South Coast Air Quality Management District

Rule 1480 Monitoring and Sampling Plan Guidance

November 2019

Preface

South Coast AQMD Rule 1480 requires the owner or operator of a facility designated as a Metal Toxic Air Contaminant (Metal TAC) Monitoring Facility to conduct Monitoring and Sampling. The owner or operator of a Metal TAC Monitoring Facility is required to submit a Monitoring and Sampling Plan to the South Coast AQMD for review and approval. The Monitoring and Sampling Plan should describe in detail how Monitoring and Sampling will be performed and should describe detailed procedures needed to ensure that samples are collected, retrieved, handled, analyzed, and reported in a manner that satisfies the Rule 1480 requirements and meets the Quality Assurance requirements described in this Guidance.

Due to the highly technical nature of ambient air quality monitoring and sampling, South Coast AQMD staff recommends that a Metal TAC Monitoring Facility use third party contractors specializing in the field to submit the Monitoring and Sampling Plan and conduct the Monitoring and Sampling.

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1. Introduction

Per South Coast AQMD Rule 1480, facilities designated as Metal TAC Monitoring Facilities are required to conduct ambient air monitoring and sampling pursuant to subdivision (d). According to Rule 1480(d)(7), Metal TAC Monitoring Facilities are defined as facilities that have:

- Equipment or processes with Metal TAC emissions;
- Metal TAC emissions that are capable of being released into the ambient air;
- Been designated as a Potentially High Risk Level Facility under Rule 1402; and
- Metal TAC emissions which have been demonstrated to exceed a cancer risk of 100 in a million or a non-cancer chronic hazard index greater than 5.0 at a sensitive receptor location, using air dispersion modeling and the Risk Assessment Procedures referenced in Rule 1401.

No later than 30 days after a facility is designated as a Metal TAC Monitoring Facility, an owner or operator shall submit a draft Monitoring and Sampling Plan to the Executive Officer [Rule 1480(d)(9)(A) and (g)(1)(A)]. Once the Executive Officer approves the Monitoring and Sampling Plan, an approval letter will be provided to the owner or operator of a Metal TAC Monitoring facility, which will also set a start date for Monitoring and Sampling. The owner or operator of a Metal TAC Monitoring Facility should keep the approval letter with the approved Monitoring and Sampling Plan.

An owner or operator of a Metal TAC Monitoring Facility submitting a Basic Monitoring and Sampling Plan whereby a third party contractor conducts Monitoring and Sampling is required to submit **all** of the information listed in this Guidance document. An owner or operator of a Metal TAC Monitoring Facility submitting an Alternative Monitoring and Sampling Plan whereby the South Coast AQMD conducts Monitoring and Sampling is only required to submit information listed in Sections 2.1 through 2.4 and Section 4.1.

2. Facility Information

2.1 Facility Name

Provide the facility name and any aliases (DBA), include facility address and centralized telephone number. Also include the name or abbreviation if any that will be used throughout the Monitoring and Sampling Plan.

2.2 Facility Address

Provide company address and address where Monitoring and Sampling will take place if different than the company's main address.

2.3 List of Equipment

Provide a list of all equipment and processes that use or emit the Metals of Concern. For each piece of equipment or process, include the operating schedules, operating conditions, source test reports and/or emissions screening test reports.

If requested by the Executive Officer, include any other process or equipment information.

2.4 Map(s) of Facility

Provide map(s) of the facility that identifies the location of the following:

1. All equipment and processes listed in Section 2.3 above
2. Air pollution control devices and stacks
3. Buildings
4. Building openings, including but not limited to doors, windows, roof openings, vents, hoods that vent to the atmosphere
    a. Note the openings that are used for ingress or egress and its purpose (e.g. the movement of people, vehicles, equipment, etc.)
    b. If the building opening is generally closed, identify the closure mechanism (e.g. a roll-up door, plastic strip curtains, etc.)
    c. Identify any mechanical device(s) that facilitate the movement of air out of the building for each piece of equipment (e.g. a fan or blower)
5. Storage of any materials that contain Metals of Concern
6. Points of vehicle egress and ingress
7. Property boundary of the facility
8. Areas within property boundary that are publicly accessible
9. Nearest sensitive receptors in all directions within a quarter mile of the facility
10. Monitor locations
11. Wind monitor locations, if applicable

2.5 Project Manager

Provide the name and complete contact information for the person at the facility who will take responsibility for all Monitoring and Sampling activities and reporting requirements. One or more back-up person(s) should also be identified.

