



DEPARTMENT OF
ECOLOGY
State of Washington

Air Monitoring Site Selection and Installation Procedure

November 2019

Publication 16-02-021

Publication and Contact Information

This report is available on the Department of Ecology's website at:

<https://fortress.wa.gov/ecy/publications/summarypages/1602021.html>

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Air Monitoring Site Selection and Installation Procedure

November 2019

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1. Introduction

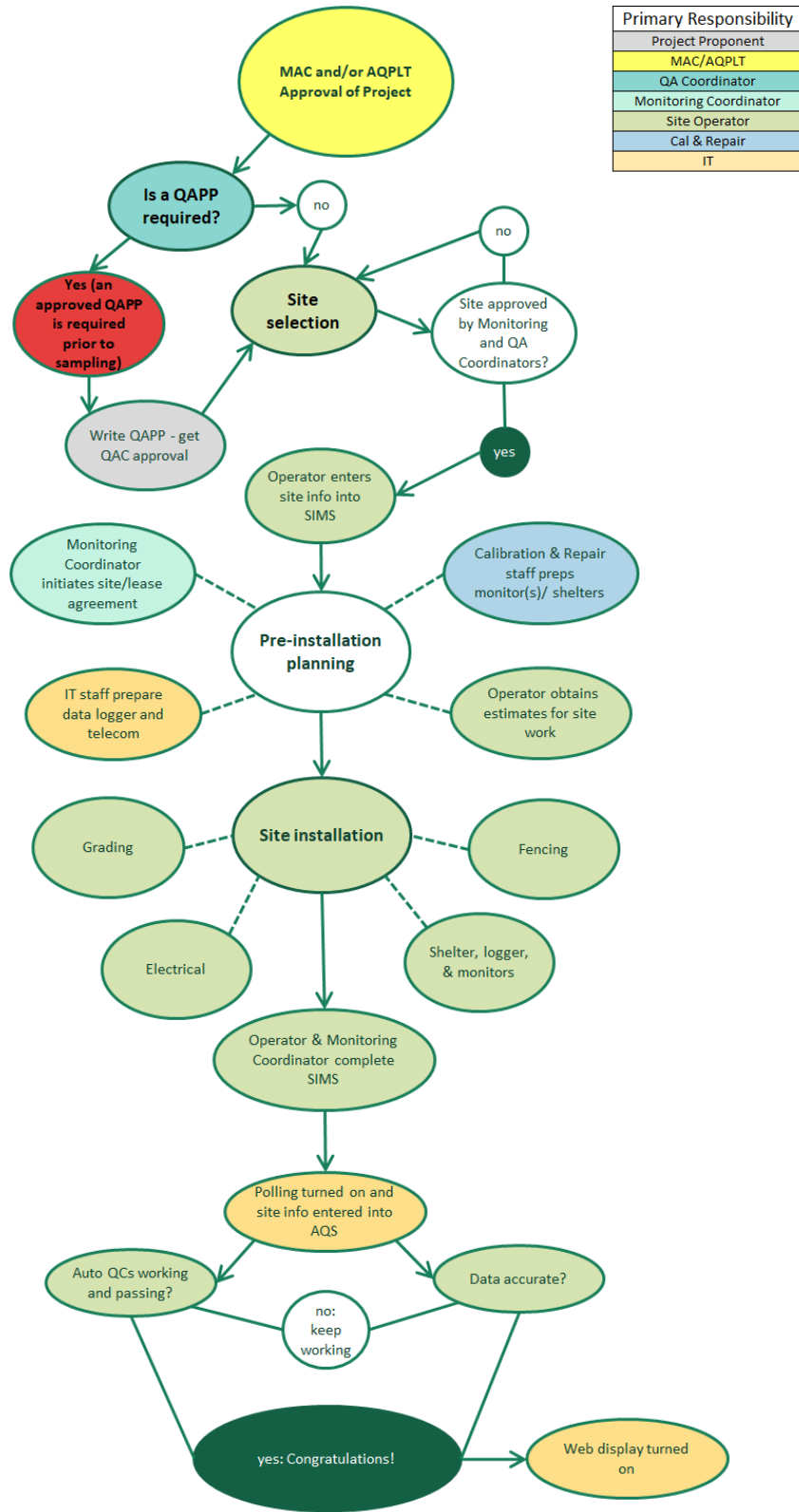
The Air Quality Program is responsible for implementing and maintaining the Washington State Ambient Air Monitoring Network (Washington Network). The Air Quality Program (AQP) mission is to enhance and protect air quality in Washington State. A key strategic goal for the program is to identify, prevent, and reduce air pollution. Pursuant to the AQP's mission and strategic goal, the Washington Network is designed to provide data of sufficient quality to do all of the following tasks:

