data since the last backup (since QA activities are seldom 'real time' on current data).
8. Once RPO goals are confirmed, polling will be disabled on the Recovery Test server, and the AirVision service re-enabled on the production server. We assume outage of the production server to be two hours or less.

9. Participating Customer staff will confirm acceptance of RTO and RPO testing within one week, and the Recovery Test server will be decommissioned.

Security Incident Procedures

In the event of a suspected security incident, the incident must be immediately reported to the Hosting Director, or to the President in his absence. The report should include the affected customer / server, the type of suspected security breach, the time of discovery, the time of the suspected breach (if known), and any logs, details, or other evidence.

At the time of the incident, passwords to the compromised system should be changed and re-distributed to associated staff in secure form (ideally in person or verbally on phone, not in email form).

The incident will be immediately reviewed by the Hosting Director (or the President in his absence), and if a breach has been confirmed, the Customer Key Contact shall be notified within 1 hour with a preliminary incident report. An investigation will commence, and once it is known that all necessary evidence has been collected and a conclusion is made regarding the method and source of the breach (if any), mitigation procedures will be put in place.

Once the mitigation procedures are in place, the Hosting Director will also notify the Customer Key Contact with this information, along with any other results of the investigation.

The investigation may continue as needed, with a final report provided to the Customer Key Contact upon completion. Where possible, this final report shall be submitted within 30 days of the incident.

The Customer Key Contact should be consulted at each stage to determine if any involvement by local, state, or federal law enforcement authorities is warranted.

More details are listed on the Company file server, under \Customer Hosted Systems\ Policies\ Incident Response Plan.

Security Incident Annual Drill

The Hosting Director shall rehearse an Annual Security Incident Drill with all employees responsible for customer service checks, the content of drill developed each year by Hosting Director. Each employee will sign a form confirming their involvement in each Drill, and the report shall be provided to the President.

Product Update Procedures

Version updates to the AirVision system shall be made in accordance with each individual hosting contract, subject to each customer's preference for update frequency, and only after authorization by the Customer Key Contact. In the event of an update to resolve a discovered security issue, the customer is immediately informed and encouraged to authorize the update as soon as possible.

Any 'test' code, debugging code, or non-production logging code shall be removed before object code is built for any release.

All updates shall be downloaded only from the Agilaire Software Release Library server.

Product Issue Notifications Procedures

All hosted customers will be on the Agilaire Newsletter email, which provides notification of new releases, links to release notes, and emergency notification of significant / time sensitive issues. Non-critical issues will be documented in the release notes posted on the web site and referenced in the newsletter.

Any issues identified that are specific to an individual hosted customer will be addressed to the Customer Key Contact within 3 days of identifying the issue, or less than 1 day for critical issues that could involve data loss.

Vulnerability Recommendation Scans

The security suite utilized by Agilaire for hosted servers (if part of hosting agreement) provides regular automated checks for recommended changes to existing security policies based on TrendMicro's best practices procedures. Where applicable, recommendations are automatically applied by the suite to provide protection as quickly as possible. Notifications are sent in the event of a change requiring user intervention and the Hosting Director addresses the issue. Scheduled Recommendation scans can be set to run and provide a status report at specified intervals if so deemed by the hosting agreement.

Server Decommissioning

Server decommissioning orders are entered with our hosting partner by the Hosting Director, and the Hosting Director shall confirm with the hosting partner compliance with stated procedures (three times overwrite with random patterns or physical shredding of drives by industrial shredder).

Management of Customer Data Duplicated for Testing

If specified by the hosting agreement, any copies of the customer database duplicated for testing shall be deleted within 14 days after completion of the support incident. Database exports *with configuration only* (and no customer operational data) are not considered sensitive data, unless dictated by the hosting contract, and are not be subject to this restriction.