2.6 Project Organization

The Monitoring and Sampling Plan shall include an organizational chart or table identifying each person involved in the Monitoring and Sampling and their role. Include any third party contractors and laboratories conducting sample analysis.

It would be prudent to assign someone the role of the Quality Assurance (QA) Officer to oversee the implementation of the Monitoring and Sampling Plan including whether specified quality control (QC) procedures are being followed as described in this document. Ideally, this individual would not be involved in the data collection/analysis/interpretation/reporting process except in a review or oversight capacity.

According to Rule 1480(e)(1)(I), the Monitoring and Sampling Plan should include the company name(s), location, and contact information for the persons who will be conducting:

- Sample collection and sample retrieval
- Sample analysis
- Sample storage
- Maintenance of Monitoring and Sampling equipment
- Set-up of Monitoring and Sampling equipment

3. Monitoring and Sampling

Rule 1480(f) establishes the monitoring and sampling requirements for the Metal TAC Monitoring Facility which include the following activities (Please refer to Rule 1480 for the specific Monitoring and Sampling requirements):

- Conduct Monitoring and Sampling at a minimum of one site that is based on the maximum expected ground level concentration of the Metals of Concern. The designation letter would include information on the initial number, type, and approximate location of the Metal TAC monitor(s) and wind monitors required to conduct Monitoring and Sampling.
- Collect one valid sample at each sampler from midnight to midnight or on a timeframe approved by the Executive Officer, provided that the total sampling time at each site is no less than 23 hours and no greater than 25 hours, on a schedule of 1 in 3 days, and 1 in 6 days if a Reduced Basic or Reduced Alternative Monitoring and Sampling Plan is approved.
- Conduct sampling on a date specified in a written notice from the Executive Officer in lieu of a normally scheduled date that is an atypical sampling day due to fireworks, construction activity, or other atypical activities or events.

- Notify the Executive Officer within two hours of knowing a valid sample was not or will not be collected.
- Only one valid sample can be missed over a consecutive 30-day period for each monitor, unless the Valid Sample was not collected due to a mechanical failure, which includes a power outage.
- Record wind speed and direction, if applicable.

3.1 Siting of Samplers

At least one monitor location must be representative of the Maximum Expected Ground Level Concentration of Metals of Concern, taking into account logistical constraints. Depending upon a facility's size, layout, and/or equipment and process characteristics, more than one monitor may be required to accurately characterize the facility's emissions.

An owner or operator of a Metal TAC Monitoring may choose to site additional monitors beyond the minimum required by Rule 1480. For example, a monitor location in the upwind direction would be useful when the owner or operator elects to provide evidence to the Executive Officer that the exceedance of three consecutive Valid Samples that are each four times the Benchmark Concentration, is not attributed to the facility.

Monitor locations must be included in the facility map(s) referenced in Section 2.4 of this Guidance or as a separate map.

When siting samplers for Monitoring and Sampling, please refer to the following basic guidelines:

Sampler Heights - The most desirable height for monitors/inlet probes for non-criteria pollutants is near the breathing zone. But practical factors such as safety and security may require that the monitor/ inlet probe be elevated. For non-criteria particulate pollutant monitors, the following monitor/inlet probe heights are recommended:

- For elevated sources: 2 to15 meters
- For ground level sources: 2 to 7 meters

Spacing from Obstructions – Samplers located on a roofs or other structures are recommended to have a minimum of 2 meters separation from walls, parapets, penthouses, etc.

If at all possible the sampler/inlet probe must be located away from obstacles and buildings such that the distance between the obstacles and the sampler/inlet probe is at least twice the height that the obstacle protrudes above the sampler/ inlet probe. Airflow must be unrestricted in an arc of at least 270° around the sampler/inlet probe, and the predominant direction for the season of greatest pollutant concentration potential must be included in the 270° arc. If the inlet probe is located on the side of a building, 180° clearance is required.

Note: Installing samplers on elevated work platforms or scaffolds may assist in meeting these siting guidelines.

3.2 Sampling Schedule

Monitoring and Sampling must be conducted at least once every three days for a Basic or Alternative Monitoring and Sampling Plan pursuant to Rule 1480(f)(3)(A), and at least once every six days for a Reduced Basic or Reduced Alternative Monitoring and Sampling Plan pursuant to Rule 1480(f)(3)(B), (h)(1), and (h)(4).

Samples are to be collected on a schedule following the U.S. EPA National Sampling Schedule. A copy of the current year's schedule shall be included in the Monitoring and Sampling Plan. This schedule can be found at the U.S. EPA Ambient Monitoring Technology Information Center (AMTIC) website at the following link: https://www3.epa.gov/ttn/amtic/calendar.html. For future years, the updated U.S. EPA National Sampling Schedule should be used for the corresponding year.

