2017
Annual Network Plan for Ambient Air Monitoring

July 1, 2017

North Coast Unified
Air Quality Management District
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Contents

Definition of Terms

AAC	Atmospheric Analysis and Consulting
AQI	Air Quality Index
AQS	Air Quality System
BAAQMD	Bay Area Air Quality Management District
CARB	California Air Resources Board
E-BAM	Emergency Beta-Attenuation Monitor
FEM	Federal Equivalency Method
FRM	Federal Reference Method
MSA	Micropolitian Statistical Area
NAAQS	National Ambient Air Quality Standards
NOAA	National Oceanographic and Atmospheric Administration
NCUAQMD	North Coast Unified Air Quality Management District
POC	Parameter Occurrence Code
PQAO	Primary Quality Assurance Organization
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Station
SOP	Standard Operating Procedure
SPM	Special Purpose Monitor
TRS	Total Reduced Sulfur

Executive Summary

Title 40, Code of Federal Regulations, Part 58.10 (40 CFR 58.10) requires the annual review of governmental air monitoring networks. The North Coast Unified Air Quality Management District's (District) "*2017 Annual Network Plan for Ambient Air Monitoring*" is an examination of the District's network of ambient air pollution monitoring stations. This report meets the requirements for an annual network plan as listed in 40 CFR 58.10, Appendix A.

The District is located in the northwestern portion of California, coving a territory of 7,753 square miles. This area is made up of varied terrain, from coastal wetlands to rugged mountains. Inversions and diurnal offshore wind patterns are common. The District is bordered on the west by the Pacific Ocean and extends from the Oregon Border south approximately 140 miles to the Mendocino County line. It has jurisdiction over three counties: Humboldt, Del Norte, and Trinity. The District office is located in Eureka, the county seat of Humboldt County. Eureka is 284 miles north of San Francisco, 466 miles south of Portland, Oregon and on the coast of the Pacific Ocean.

The two pollutants of greatest concern in the District are ozone and particulate matter. The county's sunny climate, pollution-trapping mountains and valleys, and growing population contribute to the problem. Except for a non-attainment status for the State's 24-hour PM_{10} standard in Humboldt County, the air in Humboldt, Del Norte and Trinity County is considered to be either unclassified, or in attainment of State and Federal .

The District monitoring network was initiated nearly six decades ago because of concerns about practices at pulp mills in the area. Total Reduced Sulfur started to be monitored in the 1970s at Fort Humboldt. Numerous special studies, including speciation, have occurred around Humboldt Bay. The very first time the California Air Resources Board (CARB) mobile monitoring trailer was deployed it was to Humboldt County to investigate concerns around the Humboldt Flakeboard Panel plant in Arcata. Beginning in 1986, PM_{10} monitoring began with a solitary PM_{10} monitoring sampler in Eureka. Currently the District operates four air monitoring stations sites.

All Title V sources in the District are located in Humboldt County: Humboldt Redwood Company (Scotia), PG&E Humboldt Bay Generating Station (Eureka), DG Fairhaven (Samoa), and the Blue Lake Power LLC (Blue Lake). In addition to these major sources, the District is impacted by several large saw mills, minor industrial sources, and mobile sources throughout the traffic corridors. Wildfire smoke can also heavily impact the District's air quality.

This report will be available for a 30-day public inspection period. Any comments received during the public inspection period will be forwarded to the United States Environmental Protection Agency (EPA) concurrently with submittal of the plan. Changes suggested in the comments will be addressed in subsequent plan updates. This report may be viewed on the District's website, and hard copies are available for review at District's office. Written comments should be submitted to the North Coast Unified Air Quality Management District, Attn: Comments on Annual Network Monitoring Plan, 707 L Street, Eureka, California, 95501.

Network Design

The District operated four monitoring sites in 2016. The following maps show the locations of the monitoring sites. Tables 1 and 2 list the pollutants measured at each site.

Table 1. List of Special Purpose Monitoring Sites

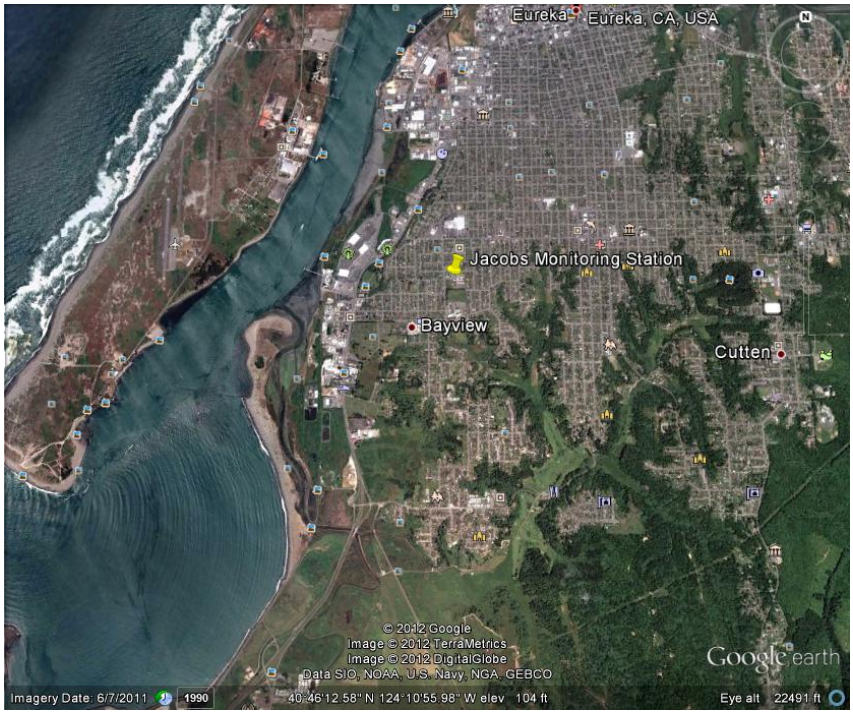
Site Name	AQS Site #	Pollutant Monitored
Humboldt Hill	060231005	$PM_{2.5}$, O_3, NO_2, CO, SO_2
Crescent City	060150006	$PM_{2.5}$

Table 2. List of State and Local Air Monitoring Sites

Site Name	AQS Site #	Pollutants Monitored
Jacobs	060231004	PM_{10}, $PM_{2.5}$, O_3, NO_2, CO, SO_2
Weaverville	061050002	$PM_{2.5}$