- Determine if air quality is meeting the National Ambient Air Quality Standards (NAAQS)
- Provide near-real-time air quality information for the protection of public health
- Forecast air quality
- Make daily burn decisions and curtailment calls
- Assist with permitting activities
- Evaluate the effectiveness of air pollution control programs
- Evaluate the effects of air pollution on public health
- Determine air quality trends
- Identify and develop cost-effective pollution control strategies
- Evaluate air quality models

In order to ensure that the Washington Network continues to meet the needs of the Air Quality Program, new monitoring proposals must be reviewed and receive advance approval prior to the beginning of any sampling.

This procedure describes the process for selecting, and installing monitoring sites within the Washington Network and defines the roles and responsibilities for the organizational positions responsible for managing and implementing the Washington Network. It is designed to be used by all Washington Network partners including Ecology, local air agencies, federal agencies, and tribal nations. This procedure does not address emergency monitoring for wildfires or using E-Samplers for short-term (less than 3 months) monitoring projects outside of wildfire season. The process for that monitoring is described in Air Quality Program policies AAM 1a and AAM 1b available on the Air Quality Program's Monitoring Advisory Committee (MAC) SharePoint site.

The flow of a monitoring project from approval to data collection is presented in Figure 1 below.



Primary Responsibility
Project Proponent
MAC/AQPLT
QA Coordinator
Monitoring Coordinator
Site Operator
Cal & Repair
IT

Figure 1: Air Monitoring Project Flow Chart

2. Roles and Responsibilities

The following section describes the roles & responsibilities of staff in the Air Quality Program and its partner agencies in relation to the selection and installation of monitoring sites and measured parameters.

2.1. Monitoring Advisory Committee

The Monitoring Advisory Committee (MAC) is Ecology's advisory body for Washington Network monitoring efforts. The role of the MAC is to plan the effective and efficient design and implementation of the Washington Network to help the AQP achieve its strategic goals. The AQP Strategic Plan 2020 set goals to Identify, Prevent, and Reduce Air Pollution and ensure Progressive Management and Effective Leadership.

The MAC meets bi-monthly and is comprised of AQP managers and staff. In addition to evaluating monitoring project proposals, the MAC assesses current and future monitoring needs, identifies communities where monitoring may be needed, and specifies data quality objectives for monitoring projects where federal DQOs have not been established. The MAC is empowered by the Air Quality Program Leadership Team (AQPLT) to approve/reject monitoring proposals within the Washington Network. While the MAC is authorized to make monitoring project decisions, the allocation of resources to carry out approved projects is the purview of AQPLT. The AQP Manager has ultimate approval authority for monitoring projects within the Washington Network.

The MAC charter provides additional detail on its role and decision making processes and can be found on the Air Quality Program's SharePoint site.

The MAC is comprised of the following AQP personnel:

- Executive sponsor: Deputy Program Manager
- AQPLT Lead: Technical Services Section Manager
- MAC Meeting Lead: Air Monitoring Coordinator
- Team members:
 - Science & Engineering Section Manager
 - Quality Assurance Coordinator
 - CRO Representative*
 - ERO Representative*
 - NWRO Representative*
 - State Implementation Plan Representative*
 - Modeling/Meteorology Representative*

- Data Analyst*
- Air Monitoring Operator*

*Managers have flexibility to rotate MAC representation amongst staff. To ensure reasonable continuity, these positions should be rotated amongst staff at a frequency of no less than 1 year.