Product Development / Quality Control Policy

Agilaire, LLC's written system development methodology and quality control procedure includes the following:

- Alpha testing
- Beta testing with at least two customers utilizing features that are critical for operation and reflect functions that have been modified since the last release.
- Pre-Release testing for functionality issues, malicious code, or security flaws.

Agilaire Development / File Server Security Policy

Purpose

The purpose of this policy is to establish standards for the base configuration of internal server equipment that is owned and/or operated by Agilaire, LLC. Effective implementation of this policy will minimize unauthorized access to Agilaire, LLC proprietary information and technology.

Scope

This policy applies to server equipment owned and/or operated by Agilaire, LLC, and to servers registered under any Agilaire, LLC owned internal network domain.

Ownership and Responsibilities

All internal servers deployed at Agilaire, LLC must be owned by an operational group that is responsible for system administration. Approved server configuration guides must be established and maintained based on business needs and approved by Agilaire, LLC .

Addition, removal, or configuration changes for production servers must follow the appropriate change management procedures (\Customer Hosted Systems\Change Management Policy).

General Configuration Guidelines

- Operating System configuration should be in accordance with approved Agilaire, LLC guidelines.
- Services and applications that will not be used must be disabled where practical.
- Access to services should be logged and/or protected through access-control methods.

- The most recent security patches must be installed on the system as soon as practical, the only exception being when immediate application would interfere with business requirements.
- Trust relationships between systems are a security risk, and their use should be avoided. Do not use a trust relationship when some other method of communication will do.
- Always use standard security principles of least required access to perform a function.
- Do not use root when a non-privileged account will do.
- If a methodology for secure channel connection is available (i.e., technically feasible), privileged access must be performed over secure channels, (e.g., encrypted network connections using SSH or IPSec).
- Servers are specifically prohibited from operating from uncontrolled cubicle areas.

Monitoring

- All security-related events on critical or sensitive systems must be logged and audit trails saved with a buffer size of 2GB set (oldest records will be overwritten when max retention size limit is reached).
- Security-related events will be reported to Agilaire, LLC , who will review logs and report incidents to IT management. Corrective measures will be prescribed as needed. Security-related events include, but are not limited to:
 - Port-scan attacks
 - Evidence of unauthorized access to privileged accounts
 - Anomalous occurrences that are not related to specific applications on the host.

Compliance

- Audits will be performed on a regular basis by authorized Agilaire, LLC members.
- Audits will be managed by the internal audit group or Agilaire, LLC. Agilaire, LLC will filter findings not related to a specific operational group and then present the findings to the appropriate support staff for remediation or justification.
- Every effort will be made to prevent audits from causing operational failures or disruptions.

Enforcement

Any employee found to have violated this policy may be subject to disciplinary action, up to and including termination of employment.

Network Security Policy

Agilaire, LLC follows the following processes to prevent Network Security issues:

- We maintain network logs and generate exception reports to monitor unacceptable or restricted transactions, correcting or reversing entries, unsuccessful attempts to access restricted information on the site.
- We have network safeguards including intrusion detection software and backup and recovery processes.
- We have a firewall installed and configured on the network, controlled by our firewall administrator.
- We have written procedures for user ID and password management.

- Secure areas of our website require a login ID and password.

Annual Review of Hosting Procedures

These policies must be reviewed annually by the Hosting Director and the President and a revised document must be published each year, dated, and re-signed by all participating Agilaire personnel.

Audit Policy

The purpose of this policy is to ensure all servers deployed at Agilaire, LLC are configured according to the Agilaire, LLC security policies. Servers deployed at Agilaire, LLC shall be audited at least annually and as prescribed by applicable regulatory compliance.

Audits may be conducted to:

- Ensure integrity, confidentiality and availability of information and resources
- Ensure conformance to Agilaire, LLC security policies

Policy

Agilaire, LLC hereby provides its consent to allow its designated Internal or External Audit firm to access its servers to the extent necessary to allow the Audit firm to perform scheduled and ad hoc audits of all servers at Agilaire, LLC

Specific Concerns

Servers in use for Agilaire, LLC support critical business functions and store company sensitive information. Improper configuration of servers could lead to the loss of confidentiality, availability or integrity of these systems.