Monitoring Station Locations

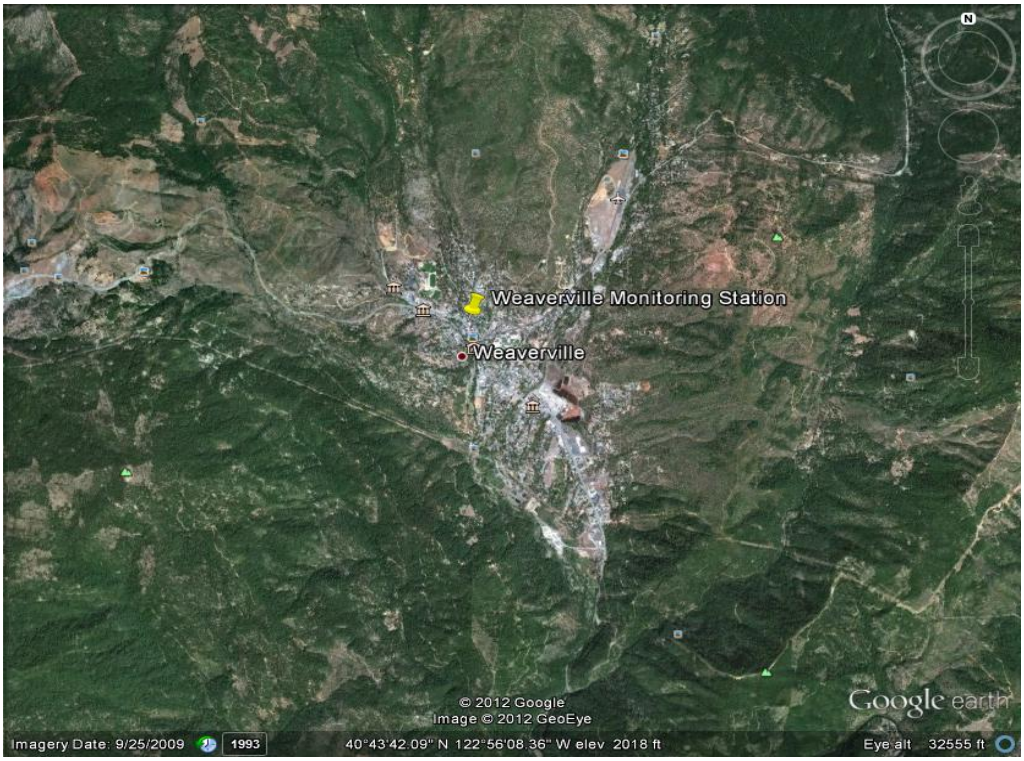
Jacobs Monitoring Station (717 South Ave, Eureka, Humboldt County)



Humboldt Hill Monitoring Station (7333 Humboldt Hill Rd., Eureka, Humboldt County)

Crescent City Monitoring Station (994 G Street, Crescent City, Del Norte County)

Weaverville Monitoring Station (11 Court Street, Weaverville, Trinity County)



Minimum Monitoring Requirements

This network meets the minimum monitoring requirements for all criteria pollutants (Tables 3-11).

Ozone

Table 3. Minimum Monitoring Requirements for Ozone Sites.

Micropolitian Statistical Area (MSA)	County	Pop. In Year 2010	4th highest 8-hour max. (ppm) (2014-2016)	3 year design value	SLAMS Ozone Sites Required	Active SLAMS Ozone Sites	Active Ozone SPMs	Sites Needed
Eureka, Arcata, Fortuna	Humboldt	134,623	Jacobs 0.044 Humboldt Hill 0.046	Jacobs 0.043 Humboldt Hill 0.045	0	1	1	0
Crescent City	Del Norte	28,610	-	-	0	0	0	0
none	Trinity	13,786	-	-	0	0	0	0

No Ozone monitors are required for either a SIP or Maintenance Plan. The District monitors Ozone as an examination of population exposure levels. Since the District has no required ozone sites, it is not necessary to identify the maximum concentration ozone site.

PM 2.5

Table 4. Minimum Monitoring Requirements for SLAMS $PM_{2.5}$.Sites.

Micropolitian Statistical Area	County	Pop. In Year 2010	Annual Design Value ($\mu g/m^3$) (2014-2016)	Daily Design Value ($\mu g/m^3$) (2014-2016)	FRM Sites Required	SLAMS Sites Active	SPM Sites Active	Sites Needed
Eureka, Arcata, Fortuna	Humboldt	134,623	Jacobs 5.8 Humboldt Hill 3.8	Jacobs 19 Humboldt Hill 10	0	1	1	0
Crescent City	Del Norte	28,610	-	-	0	0	0	0
none	Trinity	13,786	-	-	0	0	0	0

Since NCUAQMD has no required FRM $PM_{2.5}$ sites, it is not necessary to identify the maximum concentration $PM_{2.5}$ site

Table 5. Minimum Monitoring Requirements for Continuous $PM_{2.5}$ Sites.

Micropolitian Statistical Area	County	Pop. In Year 2010	SLAMS FEM Sites required	SLAMS Sites Active	SPM Sites Active
Eureka, Arcata, Fortuna	Humboldt	134,623	0	0	1*
Crescent City	Del Norte	28,610	0	0	1*
none	Trinity	13,786	0	0	1

* Grimm 180

Table 6. Collocation of continuous PM2.5 monitors

Method Code	# Primary Monitors	POC designations	Required NCUAQMD operated collocated monitors	Active NCUAQMD operated collocated FRM monitors	Active Collocated FEM Monitors
195	1	1	0	1	0
731	1	1	0	0	0

Collocation is the responsibility of the Primary Quality Assurance Organization (PQAO). The District works with the ARB PQAO to assist wherever possible. No $PM_{2.5}$ monitors are required for either a State Implementation Plan (SIP) or Maintenance Plan.

PM10

Table 7. Minimum Monitoring Requirements for PM_{10} Sites.

Micropolitian Statistical Area	County	Population in Year 2010	Max Concentration (2014-2016) (ug/m^3)	SLAMS Sites Required	SLAMS Sites Active	SPM Sites Active	Sites Needed
Eureka, Arcata, Fortuna	Humboldt	134,623	Jacobs 104	0	1	0	0
Crescent City	Del Norte	28,610	-	0	0	0	0
none	Trinity	13,786	-	0	0	0	0

No additional PM_{10} monitors are required for either a State Implementation Plan (SIP) or Maintenance Plan.

NO2

Table 8. Minimum Monitoring Requirements for NO_2 Monitors.