A copy of the 2020 sampling schedule is included as Figure 1.

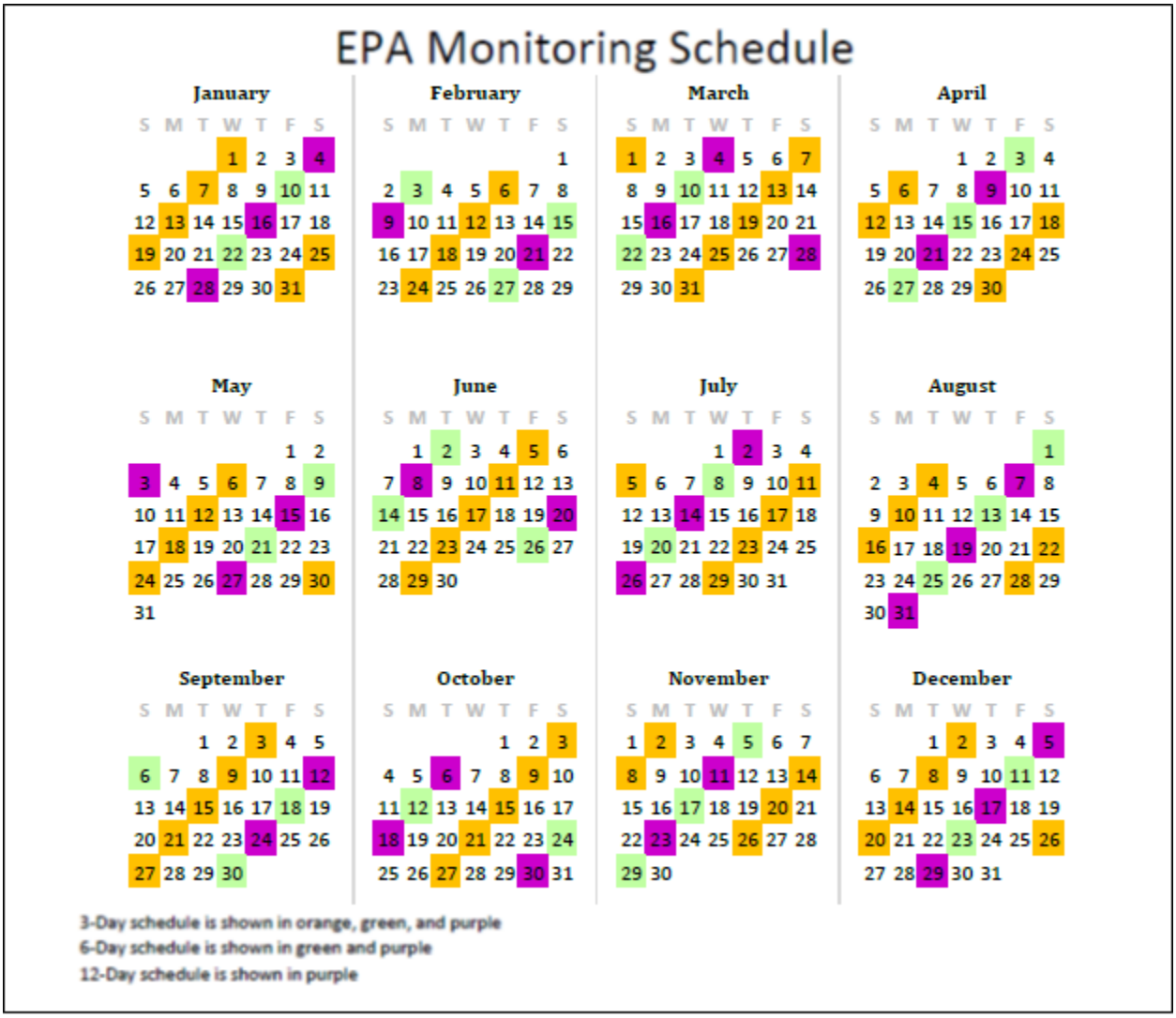
The EPA schedule is a one in three day schedule; the highlighted dates on the 2020 calendar are the expected sampling days. Typically samples are collected from midnight to midnight but alternate sample collection times may be approved by the Executive Officer.

Note: Sampler clocks shall be maintained on Pacific Standard Time (PST) year round and shall not be changed to Daylight Savings Time (DST). Additionally, the clocks for all monitoring equipment shall be maintained within ±5 minutes of each other at all times.