2.2. Monitoring management and personnel

The implementation of the statewide air monitoring network is the work of a statewide team of personnel, including Air Quality Program managers and staff as well as station operators from local and federal air agencies and tribal nations.

A brief description of the roles and basic responsibilities of key Washington Network Personnel is presented below. Unless otherwise noted, personnel are Air Quality Program employees.

Deputy Program Manger

- MAC Executive Sponsor
- Supervises the Technical Services Section Manger and Eastern Regional Office Section Manager

Eastern Regional Office Section Manager

- Supervises Eastern Regional Office (ERO) monitoring operators

Technical Services Section Manager

- AQPLT Lead for MAC
- Supervises the Air Monitoring Coordinator
- Supervises the Quality Assurance Coordinator/SWRO & Air Quality Operations Unit Manager
- Supervises IT Unit Manager
- Manages statewide air monitoring budget

Northwest Regional Office Section Manager

- Supervises Northwest Regional Office (NWRO) monitoring operators

Air Monitoring Coordinator

- MAC Meeting Lead

- Serves as the point of contact for new monitoring requests
- Approves site and shelter rental agreements
- Writes contracts for air monitoring/QA/Telemetry System support in coordination with QA Coordinator and IT Unit Manager
- Writes and submits annual network plan to EPA
- Reviews and approves site locations in coordination with QA Coordinator
- Reviews and approves standard operating procedures (SOPs)
- Manages federal air monitoring grants
- Completes site documentation in SIMS prior to beginning sampling
- Researches and coordinates the evaluation of new air monitoring technology

Quality Assurance Coordinator/SWRO & Air Quality Operations Supervisor

- Reviews and approves Washington Network Quality Assurance Plan, special study Quality Assurance Project Plans, and SOPs
- Supervises Calibration & Repair Laboratory staff
- Supervises SWRO air monitoring operator
- Supervises Quality Assurance staff
- Supervises the Air Quality System (AQS) Coordinator

Calibration & Repair Laboratory staff

- Maintain equipment inventory
- Calibrate, maintain, and repair Washington Network monitors and equipment
- Evaluate, select, and acceptance test new monitoring equipment for use in the Washington Network
- Provide technical assistance to site operators on the installation, operation, calibration, maintenance, and repair of Washington Network monitors and equipment
- Write standard operating procedures (SOPs)

Quality Assurance staff

- Conduct independent performance evaluations (audits)
- Conduct site evaluations to ensure siting criteria are consistent with monitoring objective

- Conduct final level validation of ambient air monitoring data
- Write SOPs
- Conduct special monitoring projects
- Evaluate air monitoring equipment
- Maintain Quality Assurance laboratory and standards (separate from operations)

Information Technology staff

- Configure and maintain the Washington Network telemetry system, web sites and communication network including the following:
 - Central servers and databases configuration, procurement and maintenance
 - Data logger hardware and software configuration, procurement and maintenance
 - Telecommunication network, contracts, services, configuration, hardware and software procurement and maintenance
 - Ambient air monitoring and associated metadata backup
 - Public ambient air quality data website configuration, hardware and software procurement and maintenance
- Define, implement and maintain security practices for data, data loggers and other equipment, the telecommunication network and servers.
- Define procedures for requesting IT and Washington Network related services including use of the Site Information Management System (SIMS)
- Submit air monitoring, quality control, and performance audit data to EPA
- Eastern Regional Office Section Manager
- Supervises Ecology Eastern and Central Region air monitoring staff

Air monitoring site operators (Ecology, partner agencies, and tribes)

- Work with Air Monitoring Coordinator to identify and establish monitoring locations
- Obtain quotes for services (electrical, fencing, site grading) related to ambient air monitoring stations
- Install monitoring sites/shelters/equipment
- Complete site documentation in SIMS
- Operate monitors/sites
- Perform routine maintenance
- Perform minor repairs

- Routinely review QC results
- Conduct preliminary level validation of air monitoring data
- Maintain monitoring sites (remove debris, cut grass, control weeds, keep shelter clean and dry)
- Write SOPs

3. Quality Assurance Project Plans

EPA requires that all projects funded by EPA involving the generation, acquisition, and use of environmental data are planned, documented, and have a Quality Assurance Project Plan (QAPP) that is approved by Ecology's Quality Assurance Officer. Because of the EPA mandate, Ecology has implemented a mandatory requirement to prepare QAPPs for all projects generating and/or interpreting environmental data. Ecology formalizes this requirement in Ecology Policy 1-21, "Establishing Quality Assurance."