Micropolitian Statistical Area	County	Population. in Year 2010	Annual Design Value (ppb) (2014-2016)	SLAMS Monitors Required	Active SLAMS Monitors	Active SPM Monitors	Monitors Needed
Eureka-Arcata, Fortuna	Humboldt	134,623	Jacobs 2.7 Humboldt Hill 0.8	0	1	1	0
Crescent City	Del Norte	28,610	-	0	0	0	0
none	Trinity	13,786	-	0	0	0	0

No NO_2 monitors are required for SIP or Maintenance Plans. The District monitors NO_2 in Humboldt County to examine population exposure. Based on population, no near-road NO_2 monitors are required within the District boundaries.

SO2

Table 9. Minimum Monitoring Requirements for SO_2 Monitors.

Micro-politian Statistical Area	County	Pop. in Year 2010	Annual Design Value (ppb) (2014-2016)	Max 24 hour (ppb) (2014-2016)	Max 1 hour (ppb) (2014-2016)	SLAMS Monitors Required	Active SLAMS Monitors	Active SPM Monitors	Monitors Needed
Eureka, Arcata, Fortuna	Humboldt	134,623	Jacobs 0.3 Humboldt Hill 0.0	Jacobs 1.3 Humboldt Hill 1.2	Jacobs 2.7 Humboldt Hill 1.3	0	1	1	0
Crescent City	Del Norte	28,610	-	-	-	0	0	0	0
none	Trinity	13,786	-	-	-	0	0	0	0

No monitors are required for SIP or Maintenance Plans. The District is not required to monitor SO_2. The District monitors SO_2 in Humboldt County to examine population exposure.

CO

Table 10. Minimum Monitoring Requirements for CO Monitors.

Micro-politian Statistical Area	County	Pop. in Year 2010	8-hour Design Value (ppm) (2014-2016)	1 hour. Design Value (2014-2016)	SLAMS Monitors Required	Col-located Monitors Required	Active SLAMS Monitors	Active SPM Monitors	Monitors Needed
Eureka, Arcata, Fortuna	Humboldt	134,623	Jacobs 1.0 Humboldt Hill 0.5	Jacobs 1.3 Humboldt Hill 0.5	0	0	1	1	0
Crescent City	Del Norte	28,610	-	-	0	0	0	0	0
none	Trinity	13,786	-	-	0	0	0	0	0

No monitors are required for SIP or Maintenance Plans. The District is not required to monitor CO. The District monitors CO in Humboldt County to examine population exposure.

Pb

Table 11. Minimum Monitoring Requirements for Pb.

Micropolitian Statistical Area	County	Pop. In Year 2010	Annual Design Value	Monitors Required	Active Monitors	Monitors Needed
Eureka, Arcata, Fortuna	Humboldt	134,623	-	0	0	0
Crescent City	Del Norte	28,610	-	0	0	0
none	Trinity	13,786	-	0	0	0

No Lead (Pb) monitors are required for SIP or Maintenance Plans. The District is not required to monitor Pb and does not do so.

Quality Control

The District is a member of the CARB Primary Quality Assurance Organization (PQAO). All District ambient air monitoring meet CARB Quality Control and Quality Assurance requirements. ARB audit records and site information for the District can be found on the CARB website at , or obtained by contacting the District at (707) 443-3093.

District $PM_{2.5}$ FRM filters are analyzed by the Bay Area Air Quality Management District (BAAQMD). The BAAQMD Laboratory meets Federal Requirements for Quality Control and Quality Assurance. Information regarding the laboratory can be found on the BAAQMD website at .

Collocation

The District is a member of the CARB PQAO and relies on the ARB PQAO network to satisfy all collocation requirements. (CFR 58 App A 3.2.5).

The District does not have any permanently collocated $PM_{2.5}$ samplers. It currently operates one collocated FRM $PM_{2.5}$ sampler. A FEM Grimm 180 (AQS# 06-023-1005 POC 1) has been collocated with an FRM Thermo 2000 instrument (AQS# 06-023-1005 POC 2) since March 2013 at the Humboldt Hill station for the purpose of evaluating the performance of the Grimm 180. The FRM is labeled the Primary instrument.

It was found that during the period March 2013 through December 2015, this Grimm 180 (Grimm unit serial number 18A11018) did not produce data of sufficient comparability to the $PM_{2.5}$ FRM to allow for comparison to the National Ambient Air Quality Standard (NAAQS). The waiver request for this period of data was approved in May 2016. A waiver request for January 2016 through May 18, 2016 data (serial number 18A11018) is attached to this Network Plan.

It is hypothesized that the issue with Grimm vs FRM comparability is an instrument design flaw, as opposed to an individual instrument problem. Hence, collocation studies of additional Grimm 180 instruments are warranted. In May 2016, the collocation of a different FEM Grimm 180, (serial number 18A10013) to that same FRM Thermo 2000

was set up at Humboldt Hill. Due to insufficient data at the time of this writing, a waiver request cannot be requested at this time. Preliminary data indicates a correlation problem similar to that discovered in the original collocation study.

The District also operates a remote site in Crescent City. Unfortunately, the distance between the District's headquarters and the Crescent City Monitoring Site precludes the possibility of running a collocation study in Crescent City. Currently, the Grimm 180 (serial number 18A11018) is deployed in Crescent City. This instrument could not meet coorelation or bias requirements when collocated with an FRM instrument at Humboldt Hill. The Crescent City site is similar to the Humboldt Hill site, and there is little reason to expect the instrument is performing better in this different location. Based on the earlier collocation study, The District deems the data generated by this instruments as not comparable to the NAAQS. The District requests guidance on this issue.

Recent or Proposed Modifications to Network

The Grimm 180 was approved for a waiver at the Humboldt Hill Monitoring Station for data March 20, 2013 through December 29, 2015. This instrument was subsequently moved to Crescent City, to allow the original Crescent City instrument to be relocated to a site near the District's headquarters to undergo a collocation study. A waiver request for this Grimm data is attached.

The Jacobs Station was moved approximately 25 meters to the South in April 2017. This was necessitated by a parking lot realignment project at the school which hosts the station.

Review of Changes to PM2.5 Monitoring Network

A waiver for the Grimm 180 (serial number 18A11018) was approved in May 2016 (Attachment A) for the period of March 2013 through December 2015. Data for the period of this waiver under AQS code parameter 88502.