3.3 Atypical Sampling Days

According to Rule 1480(f)(3)(C), atypical sampling days are days when fireworks or other known activities will likely contribute to higher results at a facility's monitor during a regularly scheduled sampling day. Since South Coast AQMD is aware that there are other sources which would contribute to high results on these days, the Executive Officer would provide written notice to the owner or operator of a Metal TAC Monitoring Facility of when Monitoring and Sampling should occur in lieu of the atypical sampling day. Examples of atypical sampling days would be January 1 and July 4.

Figure 1 - U.S. EPA's Sampling Schedule for 2020



3.4 Missed Samples and Make-Up Sample Procedures

According to Rule 1480(i)(4), in the event of a missed sample, an owner or operator of a Metal TAC Monitoring Facility must call 1-800-CUT-SMOG within two hours of knowing that a valid sample was not or will not be collected from any approved monitor and provide the following information:

- Facility Name
- Identification of Monitor
- Date of occurrence
- Reason why sample was not collected, or why the collected sample did not meet definition of a valid sample

- Repair date or anticipated repair date, if the cause was due to mechanical breakdown of equipment

Per Rule 1480(i)(5), within seven days following the notification to the Executive Officer that a Valid Sample was not or will not be collected, the owner or operator of a Metal TAC Monitoring Facility must electronically submit copies of documentation of any required repairs or replacement due to mechanical failure, unless the mechanical failure was a power outage. The Executive Officer may extend this seven day deadline as needed based on the repair date.

Samples and sample results may be invalidated for a number of reasons. In order to increase the likelihood of attaining a high completeness goal, make-up samples may be collected when a sample or sample result is invalidated. A replacement sample (make-up sample pursuant to (e)(1)(H)(iv)) should be collected as close to the original sampling date as possible, and preferably before the next scheduled sampling date.

3.5 Use of Surrogates of a Metal of Concern

An owner or operator of a Metal TAC Monitoring Facility that would like to propose the use of a surrogate when Monitoring and Sampling for a Metal of Concern should include the following information:

- The Metal of Concern and the corresponding surrogate
- Explanation of why the use of a surrogate is appropriate. This can include information such as methods which have been approved by U.S. EPA or other agencies and procedures which will be used to demonstrate the appropriate use of the surrogate (e.g. collocating monitors to collect both the Metal of Concern and the surrogate for a period of time).

3.6 Sample Analysis Test Methods

Although Rule 1480(f)(5) does not specify test methods, an owner or operator of a Metal TAC Monitoring Facility must monitor and analyze valid samples collected in accordance with U.S. EPA methods or the appropriate methods approved by the South Coast AQMD. At the time of writing, these are the approved methods which can be used to conduct Monitoring and Sampling for Rule 1480:

- ASTM Method D7614- Standard Test Method for Determination of Total Suspended Particulate (TSP) Hexavalent Chromium in Ambient Air Analyzed by Ion Chromatography (IC) and Spectrophotometric Measurements for Hexavalent Chromium
- U.S. Environmental Protection Agency Method SOP 5-03: "Standard Operating Procedure for the Determination of Hexavalent Chromium In Ambient Air analyzed By Ion Chromatography (IC)"

- US EPA Method IO 3.1 - Selection, Preparation and Extraction of Filter Material and IO 3.5 – Determination of Metals in Ambient Particulate Matter Using Inductively Coupled Plasma/ Mass Spectrometry (ICP/MS). These methods are for non-hexavalent chromium metals

Table 1 summarizes the Metals of Concern and the associated test methods and sampling media.

Table 1 - Principal Metals of Concern and Associated Test Methods and Sampling Media

METALS OF CONCERN	Test Method	Sampling media
Hexavalent Chromium (TSP)	ASTM D7614 EPA Method SOP 5-03 NATTS TAD Revision 2	acid washed sodium bicarbonate impregnated cellulose filter
Non-hexavalent Chromium Metals TSP/PM10 *	EPA IO 3.1 and IO 3.5 NATTS TAD Revision 2 and 3	quartz, Teflon, glass or cellulose filter

** The Monitoring and Sampling Plan must specify whether a non-hexavalent chromium Metal of Concern is sampled using the methods associated with TSP or PM10 particles. The method must be approved by the Executive Officer.*

The Monitoring and Sampling Plan must specify the Metal of Concern, test method, and sampling media which will be used to conduct Monitoring and Sampling.

3.7 Sample Storage and Sample Retention

Rule 1480(f)(6) requires that all collected Valid Samples or the solution rendered from the acid extraction of a filter sample be retained and properly stored for a period of six months unless the entire filter media is digested and consumed.