Ecology policy requires that all monitoring project QAPPs must be reviewed by the program's Quality Assurance Coordinator (AQP QAC) and receive the QAC's approval prior to the beginning of any environmental sampling/monitoring.

The QAPP is the critical planning document for any environmental data collection operation as it documents how quality assurance and quality control activities will be implemented during the project's life cycle. It serves as a blueprint for site operators, project officers, and program managers responsible for designing, coordinating, and implementing air pollution monitoring projects and provides the foundation to ensure that the data collected during the project will be the correct type and of adequate quality for intended uses.

Ecology follows EPA's graded approach to writing QAPPs, meaning that project managers must consider the scale and potential impacts of each project when working with the Quality Assurance Coordinator (QAC) to determine the appropriate level of detail and appropriate data quality objectives contained in the QAPP. Find more information on the graded approach to QAPPs in Ecology's Quality Assurance Plan.

The majority of new projects/sites aimed at determining NAAQS compliance, providing near-real-time PM_{2.5} data via correlated nephelometers, or measuring meteorological parameters do not require a separate QAPP. These types of monitoring activities are routine in nature and are already fully addressed by Ecology's existing Quality Assurance Plan and Standard Operating Procedures. Unique projects funded either entirely, or in part, by Ecology or via Ecology pass-through of EPA funds, and that fall outside the scope of the Quality Assurance Plan and SOPs, will require a project-specific QAPP.

Project managers must consult with the AQP QAC to determine if a QAPP is required for a new monitoring project.

If the AQP QAC determines a QAPP is required, the AQP QAC will work with the project manager to determine the appropriate level of QAPP detail (i.e., the grade of the Graded Approach) and provide timely review of the QAPP.

4. Information Technology Requirements for Monitoring Projects

All fixed monitoring sites within the Washington Network are equipped with TCP/IP-addressable, PC-based, data loggers. All data loggers are connected to a central data acquisition system (central system) that polls the loggers every hour for air monitoring data. The responsibility for IT in Washington State resides with the Washington Technology Solutions (WaTech) Office of the Chief Information Officer (OCIO). All statewide IT policies, standards, and guidelines apply to Ecology, local air agencies, and other Washington Network partners and their respective staff. In the Air Quality Program, the IT and Telemetry Unit implements and maintains the requirements of the OCIO and the Department of Ecology.

All monitoring projects within the Washington Network require data collection, storage, web display, and records retention. It is the responsibility of the project manager to alert the Air Quality Program Information IT Unit Manager as soon as a project receives MAC/AQPLT approval in order to ensure:

- Ample time and funding exists to acquire all data collection equipment and software
- Data collection, storage, retention, and web display processes flow as smoothly as possible

The project manager or their designated site operator must update the Site Information Management System (SIMS) as soon as a monitoring site has been selected. Find additional information on SIMS in Section 7 of this document.

5. Site Selection

All new projects that have been approved by the MAC/AQPLT are required to go through the site selection process described below. The remaining sections of this document describe the process for selecting appropriate monitoring locations, installing monitoring stations, and maintaining the Site Information Management System (SIMS).

5.1. Monitoring objectives

Having a well-defined monitoring objective is critical to ensuring that projects are well-planned, cost-effective, and result in data of known and appropriate quality for intended uses. EPA defines three broad objectives for ambient air monitoring, each of which is important and must be considered individually:

- To provide air pollution data to the general public in a timely manner
- To determine compliance with National Ambient Air Quality Standards (NAAQS) and emissions strategy development
- To support air pollution research

Pursuant to these broad categories, EPA defines six primary monitoring objectives.