Guidelines

Approved and standard configuration templates shall be used when deploying server systems to include:

- Host security agent such as antivirus shall be installed and updated
- Network scan to verify only required network ports and network shares are in use
- Verify administrative group membership
- Conduct baselines when systems are deployed and upon significant system changes
- Changes to configuration template shall be coordinated with approval of change control board

Responsibility

The designated Audit Firm shall conduct audits of all servers owned or operated by Agilaire, LLC. Server and application owners are encouraged to also perform this work as needed.

Relevant Findings

All relevant findings discovered as a result of the audit shall be listed in the Agilaire, LLC tracking system to ensure prompt resolution or appropriate mitigating controls.

Ownership of Audit Report. All results and findings generated by the designated Audit Firm's team must be provided to appropriate Agilaire, LLC management within one week of project completion. This report will become the property of Agilaire, LLC and be considered company confidential.

Enforcement

The designated Audit Firm shall never use access required to perform server audits for any other purpose. Any employee found to have violated this policy may be subject to disciplinary action, up to and including termination of employment.

3. Incident Response Plan

In accordance with industry 'best practices' and to comply with numerous compliance regulations, Agilaire has implemented various procedures, policies and guidelines in order to protect the confidentiality, integrity and availability (CIA) of their critical client data and their computing resources. This Incident Response Plan is one such procedural document intended to prepare Agilaire to address security incidents. This plan will help Agilaire prepare for adverse security incidents and ultimately help to manage and minimize risk.

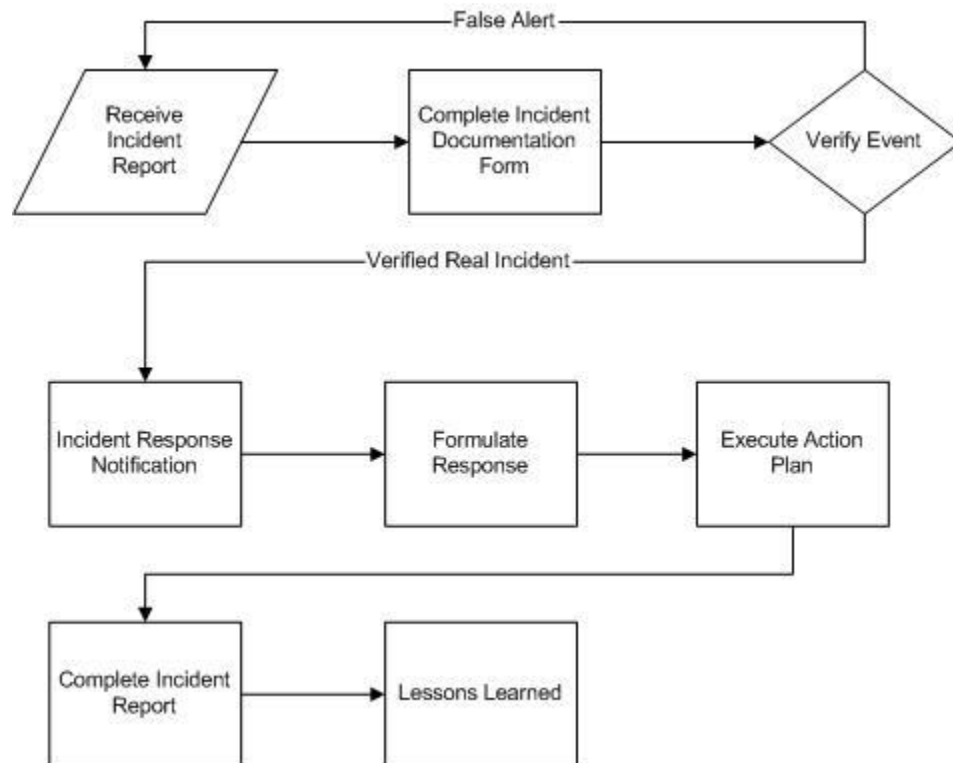
It is anticipated that as new technologies and new requirements are introduced this document will need to be modified and should be reviewed at least annually.