The Monitoring and Sampling Plan should specify the location where the samples or sample solutions will be stored and the procedures for the proper storage including how the Chain of Custody is maintained.

3.8 Standard Operating Procedure and Chain of Custody

The Monitoring and Sampling Plan must include a Standard Operating Procedure (SOP) for sample handling and custody and a sample of the Chain of Custody form that will be used.

Persons performing sampling and laboratories performing sample analysis shall follow the approved sampling handling SOP and are required to utilize Chain of Custody documentation as a method of identifying each sample and documenting who has had possession of samples at any given time (i.e., who handled it) throughout its life cycle. A critical aspect of the Chain of Custody

system is the use of unique sample identification numbers which can be assigned at distribution of sample media or at sample collection.

A proper Chain of Custody system tracks the location and destination of each sample through all of the following stages:

- Sample media preparation
- Sample media transfer to operator
- Sampled media removal and new sample media installation on sampler
- Sampled media return to laboratory
- Sample recovery and analysis
- Sample archive (if some sample remains after analysis)

When preparing a sampler for a collection run, the operator chooses a filter and enters the Sample ID# on the Chain of Custody form with the appropriate supporting information. When the filter is loaded into the sampler, the operator will document the date, time, station, sampler ID number, and name of person loading the sampler, confirming filter number on the Chain of Custody form with that of the filter. The operator collects the actual time-integrated sample on the prepared media, then recovers the exposed sample from the sampler and prepares it for transport by returning the filter to its designated container and placing the container in a clean plastic bag. The plastic bag should be transported in a clean insulated container with clean frozen ice to keep samples cool during transport. The use of blue ice packs is recommended as it minimizes the possibility of melted ice water compromising the samples making them invalid.

If samples are not analyzed immediately after collection the sample media should be stored in a freezer until analysis. Table 2 summarizes hold times.

Table 2 - Typical Sampling Media Holding Times

Media	Hold Time	From	To	Reference
Filters used for metals sampling	180 day	Sample end date/time	Analysis	NATTS TAD Revision 3
Filters used for Hexavalent Chromium sampling	21 day Freezer hold time	Sample end date/time	Analysis	NATTS TAD Revision 2

After securing the sample for transport the site operator checks or completes relevant portions of the Chain of Custody form, including date, time and name of personnel removing the sample from the sampler.

When the filter is returned to the laboratory, the date, time, and personnel returning the filter are documented. When the filter arrives at the designated location in the laboratory, the date, time, and person receiving the filter are documented.

Note: Sample filters must not be handled with bare hands. Always wear clean lint free synthetic gloves (Latex, Nitrile, etc.).

4. Wind Monitoring

Note: Wind direction is defined as the direction from which the wind is blowing from, measured in degrees from true north.

4.1 Required Wind Monitoring Information

According to Rule 1480(f)(8), facilities must collect wind speed and direction data, if it is required by the approved Monitoring and Sampling Plan. A Basic or Alternative Monitoring and Sampling Plan should include one of the following:

- If using a third party contractor other than the South Coast AQMD to collect wind speed and direction data, include a list of all equipment to be used and the location of the wind monitor should be included in the map provided in Section 2.4 or in a separate map of the facility. For each piece of equipment, include manufacturer, model, serial numbers, operating procedures and maintenance schedule, height of wind sensors above ground and above any building or structure it may be mounted on, and the distance from any obstacles of equal or greater height in all directions.
- If wind speed and direction data will not be collected, include an explanation of why such data collection is not necessary. For example, based on local topography there is an existing meteorological station which is representative of the project conditions and data meeting the requirements of Rule 1480(f)(8) available; the Metal TAC Monitoring Facility elects to only site one monitor based on the maximum modeled ground level concentration and does not wish to use wind speed or direction data as evidence that exceedances of four times the Benchmark Concentration are not attributed to the facility as allowed in Rule 1480(h)(2) and (h)(5); or any other reasons.
- If using South Coast AQMD to collect wind speed and direction data, the Alternative or Reduced Alternative Monitoring and Sampling Plan should state that the owner or operator of a Metal TAC Facility elects to have the South Coast AQMD collect wind speed and direction data and agrees to pay the fees in Appendix 1 or Rule 301. South Coast AQMD staff will provide the necessary information on wind monitoring at the time of preparation of the Alternative Monitoring and Sampling Plan.

The following sections provide the minimum recommendations for collecting wind speed and direction data to meet the requirements of Rule 1480(f)(8).