Both Grimm 180s in the network are operating as special purpose instruments, and neither meet the requirements of Appendix A or an approved alternative. The Grimm 180 does not meet the EPA Minimum Data Assessment Requirements for $PM_{2.5}$ instruments (CFR 40, part 58, Appendix A). It does not indicate a flow rate. With no instrument flow rate information (other than the ideal flow stated in the instrument manual), it is impossible to perform a flow rate verification of the individual instrument, as required by Appendix A to 40 CFR Part 58. The District does preform flow checks on the Grimm, but does not interpret a flow check to be equivalent to a flow verification. Flow verification includes the calculation of bias, something which is mathematically impossible with only one measurement. If Appendix A intends to mean that a flow verification is a comparison of the reading measured by a flow standard and the optimal flow stated in the instrument manual for the instrument being verified, please advise the District of that in an official letter. Please also advise if this meaning can be applied to all FEM $PM_{2.5}$ instruments, or only the Grimm 180.

A flow problem is one possible reason for the low correlation between the District FRM data, and Grimm data. There is no way to assess the flow of the Grimm during routine sampling. Thus, both to adhere to Federal Regulations, and to protect the public from

possibly heavily biases data, the District will use the Network's Grimm 180s exclusively for AQI reporting. All data collected will be reported to AQS under code 88502 until the District receives an official document from EPA excluding the Grimm 180 from minimum data assessment requirements.

The District has not changed the location of any violating $PM_{2.5}$ monitor. Any changes to the District's $PM_{2.5}$ network are reviewed by EPA Region 9. The District has never eliminated an FRM $PM_{2.5}$ sampler from the network. If a violating $PM_{2.5}$ monitor ever needs to be moved, it is planned to use the annual network plan inspection/comment process to provide for the review of the change.

A Grimm 180 $PM_{2.5}$ FEM instrument was deployed in Crescent City in April of 2016. It is an SPM monitor, and thus did not require EPA approval to begin operation.

The California Air Resources Board attempted to audit the Grimm 180 in December of 2015 by measuring flow. ARB usually performs flow verifications, rather than flow checks during auditing of Particulate Matter 2.5. Because there is not an instrument reading available to compare this measured flow to, reporting of CARB flow checks has not taken place. Until a new EPA approved procedure on how to audit an instrument which gives no flow data is promulgated, CARB will only perform flow checks on the Grimm 180. Such flow checks are not uploaded to AQS.

Data Submission Requirements

Data and Precision/Accuracy reports are submitted to CARB no later than 60 days after the quarter of record. The ARB uploads District data to the National Air Quality System (AQS) no later than 90 days after the quarter of record. CARB submits the annual data certification no later than May 1st of each year.

Data Availability

The District's air quality data is available in the AQS database. It can also be obtained directly from the District in the form of monthly reports. Please contact the District at 707-443-3093 to request copies of these reports.

Detailed Site Information

Site Name: Jacobs

The Jacobs site was established in December of 2006. It is located on the west side of Eureka and is expected to represent neighborhood scale air quality.

Jacobs	
AQS ID	060231004
Latitude /Longitude (degrees)	40.7767667 N -124.1794861 W
Location	Alice Birney Elementary School
Address	717 South Ave, Eureka
County	Humboldt
Dist. to road (meters)	50
Traffic count (AADT)	3100 (2007)
Representative statistical area name	Eureka, Arcata, Fortuna
Groundcover	grass
PEP audit?	Information maintained by EPA
NPAP audit?	Information maintained by EPA
PM_{10} Flow audits	Performed every 2 weeks by NCUAQMD, Performed biannually by ARB
$PM_{2.5}$ Flow audits	Performed monthly by NCUAQMD, Performed biannually by ARB
Gaseous audits	Following the requirement in QA Volume II, performance audits are performed annually by ARB
Date of 2016 annual performance evaluation for gaseous instruments (ARB audit)	June 9, 2016
Dates of two semi-annual PM10 flow audits conducted by ARB, occurring in 2016	June 9, 2016 November 9, 2016
Dates of two semi- annual PM2.5 flow audits, conducted by ARB, occurring in 2016	June 9, 2016 November 9, 2016
Gaseous One-point control checks	Performed a minimum of once every two weeks

Jacobs						
Gaseous instrument calibrations	Performed bi-annually by ARB					
Representative Area	Humboldt County Micropolitian Statistical Area, Eureka-Arcata-Fortuna, suburban					
Pollutant	**O_3**	**NO_2**	**CO**	**SO_2**	**$PM_{2.5}$**	**PM_{10}**
Primary/QA Collocated/Other	N/A	Primary	N/A	N/A	Primary	Primary
Parameter Code	44201	42602	42101	42401	88101	81102
POC	1	1	1	1	1	1
Basic Monitoring Objective	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison
Site Type	Population exposure	Population exposure	Population exposure	Population exposure	Population exposure	Population exposure
Monitor Type	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Sampling method	Photometric EQOA-0880-047	Chemiluminescence RFNA-1289-074	Gas Filter correlation RFCA-0981-054	Pulsed Florescence EQSA-0486-060	Low Volume RFPS-0498-143	EQPM-0798-122
Instrument manufacturer and model	Thermo 49i	Thermo 42i	Thermo 48i	Thermo 43i	R&P 2000	Met One Bam1020
FRM/FEM/ARM	FEM	FRM	FRM	FEM	FRM	FEM
Collecting Agency	NCUAQMD	NCUAQMD	NCUAQMD	NCUAQMD	NCUAQMD	NCUAQMD
Analytical Lab	N/A	N/A	N/A	N/A	BAAQMD	N/A
Reporting Agency	ARB	ARB	ARB	ARB	ARB	ARB
Start date	Dec 15, 2006	Dec 15, 2006	Dec 15, 2006	Dec 15, 2006	Dec 25, 2006	Jan 1, 2014
Current Sampling Frequency	continuous	continuous	continuous	continuous	1:3	continuous
Sampling season	Year round	Year round	Year round	Year round	Year round	Year round
Probe height (meters)	4.5	4.5	4.5	4.5	4.3	5
Distance of low-volume PM instrument from other PM instruments are >1 meter?	NA	NA	NA	NA	Yes	NA
Distance from supporting structure (meters)	2	2	2	2	1.8	2.4
Distance from obstructions on roof (meters)	N/A	N/A	N/A	N/A	N/A	N/A
Distance from obstructions not on roof (meters)	N/A	N/A	N/A	N/A	N/A	N/A

Jacobs						
Pollutant	**O_3**	**NO_2**	**CO**	**SO_2**	**$PM_{2.5}$**	**PM_{10}**
Height of obstructions not on roof (meters)	N/A	N/A	N/A	N/A	N/A	N/A
Distance from trees (meters)	15	15	15	15	15	17
Distance to furnace or incinerator flue (meters)	N/A	N/A	N/A	N/A	N/A	N/A
Distance between collocated monitors (meters)	N/A	N/A	N/A	N/A	N/A	N/A
Unrestricted airflow (degrees)	360	360	360	360	360	360
Probe material	Teflon	Teflon	Teflon	Teflon	N/A	N/A
Residence time (seconds)	6.8	7.4	4.6	5.3	N/A	N/A
Operation meets requirements of appendices A,B,C, D and E where applicable	yes	yes	yes	yes	yes	yes
Will there be changes within the next 18 months?	Yes	Yes	Yes	Yes	Yes	Yes
Is it suitable for comparison against the annual PM2.5?	N/A	N/A	N/A	N/A	Yes	N/A

Because of a parking lot realignment project at Alice Birney School, the Jacobs Station will be relocated approximately 30 feet to the South during the Spring of 2017.