1. Determine the highest concentrations expected to occur in the area covered by the network
2. Measure typical concentrations in areas of high population density
3. Determine the impact of significant sources or source categories on air quality
4. Determine general background concentration levels
5. Determine the extent of regional pollutant transport between populated areas; and in support of secondary standards
6. Measure air pollution impacts on visibility, vegetation damage, and other public welfare-based impacts

EPA's monitoring objectives are not all inclusive; there may be other valid monitoring objectives.

5.2. Monitoring spatial scales

Monitoring sites must be located such that the spatial scale represented by the monitor aligns with the monitoring objective. Sites in the Washington Network fall into one of the EPA's five spatial scale categories listed below:

- **Micro:** Concentrations associated with area dimensions ranging from several meters up to about 100 meters.

- **Middle:** Concentrations typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometer.
- **Neighborhood:** Concentrations within an extended area that has relatively uniform land use with dimensions in the range of 0.5 to 4.0 kilometers.
- **Urban:** Overall, citywide conditions with dimensions on the order of 4 to 50 kilometers. This scale would usually require more than one site for definition.
- **Regional:** Usually a rural area of reasonably homogeneous geography that extends from tens to hundreds of kilometers.

Table 1 illustrates the relationship between the primary monitoring objectives and appropriate spatial scales.

Table 1: Appropriate spatial scales for monitoring objectives

Monitoring Objective	Appropriate Siting Scale
Highest concentration	Micro, Middle, Neighborhood
Population	Neighborhood, Urban
Source impact	Micro, Middle, Neighborhood
General/background & regional transport	Urban, Regional
Welfare related	Urban, Regional

5.3. Factors in Choosing a Monitoring Location

Washington Network monitors used to determine compliance with the NAAQS and for reporting near-real-time levels of criteria pollutants are sited in accordance with the pollutant-specific criteria described in detail in 40 CFR 58, Appendices D and E and in Ecology’s instrument-specific SOPs. Washington Network meteorological sites are required to meet PSD-quality specifications and are selected and installed in accordance with the specifications of Ecology’s Meteorological Monitoring SOP and EPA’s 1987 Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD) publication.

Additional information on locating monitors can be found through EPA’s technical assistance documents on NAAQS compliance monitoring. These documents can be accessed through EPA’s online Air Monitoring Technical Information Center (AMTIC).

When selecting a monitoring location, special attention should be given to the following:

- Suitability of the location to yield representative data that meets the monitoring objective. Considerations for suitability include:
 - Spatial scale—whether the scale is appropriate for the monitoring objective
 - Topography—how terrain or obstructions may impact concentrations
 - Pollutant considerations – influence from nearby sources
 - Atmospheric conditions – how wind patterns around the site affect sampling
- Safety of the site operator and QA personnel at the proposed location. Important items to consider include:
 - Security/safety of ladders for rooftop monitoring installations. Ground-level sites are preferred over rooftop installations. Rooftop sites will only be considered if no suitable ground-level site is available.
 - All fixed ladders must meet Occupational Safety and Health Administration safety requirements.
 - Step ladders must be appropriate for the height of the rooftop and weight of the site operator and light enough to be manageable for staff of varying physical stature and strength.
 - Slip hazards should be identified.
- Security of the site, instruments, and equipment:
 - Proper fencing or other barriers to vandalism/theft should be available or possible to install.
 - Ladders required to access the site should be secured against unauthorized access.
- Logistics. Logistical considerations include:
 - Ease of site access. Operators should consider whether access is limited to certain days or hours and if personnel associated with the property must be present for operators to access the site.
 - Power availability. Operators should consider the cost and timeframe associated with installing power in locations where not already available.
 - Telecommunications. If the location is not covered by Ecology’s standard cellular service provider, special telecommunications arrangements will be needed.
 - Building considerations:
 - If the site will make use of an existing building, the room or shelter must be clean, dry, and maintained at a consistent temperature between 20 and 30 degrees C.
 - If a new shelter will be installed, the location must be able to accommodate a shelter of appropriate size and dimensions for the monitoring equipment.

- Cost. The most cost effective option(s) that meet the monitoring objective(s) should be identified.