4.2 Siting of the Wind Sensor

In order for the wind system to record data that is representative of the general area, the system must be properly sited with minimal obstructions to the wind flow from obstacles such as buildings, hills, or trees.

The recommended sensor height for measuring surface winds is 10 meters (33 feet) above ground level over open, level terrain. This usually requires the installation of a tower or a mast. When mounted on a building or structure, wind system must be mounted at least 1.5 times the height of the building above the rooftop. Since these siting guidelines are sometimes not practical, especially in urban areas, siting that deviates from these guidelines must be clearly and thoroughly explained in the Monitoring and Sampling Plan.

4.3 Accuracy of the Wind Sensor

It is recommended that the wind system starting threshold be rated as no higher than 0.5 meters per second (m/s). If there is some suspicion that the site would have a significant number of hours of wind speeds under 0.5 m/s, sensors with a lower threshold, such as 0.22 m/s, should be used. Wind systems shall be accurate to within 0.2 m/s ± 5 percent of the observed speed. Total wind direction system errors shall not exceed 5 degrees. This includes an instrument accuracy of ±3 degrees for linearity and ±2 degrees for alignment to a known direction. Table 2 summarizes these accuracy guidelines.

Table 3 – Accuracy Guidelines for Wind Systems

Sensor Type	Sensor Height	Range	Accuracy	Resolution	Starting threshold	Procedural References
Wind Speed	10 Meters	0.5 – 50 m/s	0.2 m/s ± 5% of observed wind speed	0.1 m/s	0.5 m/s	EPA, 2000 EPA, 1995
Wind Direction	10 Meters	0-360 degrees (or 0 to 540°)	± 5 degrees	1 degree	0.5 m/s	EPA, 2000 EPA, 1995

4.4 Data Recording Devices

Electronic data loggers are the preferred method of recording and archiving wind speed and direction data. Electronic data loggers allow data to be transmitted to a central computer and easily submitted to South Coast AQMD in electronic format. All data records must be kept for a period of at least three years after the requirements for data collection has ended. Data recovery from a well-maintained meteorological system should be at least 90% complete on an annual basis, with no large data gaps (i.e., gaps greater than two weeks).

For Rule 1480, the wind speed and direction data averaging periods shall be at least every 15 minutes.

Since wind direction has a numerical discontinuity between 360 and 001 degrees, scalar averaging of the wind direction is usually calculated using the unit vector method (EPA 2000). Data logger clocks must be maintained within five minutes Pacific Standard Time (PST) on a 24-hour clock. Wind system clocks shall remain on PST year round and should not be changed to Daylight Savings Time.

5. Project Data Quality

Data Quality Indicators

To maintain confidence in the Monitoring and Sampling results, a quality assurance system must be established that will ensure acceptable data quality. To do this, the following Data Quality Indicators (DQIs) must be considered and addressed when designing the monitoring program and developing the Monitoring and Sampling Plan:

Representativeness: Representativeness is the expression of the degree to which data accurately and precisely represent a characteristic of an environmental condition or a population and relates to where, how, and when samples are collected. Assuring the collection of a representative air quality sample depends on the following factors:

- Locating representative sampling sites and selecting a network size that is consistent with the monitoring objectives.
- Identifying and documenting the constraints on the sampling sites that may be imposed by local topography, emission sources, meteorology, land access and any other physical constraints.
- Selecting a sampling schedules and frequencies that are consistent with the monitoring objectives.

Completeness: Completeness is an important data quality indicator, the level of completeness of an air monitoring program can be considered a qualitative measure of the reliability of the air monitoring equipment and laboratory analytical equipment, and a measure of the efficiency of the monitoring program as a whole. Completeness is typically expressed as percent of valid usable data actually obtained compared to the amount that was expected. 100% completeness level is ideal, but due to a variety of circumstances all samples scheduled to be collected may not be collected. Or, the data from collected samples cannot be used due to various reasons discovered after sample collection, for example; failed sampler flow checks or calibrations, sample handling errors or analytical errors. Under Rule 1480 facilities are allowed to miss only one sample per month therefore the completeness goal is 90%.

Precision: Precision is defined as the degree of mutual agreement between or among independent measurements of a similar property. Precision is typically reported as Coefficient of Variation (CV).

Field precision is assessed using collocated samples, field duplicates, or field splits. Collocated samples are samples collected simultaneously using two independent collections systems at same location. Laboratory precision is assessed using laboratory duplicates, matrix spike duplicates, or laboratory control sample duplicates.

Bias: Bias is defined as the difference of a measurement from a true or accepted value and can be negative or positive. As much as possible, bias should be minimized as biased data may result in incorrect conclusions and therefore incorrect decisions. Bias may originate in several places within the sample collection and analysis processes.