Site Name: Humboldt Hill

The Humboldt Hill site was established in June 2011. It is located on Humboldt Hill on the south side of Eureka and is expected to represent neighborhood scale air quality.

Humboldt Hill		
AQS ID	060231005	
Latitude/ Longitude (degrees)	40.7152556 N -124.2014861 W	
Location	Humboldt Hill Summit	
Address	7333 Humboldt Hill Road, Eureka	
County	Humboldt	
Dist. to road (meters)	25	
Traffic count	Unknown, less than 50	
Groundcover	grass	
PEP audit?	Information maintained by EPA	
NPAP audit?	Information maintained by EPA	
$PM_{2.5}$ Flow audits	FRM: Performed monthly by NCUAQMD, Performed biannually by ARB	FEM: Performed every two weeks
Gaseous audits	Following the requirement in QA Volume II, performance audits are performed annually by ARB	
Date of 2016 annual performance evaluation for gaseous instruments conducted by ARB.	June 8, 2016	
Dates of two semi-annual $PM_{2.5}$ flow audits by ARB occurring in 2016	FRM method: June 8, 2016 November 9, 2016	FEM Method: *Unofficial check June 8,2016* *Unoffical check November 9, 2016* *ARB audit device not appropriate to check at this flow rate, nor is there an instrument reading to compare to.*
Gaseous One-point control checks	Performed a minimum of once per two weeks	
Gaseous Instrument Calibrations	Performed bi-annually by ARB	
Representative Area	Humboldt County Micropolitian Statistical Area, Eureka-Arcata-Fortuna, suburban	

Humboldt Hill						
Pollutant	**O_3**	**NO_2**	**CO**	**SO_2**	**$PM_{2.5}$**	**$PM_{2.5}$**
Primary/QA Collocated/ Other	N/A	Primary	N/A	N/A	Primary	Other
Parameter code	44201	42602	42101	42401	88101	88502
POC	1	1	1	1	2	1
Basic Monitoring Objective	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison	AQI comparison
Site Type	Population exposure	Population exposure	Population exposure	Population exposure	Population exposure	Population exposure
Monitor Type	SPM	SPM	SPM	SPM	SPM	SPM
Spatial scale	Neighbor-hood	Neighbor-hood	Neighbor-hood	Neighbor-hood	Neighbor-hood	Neighbor-hood
Sampling method	Photometric EQOA-0880-047	Chemilum-inescence RFNA-1289-074	Gas Filter correlation RFCA-0981-054	Pulsed Florescence EQSA-0486-060	Low Volume RFPS-0498-143	Light scatter EQPM-0311-195
Instrument manufacturer and model	Thermo 49i	Thermo 42i	Thermo 48i	Thermo 43i	R&P 2000	Grimm 180
FRM/FEM/ ARM	FEM	FRM	FRM	FEM	FRM	FEM
Collecting Agency	NCUAQMD	NCUAQMD	NCUAQMD	NCUAQMD	NCUAQMD	NCUAQMD
Analytical Lab	N/A	N/A	N/A	N/A	BAAQMD	N/A
Reporting Agency	ARB	ARB	ARB	ARB	ARB	ARB
Start date	June 20, 2011	June 20, 2011	June 20, 2011	June 20, 2011	March 20, 2013	June 20, 2011
Current Sampling Frequency	continuous	continuous	continuous	continuous	1:3	continuous
Sampling season	Year round	Year round	Year round	Year round	Year round	Year round
Probe height (meters)	4.4	4.4	4.4	4.4	4.3	3.7
Distance of low-volume PM instrument from other PM instruments are >1 meter?	NA	NA	NA	NA	Yes	NA
Distance from supporting structure (meters)	1.9	1.9	1.9	1.9	1.8	1.8

Humboldt Hill						
Pollutant	**O_3**	**NO_2**	**CO**	**SO_2**	**$PM_{2.5}$**	**$PM_{2.5}$**
Distance from obstructions on roof	N/A	N/A	N/A	N/A	N/A	N/A
Distance from obstructions not on roof (meters)	69	69	69	69	69	69
Height of Obstruction not on roof (meters)(cell tower)	59.4	59.4	59.4	59.4	59.4	59.4
Distance from trees (meters)	93	93	93	93	93	93
Distance to furnace or incinerator flue	N/A	N/A	N/A	N/A	N/A	N/A
Distance between collocated monitors (meters)	N/A	N/A	N/A	N/A	2	2
Unrestricted airflow (degrees)	360	360	360	360	360	360
Probe material	Teflon	Teflon	Teflon	Teflon	N/A	N/A
Residence time (seconds)	6	6	5	8	N/A	N/A
Operation of monitor meets requirements of appendices A, B, C, D, and E, where applicable	yes	yes	yes	yes	yes	no
Will there be changes within the next 18 months?	No	No	No	No	No	Yes
Is it suitable for comparison against the annual $PM_{2.5}$?	N/A	N/A	N/A	N/A	Yes	No. 88501 code requested. Does not meet correlation requirements. Waiver application submitted for January to May 18, 2016 data .

Site Name: Weaverville

The Weaverville site was established in 1995. It is located in downtown Weaverville near HWY 299 and is expected to represent neighborhood air quality.