5.3.1. Finding an appropriate site

The Air Monitoring Coordinator will assist the project manager or designated site operator in finding an appropriate site that meets the monitoring objective(s) through:

- The use of online mapping software such as Google or Bing Maps
- Evaluation of available modeling data in concert with Ecology modelers
- In person visits to potential sites identified through online tools

Once an appropriate site has been identified, the project manager should work with the Air Monitoring Coordinator to contact property owners to obtain permission to use land/facilities. The Air Monitoring Coordinator can arrange any necessary evaluations of proposed site installations (e.g., obtaining an engineering assessment for a rooftop met tower).

Site operators must provide basic site location information (e.g., address, latitude and longitudinal coordinates) to the Air Monitoring and Quality Assurance Coordinators via email prior to any site installation. The Air Monitoring and Quality Assurance Coordinators will review and approve locations that meet siting criteria and are consistent with stated monitoring objectives of proposals approved by MAC.

Once an appropriate site location has been approved, the Air Monitoring Coordinator will work with the property owner to establish a rental agreement and arrange for payment of rent if necessary.

The site operator responsible for installing the site will evaluate the proposed location for compliance with the siting criteria defined in 40 CFR 58, Appendices D and E for the specific pollutant(s) being monitored.

6. Site Information Management System

EPA requires states to keep records on monitoring location metadata such as address, geographic information (lat/longs, elevation), land use types, etc. To satisfy this requirement and to characterize sites and monitored parameters through time, the Air Quality Program uses the Site Information Management System (SIMS). SIMS is the repository for all site and parameter information that is needed to meet EPA reporting requirements. The information in SIMS is used by IT staff to properly configure data loggers and the central data acquisition system (i.e., the telemetry system). SIMS is also used by the Air Quality System (AQS) Coordinator to provide required information to EPA and allow for the submittal of data from Ecology's telemetry system to EPA's AQS. SIMS also serves as the air monitoring and IT equipment inventory which satisfies state and federal requirements for equipment tracking.

SIMS site information is updated by station operators whenever a site is established or discontinued and as monitored parameters and/or physical conditions at the site change. IT and Calibration & Repair staff maintain the Equipment Inventory portion of SIMS.

SIMS includes:

- Site Information (address, physical location, type of monitoring site, probe information, monitored parameters)
- Monitor/station type (SLAMS, NCore, Near-road, SPMS)
- Instrumentation and methods (pollutant being measured, equipment manufacturer's make and model, etc.)
- Measurement scale (micro, middle, neighborhood, etc.)
- Land use (industrial, commercial, etc.)
- Location setting (urban, rural, etc.)
- Monitoring objective
- Telemetry and telecommunication information (central setup, data logger channel mapping)
- Physical location and characteristics (address, latitude and longitude coordinates, elevation, etc.)
- Probe location (top of building, ground level, etc.)
- Equipment inventory

In addition to SIMS, Ecology's Envidas ambient air monitoring website includes additional site information:

- Site photos, including the 8 compass cardinal point pictures (N, NE, E, SE, etc.)
- A Microsoft Bing map showing the location of all monitoring locations in the state
- Washington Air Quality Advisory (WAQA) information

7. Site Installation

Following the AQP Monitoring and QA Coordinator's approval of a site location, the project manager or site operator is responsible for:

- Completing the required site information in SIMS prior to data collection. IT staff will not configure sites or establish data collection in the central system until SIMS has been updated with the required basic site information.
- Contacting the SWRO & Air Quality Operations Unit supervisor to arrange for the acquisition of the instruments and equipment needed for monitoring. Prior notice of at least 60 days is required. Allow for additional time if new instruments or equipment is needed as instruments costing over \$10K typically require a competitive bidding process.
- Contacting the IT Unit Manager to acquire data logging and telecommunication equipment. Prior notice of at least 30 days is required.
- Obtaining bids and scheduling contractors for the following elements
 - Electrical. Electrical power must be installed by a licensed and bonded electrician.
 - Site grading
 - Fencing and any additional site security measures
 - Crane (e.g., for lifting monitors/shelters onto rooftops)
- Installing the shelter (if needed)
- Installing any necessary fencing or other site security needs
- Installing necessary safety equipment (e.g. mats to prevent slips)
- Installing adequate room/shelter temperature controls
- Installing sample line(s) and probe(s)
- Installing instruments and equipment (sampler platforms, pumps, data logger, modem, router, etc.)
- All Ecology IT security policies must be followed: No keyboards, mice, or monitors are allowed unless approved by Ecology's IT Unit Supervisor
- Conducting initial quality control checks on all monitors/sensors and ensuring that monitors are operating properly
- Confirming that Automated QC checks are occurring on the required schedule and that sequence phases are correctly programmed per the standard operating procedure to challenge the analyzer/monitor at the appropriate test levels and for the appropriate duration.
- Confirming that all quality control results are being properly captured by the logger and correctly reported to the EnvistaARM