- Sources of **sample collection bias** include, but are not limited to, incorrectly calibrated flows or out-of-calibration sampling instruments, elevated and unaccounted for background on collection media, poorly maintained (dirty) sampling inlets and flow paths, and poor sample handling techniques resulting in contamination or loss of analyte.
- Sources of **analysis bias** include, but are not limited to, poor hygiene or technique in sample preparation, incorrectly calibrated or out of tolerance equipment used for standard materials preparation and analysis, and infrequent or inappropriate instrument maintenance leading to enhanced or degraded analyte responses.

Assessing Sampler Bias. The direction of the flow rate bias in metals sampling is conversely proportional to the bias introduced in the reported concentrations. In other words; sampler flow rates which are biased low result in overestimation of air concentrations, whereas sampler flow rates which are biased high result in underestimation of air concentrations.

The indicated flow rate for the low volume metals sampling must be within ± 4% of the flow transfer standard and within ± 5% of the sampler design flow rate. Failure to meet these criteria must result in corrective action such as recalibration of the sampling unit. Samplers which cannot meet these flow accuracy specifications should not be utilized for metals sample collection.

Note: Following a failed calibration or flow check, sample data collected since the last acceptable calibration or flow check must be evaluated and such data may be subject to invalidation. To minimize risk of invalidation of data, monthly (or shorter) flow checks are highly recommended.

Assessing Analytic Bias. Rule 1480 analytic bias is determined by review of instrument and filter blank, field blanks, spike, and other analytic quality control data as well as analysis of performance test samples.

Sensitivity: Usually expressed as method detection limit (MDL). The MDL should be related to any decisions that will be made as a result of the data collection effort.

Table 3 and **Table 4** list the required parameters for data measurement quality objectives (MQOs) that must be met when sampling for hexavalent chromium and non-hexavalent chromium metal TACs.

Table 3 - Measurement Quality Objectives for Hexavalent Chromium Sampling

MQO Parameter	Requirement	Acceptance Criteria
Precision	Collocated samples. Collected 10% of total samples	<15%CV
Bias	Performance Evaluation samples	±25%
Completeness	Valid samples collected compared to samples planned	>85%
Sensitivity	MDL should be determined annually, or after any major instrument changes	MDL should be at level to detect Hexavalent Chromium at ambient levels
Sample Flow Rate Accuracy	Sampler indicated flow rate compared to measured sample flow rate.	±4%

Reference: South Coast AQMD NATTS QAPP

Table 4 - Measurement Quality Objectives for Non-Hexavalent Chromium Metal TAC Sampling

MQO Parameter	Requirement	Acceptance Criteria
Precision	Collocated samples. Collected 10% of total samples	<15%CV
Bias	Performance Evaluation samples	± 25% for each analyte/sample
Completeness	Valid samples collected compared to samples planned	>85%
Sensitivity	MDL should be determined annually, or after any major instrument changes	MDLs should be at levels to detect analytes of interest at ambient levels
Sample Flow Rate Accuracy	Sampler indicated flow rate compared to measured sample flow rate.	±4%

Reference: South Coast AQMD NATTS QAPP

6. Data Review and Validation

All analytical and meteorological data are to be compiled and reviewed by Project Manager before submission to South Coast AQMD. For efficient data review it is recommended data be compiled in a tabular format and archived and transmitted electronically.

Decisions to invalidate data or qualify data are made during this review and should be noted in monthly report, including reason for invalidation and corrective action taken, if any.

Rule 1480(i)(4) states that if a valid sample is missed or invalidated the facility must notify the Executive Officer by telephone within two hours of knowing a valid sample was not or will not be collected and that a follow up report must be submitted within seven days to the Executive Officer pursuant to (i)(5); therefore this review should be subsequent and in addition to the initial telephone notification.

As needed or at least annually, assessments of precision, completeness, bias, and sensitivity will be performed to verify quality objectives are met. If these data quality indicators do not meet the project goals, then corrective action should be taken.

7. Data Management

The Monitoring and Sampling Plan must provide a list of the steps that will be taken to ensure that data are transferred accurately from collection to analysis to reporting. The plan should discuss the measures that will be taken to review the data collection processes, including field notes or field

data sheets; to obtain and review complete laboratory reports; and to review the data entry system, including its use in reports. A checklist or table is acceptable.