Weaverville	
AQS ID	061050002
Latitude/Longitude (degrees)	40.7347667 N, -122.9411722 W
Location	Trinity County Courthouse
Address	11 Court Street, Weaverville
County	Trinity
Dist. to road	21 meters to highway 299
Traffic count	5,100 AADT for HWY 299
Groundcover	Paved
PEP audit	Information maintained by EPA
NPAP audit	Information maintained by EPA
$PM_{2.5}$ Flow audits	Performed biweekly by NCUAQMD, Performed biannually by ARB
Date of annual performance evaluation (2016 ARB flow audit)	June 7, 2016
2016 semi-annual $PM_{2.5}$ flow audits by ARB	June 7, 2016 November 9, 2016
Representative Area	Rural, no MSA in Trinity County
Pollutant	**$PM_{2.5}$**
Primary/QA Collocated/ Other	Primary
Parameter Code	88502
POC	1
Basic monitor objective	Air Pollution Data
Site Type	Population exposure
Monitor Type	SPM
Spatial scale	Neighborhood
Sampling method	731
Instrument manufacturer and model	Met One Bam1020
FRM/FEM/ARM	Non-FEM
Collecting Agency	NCUAQMD
Analytical Lab	N/A
Reporting Agency	ARB
Start date	March 2015

Weaverville	
Pollutant	**PM2.5**
Current Sampling Frequency	continuous
Sampling season	Year round
Probe height (meters)	8
Distance from supporting structure (meters)	2.4
Distance from obstructions on roof (meters)	N/A
Distance from obstructions not on roof	N/A
Distance from trees (meters)	15
Distance to furnace or incinerator flue	N/A
Distance between collocated monitors	N/A
Unrestricted airflow (degrees)	360
Probe material	N/A
Residence time	N/A
Operation meets requirements of appendices A, B, C, D, and E, where applicable	yes
Will there be changes within the next 18 months?	No
Is it suitable for comparison against the annual $PM_{2.5}$?	No

Site Name: Crescent City

The Crescent City site was established in 1998. It is located at the Crescent Elk Middle School. It is expected to represent neighborhood scale air quality.

Crescent City	
AQS ID	060150006
Latitude/ Longitude (degrees)	41.8725889 N -124.2036139 W
Location	Crescent Elk Middle School
Address	994 G Street
County	Del Norte
Dist. to road	64 meters to 9th Street
Traffic count	13400 AADT HWY101 CRESCENT CITY, ON L STREET AT 9TH STREET
Groundcover	Paved/grass
PEP audit	Information maintained by EPA
NPAP audit	Information maintained by EPA
Flow audit	bimonthly by NCUAQMD
Date of 2016 annual performance evaluation (ARB audit)	Not audited
Dates of two semi-annual flow audits occurring in 2016	Not audited
Representative Area	Del Norte County, Micropolitian Statistical Area, Crescent City Urban
Pollutant	**$PM_{2.5}$**
Primary/QA Collocated/Other	Other
Parameter Code	88502
POC	1
Basic Monitoring Objectives	AQI comparison
Site Type	Population exposure
Monitor Type	SPM
Spatial scale	Neighborhood
Sampling method	Light scatter EQPM-0311-195
Instrument manufacturer and model	Grimm 180
FRM/FEM/ARM	FEM
Collecting Agency	NCUAQMD
Analytical Lab	N/A
Reporting Agency	ARB
Start date	April 2016
Current Sampling Frequency	Continuous
Sampling season	Year round

Crescent City	
Pollutant	**$PM_{2.5}$**
Probe height	7
Distance from supporting structure	2
Distance from obstructions on roof	N/A
Distance from obstructions not on roof	N/A
Height of obstruction not on roof (meters)	N/A
Distance from trees	93 meters
Distance to furnace or incinerator flue	49 meters
Height of stack	4 meters
Fuel burned	diesel
Distance between collocated monitors	N/A
Unrestricted airflow(degrees)	360
Probe material	N/A
Residence time	N/A
Operation meets requirements of appendices A, B, C, D, and E, where applicable	No
Will there be changes within the next 18 months?	Yes
Is it suitable for comparison against the annual $PM_{2.5}$?	No. A waiver submitted for this instrument when it was located in Eureka. There is no justification to believe it would correlate to an FRM in this new location.

Review of Network

See Annual Network Plan, above.

Review of data comparability of the $PM_{2.5}$ continuous monitors

Most recently, The District received a waiver for the data collected during this comparison inception through December 29, 2015. The current waiver request seeks to include the complete data range of this collocation.

Data from January 1st[t], 2015 through May 18[th,] 2016 were analyzed. Data was evaluated using the EPA ARM Candidate Method Test. Two comparisons were run - the first meets the requirement for a waiver comparison. It also excludes data below 3 *u*g/m3.

A second comparison for the period August 2015 through May 18, 2016 was run, from which no data was excluded. The hope was that operations of the instrument had improved, and this was done to ascertain whether some improvement was being made. The results are below.

Data is available electronically on request.

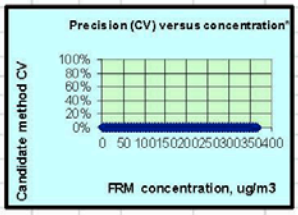
January 2015- May 2016, Excluding data below 3ug/m3

Summary - Candidate ARM Comparability

Applicant:	NCUAQMD
Candidate method:	excluding data below 3 ug/m3 - Class
Test site:	

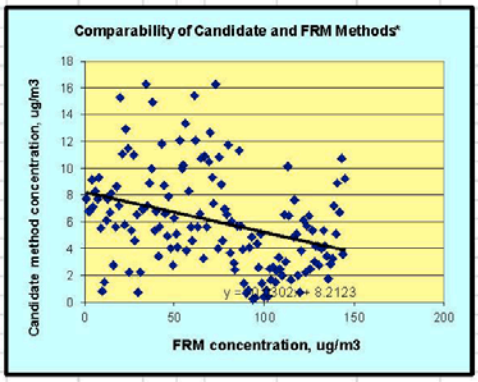
Data sets	Number	
Valid data sets available:	143	(Including 52 data sets excluded because FRM conc. < 3.)
Number of valid data sets required for ARM Comparison:	90	
Number of valid data sets for this test is:	OK	
Additional data sets needed:	--	

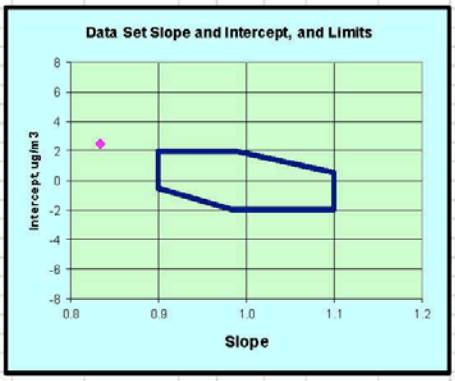
Precision (If data are available)	Data set mean, µg/m³ FRM	Data set mean, µg/m³ Candidate	Data set precision, µg/m³ FRM	Data set precision, µg/m³ Candidate	Relative precision (CV) FRM	Relative precision (CV) Candidate
Mean:						
Maximum:	0.0	0.0				
Minimum:	0.0	0.0				
Candidate / FRM Ratio:						
RMS Relative Precision for this site:						
Test requirements - Class III:					10.0%	15.0%
Precision Test Results for site:						



Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		0.834	2.507	0.57346
Limits for Class III	Upper:	1.100	2.000	
	Lower:	0.900	0.598	0.95000
Test Results (Pass/Fail):		FAIL	FAIL	FAIL

[1]Multiplicative bias [2]Additive bias





*If chart does not plot correctly, go to the Regression sheet and click on the ▼ in the Validity column and then on "ok." If new data are added, click "all" then "ok" to include the new data.