Incident Response Plan Overview

There are many different security incidents that can occur with assorted severity levels and not all incidents will require focus on each step. However it is important to be prepared and understand that typically different phases exist in responding to an incident, and the goals and objectives of each phase. The different phases of a security incident response plan at Agilaire are as follows:

- Identify / Verify an Event Occurrence
- Formulate Response
- Execute Action Plan
- Complete Incident Report

- Lessons Learned



Identify / Verify an Event Occurrence

Awareness that a security incident has occurred can originate from different sources such as technical people, end users or even clients.

Best practices suggests to declare that an incident has occurred when system administrators (client side or vendor side) sense that an adverse risk to the system environment exists. It is also suggested to have multiple people involved early on, to save all key system files or records such as log files, and start detailed documentation as soon as possible.

Formulate Response

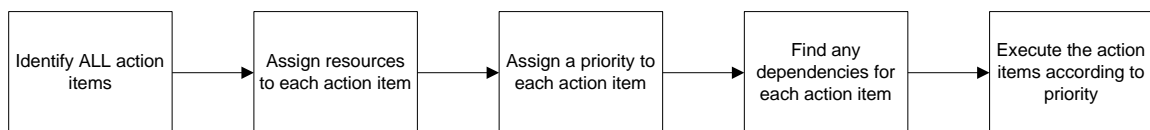
Ultimately, primary stakeholders (client and vendor) need to be involved in many security incidents to decide what the goals are in handling a particular incident, such as immediate business recovery or forensic examination.

Is there a permanent or temporary action that can be taken to mitigate the vulnerability that was exploited? This can be in the form of a security patch that can be applied. Or, as a temporary solution, applying network access controls to prevent remote exploits.

Basic steps to consider include:

- Obtain and analyze as much system information as possible including key files and possibly a backup of the compromised system for later forensic analysis.
- Isolate the system or files to facilitate containment and forensic activity.

- If one machine has been exploited others might be vulnerable. Actions that might need to be taken on a large scale may include:
 - Download security patches from vendors
 - Update antivirus signatures
 - Close firewall ports
 - Disable compromised accounts
 - Run vulnerability analyzers to see where other vulnerable hosts are
 - Change passwords as appropriate



Action Item Template

Action Item	Priority	Dependencies	Resource	Result

During the identification and prioritization of the action items, use the format of the template using LOW, MEDIUM and HIGH as the priority scale.

Execute Action Plan

Following basic procedures can contain many incidents. Specific procedures will frequently depend on the nature of the incident, as well as the direction of the primary stakeholders.

Once the “action items” are identified for the response strategy, consider the impact of these actions to the business:

- Do any of the action items require the interruption of business operations?
- Do any of the action items require corruption of confidential customer data?
- Do any of the action items prevent the further compromise of data?

The response to such questions should be presented to the primary stakeholders that own the affected systems, databases or networks to determine which course of action should be taken.

The goal is to return safely to production. Once again, specific actions might depend on the nature of the incident as well as the direction of the primary stakeholders. Key considerations include:

- Retest the system preferably with a variety of end users.
- Consider timing of the return to production.
- Discuss customer notification and their concerns
- Continue to monitor for security incidents

Complete Incident Report / Lessons Learned

This phase is to allow the primary stakeholders to better handle future security incidents. A final report should be written describing the incident and how it was handled using the Incident reporting form. Suggestions for handling future incidents and reworking this document should be included in this report.

Contact information

1. Personnel that might assist in handling an incident
2. Key partners who may need to be notified
3. Business owners to make key business decisions
4. Outside support analysts with security expertise

Additional service provider contacts