8. Sample Documentation

8.1 Field Logbooks

Separate Logbooks should be established for each sampler and wind system to document where, when, how, and from whom any vital project information was obtained. All entries should be legible, written in black ink, and signed by the individual making the entries. Use factual, objective language, entries should be complete and accurate enough to permit reconstruction of field activities. Logbooks should have consecutively numbered pages and pages should never be removed, mistakes should be lined through and dated and initialed.

At a minimum, the following information should be recorded in the Logbook during the collection of each sample:

- Sample location and description
- Site or sampling area sketch showing sample location and measured distances
- Sampler name(s)
- Date and time of sample collection
- Sampler start and end time
- Identification of sampling equipment used
- Sampler calibration dates and results
- Flow check results
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.)
- Sample identification numbers and any explanatory codes, and chain-of-custody form numbers
- Shipping arrangements (overnight air bill number)
- Name(s) of recipient laboratory

8.2 Sample Chain of Custody Forms

An example of the Chain of Custody form that will be used must be included in the Monitoring and Sampling Plan. Chain of Custody form(s) must be completed and sent with samples for each laboratory and each shipment.

In this context, Chain of Custody is chronological documentation that records the sequence of custody, control, transfer, analysis, and disposition of the sample or their extracts.

The Chain of Custody forms must identify the contents of each shipment and persons must maintain the custodial integrity of the samples or their extracts. Samples and their extracts must be kept in someone's physical possession or in a secured area that is restricted to authorized personnel.

9. Quality Control

Table 5 summarizes the schedule for quality control of field equipment.

Table 5 - Field Equipment QC Schedule

Metals Measurements			
Activity	Frequency	Acceptable Criteria	Corrective Action
Clean Sampler	Monthly	Visual Inspection	Repair/Replace/Repeat
Check Flow	Monthly	As-Is Check within ±4% of set point	Repair/Replace as needed
Calibrate Flow	Semi-Annual	±5% of true	Repair/Replace as needed
Hexavalent Chromium Measurements			
Activity	Frequency	Acceptable Criteria	Corrective Action
Clean Sampler	Monthly	Visual Inspection	Repair/Replace/Repeat
Check Flow	Monthly	As-Is Check within ±4% of set point	Repair/Replace as needed
Calibrate Flow	Semi-Annual	±5% of true	Repair/Replace as needed

9.1 Quality Control Samples

To ensure the integrity of Valid Samples collected, quality control samples must be collected. Table 6 in an example of a QC schedule that should be included in the Monitoring and Sampling Plan.

Discrete samples require field blanks at scheduled frequencies. This is necessary for determining bias (if any) for all the process post media preparation through laboratory drop off. Field blanks are handled without air sampling through the sampling media.

Field blanks are transported to the monitoring site, placed on the sampler, and then retrieved without sampling. If acceptance criteria are exceeded, the sampler and sample transportation methods should be investigated.

Table 6 - QC Sample Schedule

Description	Frequency	Acceptance Criteria
Field Blank	Monthly	TBD by Lab

9.2 Collocated Samples

Collocated samples are collected by placing a sampler in the same location as the primary sampler. If the primary sampler does not operate correctly or collected data that was invalid, valid collocated data can be substituted for the particular samples missed by the primary sampler. If the Coefficient of Variation (CV) values exceed the criteria listed in Table 7 below, then sample and analysis techniques are investigated to determine the cause of high variability

Table 7 - Collocated Sample Schedule

Description	Frequency	Criteria
Hexavalent Chromium	Monthly	<15% CV
Metals	Monthly	<15% CV

Reference SCAQMD NATTS QAP

9.3 Quality Control for Wind Monitoring

To ensure reliability of meteorological measurements regular scheduled QC checks must be performed. Table 8 below describes the QC procedures and frequency for meteorological measurements, as well as associated acceptance criteria and corrective action which are based upon the *Technical Assistance Document for the National Air Toxics Trends Stations Program,* Revision 2 (U.S. EPA, 2009) and the *On-Site Meteorological Program Guidance for Regulatory Modeling Applications* (U.S. EPA, 1987).

Table 8 - QC Requirements for Meteorological Sensors

Wind Speed and Direction Sensors		
Activity	Frequency	Acceptance Criteria
Note any maintenance activities in Met system Log Book	As needed	Notes are complete and legible
Visually check wind sensors are operable and verify direction coincides with data logger or display	Monthly	Take corrective action as needed. (realign wind system or replace-repair sensors)

10. Auditing

The South Coast AQMD reserves the authority to perform auditing activities at Rule 1480 facilities. Auditing activities may include collocated sampling, spilt analysis, or other activities to validate sampling results. Auditing may also include sampler operational and wind sensor validation checks.