- Confirming that diagnostic data are being correctly captured by the logger and correctly reported to the EnvistaARM

For Ecology-operated sites: Prior to scheduling contractors for fencing, electrical, and other site work, project personnel must work with their Purchasing Coordinators to ensure that all work complies with laws and agency contract rules.

Prior to site installation, IT staff will:

- Provide a data logger that has been set up according to the standard configuration for the parameters being measured. Among other pre-configured items, this includes:
 - All required Ecology IT security software
 - Data channel configurations
 - Diagnostic data polling
 - All automated quality control sequences and control limits
- Provide all telecommunications equipment

After the required site installation information is entered into SIMS by the operator staff will set up the monitors in the central telemetry system and AQS:

IT staff:

1. Ensure that results are being collected by the data logger
2. Ensure that all required diagnostic data are being polled
3. Ensure that the data logger is being polled by the central system

AQS Coordinator:

4. Assign an AQS ID number
5. Enter the site information in AQS
6. Turn on display of the site on the Washington Air Quality Advisory (WAQA) map



Figure 2: Electrical installation at the Tacoma-S. 36th St. Near-road location

8. Timeline

Many variables affect the time it takes to install a new site. Following approval of a project proposal, a typical site installation will take from 3 to 6 months to complete. Complicated projects (such as Near-road or NCore) may take longer. The addition of a single monitor at an existing site should be considerably shorter (days to weeks). Portable and temporary monitors, such as the E-Sampler, can be deployed much more quickly (though these instruments generally provide less accurate monitoring data than fixed site monitors).

Project managers and/or site operators planning to install a new site should allow sufficient time to complete the necessary elements of the installation. The following timeline provides a rough estimate for planning purposes. Many of these tasks can occur simultaneously:

Site selection process for MAC-approved projects

- Proposed site selection forms completed 15 days
- Air Monitoring Coordinator/QA Coordinator approval 15 days
- Establishment of site/lease agreement 60 days

Monitor/equipment procurement

- Existing monitors/equipment (i.e. already in house) 60 days
- New monitors/equipment 90
days or more

Telemetry and telecommunication setup

- Acquiring telecommunication services 30 days
- Configuring telemetry setup (after SIMS) 15 days
- Establishing data logger to analyzer communications (new manufacturer, new type of analyzer) 30-60 days
- Ordering new IT/telecommunication equipment 30-90 days

Site installation

- Site grading, electrical, shelter, fencing 30-60 days
- Monitor(s), sample line(s), and equipment 15 days
- Post installation quality control/troubleshooting 15 days

9. References

U.S. Environmental Protection Agency. Office of Air Quality Planning and Standards. *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)* EPA/450/4-87-07 May 1987

“Network Design Criteria for Ambient Air Quality Monitoring.” *Code of Federal Regulations* Title 40, Pt. 58, Appendix D, 2018 ed.

“Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring.” *Code of Federal Regulations* Title 40, Pt. 58, Appendix E, 2018 ed.

U.S. Environmental Protection Agency. Office of Air Quality Planning and Standards. *Quality Assurance Handbook for Air Pollution Measurement Systems Volume II: Ambient Air Quality Monitoring Program*. Research Triangle Park, 2017 (EPA-454/B-17-001).

U.S. Environmental Protection Agency. Office of Air Quality Planning and Standards. *Quality Assurance Handbook for Air Pollution Measurement Systems Volume IV: Meteorological Measurements Version 2.0*. Research Triangle Park, 2008 (EPA-454/B-08-002).