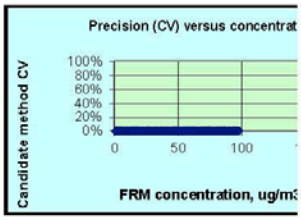
August 2015-May 2016, no exclusions.

Summary - Candidate ARM Comparability

Applicant:	NCUAQMD
Candidate method:	GRIMM180 - Class
Test site:	HUMBOLDT HILL - (Site location 06-023-1005)

Data sets	Number
Valid data sets available:	96
Number of valid data sets required for ARM Comparison:	90
Number of valid data sets for this test is:	OK
Additional data sets needed:	--

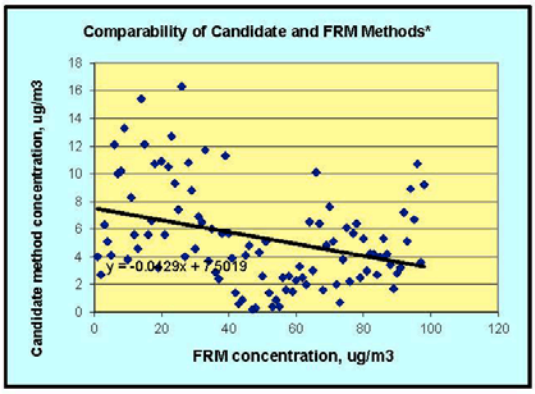
Precision (if data are available)	Data set mean, µg/m³		Data set precision, µg/m³		Relative precision (CV)	
	FRM	Candidate	FRM	Candidate	FRM	Candidate
Mean:	3.9	5.4				
Maximum:	10.9	16.3				
Minimum:	0.2	0.2				
Candidate / FRM Ratio:		138.7%				
RMS Relative Precision for this site:						
Test requirements - Class III:					10.0%	15.0%
Precision Test Results for site:						



Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		0.855	2.085	0.55813
Limits for Class III	Upper:	1.100	2.000	
	Lower:	0.900	0.246	0.95000
Test Results (Pass/Fail):		FAIL	FAIL	FAIL

[1]Multiplicative bias [2]Additive bias

Note: Precision statistics can be calculated only for data sets containing multiple FRM or multiple candidate ARM measurements.



*If chart does not plot correctly, go to the Regression sheet and click on the ▼ in the Validity column and then on "ok." If new data are added, click "all" then "ok" to include the new data.

Data:

	GRIMM 180	FRM
Date & Time	PM25_2	PM25_2
1/9/2015 00:00	7.7	7.1
1/12/2015 00:00	6.8	1.6
1/15/2015 00:00	6.8	10
1/18/2015 00:00	9.1	6.8
1/21/2015 00:00	7.1	5.3
1/24/2015 00:00	8.3	7.1
1/27/2015 00:00	7.7	6
1/30/2015 00:00	9.3	7.4
2/2/2015 00:00	5.5	1.7
2/5/2015 00:00	0.8	1.4
2/8/2015 00:00	1.5	2.7
2/11/2015 00:00	6.1	5.3
2/14/2015 00:00	7.7	5.3
2/17/2015 00:00	6.7	3.8
2/20/2015 00:00	8.1	5.9
2/23/2015 00:00	2.7	2.5
2/26/2015 00:00	5.6	3.7
3/1/2015 00:00	8.6	6.5
3/4/2015 00:00	7.2	5.9
3/7/2015 00:00	15.3	6.3
3/10/2015 00:00	11.1	4.3
3/13/2015 00:00	5.8	2.3
3/16/2015 00:00	12.9	2.3
3/19/2015 00:00	11.5	4.4
3/22/2015 00:00	2.2	1.8
3/25/2015 00:00	5.3	3
3/28/2015 00:00	11	9
3/31/2015 00:00	4.6	3
4/3/2015 00:00	6.5	4.9
4/6/2015 00:00	0.7	1
4/9/2015 00:00	2.2	2.5
4/12/2015 00:00	6.9	4.7
4/15/2015 00:00	6.9	5.7
4/18/2015 00:00	16.3	12.7
4/21/2015 00:00	7.2	7.2
4/24/2015 00:00	8.9	6.6
4/27/2015 00:00	10	2.2
7/2/2015 00:00	14.9	3.4
7/5/2015 00:00	5.3	2.3
7/8/2015 00:00	6.8	6.1
7/11/2015 00:00	3.4	2.9

7/14/2015 00:00	5.6	4.3
7/17/2015 00:00	11.8	12
7/20/2015 00:00	8.7	1.9
7/23/2015 00:00	6.6	6.1
7/26/2015 00:00	4.9	3.7
7/29/2015 00:00	7.9	9.6

	GRIMM 180	FRM
Date & Time	PM25 ug/m3	PM25_ug/m3
8/1/2015	4	3
8/4/2015	2.7	0.4
8/7/2015	6.3	5.9
8/10/2015	5.1	1
8/13/2015	4.1	5.1
8/16/2015	12.1	10.9
8/21/2015	10	8.1
8/23/2015	10.2	2.6
8/25/2015	13.3	7.6
8/28/2015	3.8	3
8/31/2015	8.3	5.7
9/3/2015	5.6	5.3
9/6/2015	4.6	4.3
9/9/2015	15.4	3.8
9/12/2015	12.1	1.8
9/15/2015	5.6	3.9
9/18/2015	6.6	3
9/21/2015	10.7	4
9/24/2015	3.2	3
9/27/2015	10.9	8
9/30/2015	5.6	5.5
10/3/2015	10.5	9.2
10/6/2015	12.7	7.9
10/9/2015	9.3	4
10/12/2015	7.4	4
10/15/2015	16.3	1.4
10/18/2015	4	2
10/21/2015	10.8	4.5
10/24/2015	8.8	5.5
10/27/2015	4.6	1.5
10/30/2015	6.9	2.9
11/2/2015	6.5	4.9
11/5/2015	11.7	10.9
11/8/2015	3.7	2.3
11/11/2015	6	4.1
11/14/2015	2.9	2.1
11/17/2015	2.4	2.3
11/20/2015	5.7	1.5
11/23/2015	11.3	4
11/26/2015	5.7	5.2
11/29/2015	3.9	4.1

12/3/2015	1.4	2
12/5/2015	0.6	1.3
12/8/2015	0.9	1.8
12/11/2015	4.1	4
12/14/2015	4.8	4.4
12/17/2015	0.2	0.4
12/20/2015	0.3	0.9
12/23/2015	4.3	3.9
12/26/2015	2.6	2
12/29/2015	5.1	3.4
1/1/2016	1.4	1.4
1/4/2016	0.4	0.7
1/7/2016	0.9	1.1
1/10/2016	0.4	0.6
1/13/2016	2.5	2.7
1/16/2016	1.6	3.3
1/19/2016	2.6	1.9
1/22/2016	1.5	2
1/25/2016	2.3	0.2
1/28/2016	3.3	2.6
1/31/2016	2.5	2
2/3/2016	2	2.3
2/6/2016	6.5	6.2
2/9/2016	3	3.7
2/12/2016	10.1	4.4
2/15/2016	6.4	2.4
2/18/2016	1.6	4.1
2/21/2016	4.8	2.4
2/24/2016	7.6	5.2
2/27/2016	5.1	5.4
3/1/2016	2	2.3
3/4/2016	0.7	1.3
3/7/2016	3.8	4.1
3/10/2016	6.1	7.3
3/13/2016	2.2	3.7
3/16/2016	5.7	4.5
3/19/2016	6.4	1.1
3/22/2016	2.5	2.9
3/25/2016	5.3	6.1
3/28/2016	3	4.3
3/31/2016	4.2	5.4
4/3/2016	4.2	2.4
4/6/2016	2.7	4.5

4/9/2016	4	4.3
4/12/2016	5.3	
4/15/2016	4.2	5.2
4/18/2016	3.4	
4/21/2016	1.7	2.3
4/24/2016	2.8	3.8
4/27/2016	3.2	4.6
4/30/2016	7.2	9.5
5/3/2016	5.1	6
5/6/2016	8.9	10
5/9/2016	6.7	7.5
5/12/2016	10.7	3.7
5/15/2016	3.6	1
5/18/2016	9.2	5.4

Waiver Request

Due to the failure of the Grimm 180, sn18A11018 data in these studies, the District requests an exclusion of PM2.5 data obtained from this Grimm 180 instrument for the period December 29, 2015 through May 18, 2016. The District requests to upload this data under the code 88502.

Attachment B - PM2.5 Grimm 180 sn18A10013 Preliminary Evaluation

Review of Network

See Annual Network Plan, above.

Review of data comparability of the $PM_{2.5}$ continuous monitors

Data from the Grimm 180 sn18A10013 to the Thermo 2000i has been compared since May 19^{t}, 2016 to the present date. Since comparison data is only available through December 2016, this collocation lacks the requirement of 23 data pairs in each season. Thus, this is not a waiver application, but rather an informational preliminary evaluation of the ongoing assessment.

The data was evaluated using the EPA ARM Candidate Method Test, the results are shown below. Data is available electronically on request.

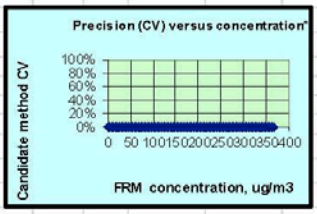
May through December 2016

Summary - Candidate ARM Comparability

Applicant:	NCUA QMD
Candidate method:	Grimm 180 sn 18A10013, insuffienct data - Class
Test site:	

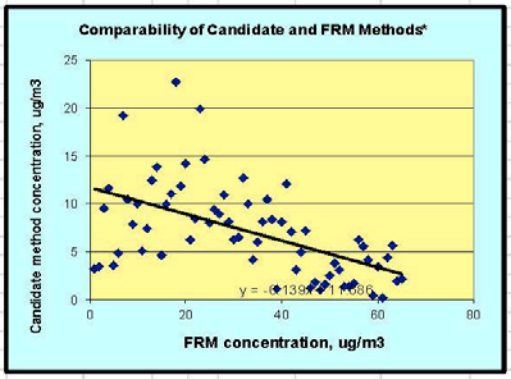
Data sets	Number
Valid data sets available:	65
Number of valid data sets required for ARM Comparison:	90
Number of valid data sets for this test is:	**Insufficient**
Additional data sets needed:	25

Precision (if data are available)	Data set mean, µg/m³		Data set precision, µg/m³		Relative precision (CV)	
	FRM	Candidate	FRM	Candidate	FRM	Candidate
Mean:						
Maximum:	0.0	0.0				
Minimum:	0.0	0.0				
Candidate / FRM Ratio:						
RMS Relative Precision for this site:						
Test requirements - Class III:					10.0%	15.0%
Precision Test Results for site:						



Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		1.043	3.688	0.42391
Limits for	Upper:	1.100	1.279	
Class III	Lower:	0.900	-2.000	0.95000
Test Results (Pass/Fail):		PASS	FAIL	FAIL

[1]Multiplicative bias [2]Additive bias



*If chart does not plot correctly, go to the Regression sheet and click on the ▼ in the Validity column and then on "ok." If new data are added, click "all" then "ok" to include the new data.

Data:

Date & Time	GRIMM 180 PM25_2	FRM PM25_2
5/21/2016 0:00	3.2	2.8
5/24/2016 0:00	3.4	2.3
5/27/2016 0:00	9.5	6.5
5/30/2016 0:00	11.6	6
6/17/2016 0:00	3.6	2.8
6/23/2016 0:00	4.8	2.3
6/26/2016 0:00	19.2	3.4
6/29/2016 0:00	10.5	5.7
7/2/2016 0:00	7.9	3.6
7/5/2016 0:00	10	6.6
7/8/2016 0:00	5.1	1.6
7/11/2016 0:00	7.4	2.3
7/14/2016 0:00	12.5	7.4
7/17/2016 0:00	13.9	3
7/20/2016 0:00	4.6	2.2
7/23/2016 0:00	10	4.9
7/26/2016 0:00	11	4.5
7/29/2016 0:00	22.7	3.9
8/1/2016 0:00	11.9	7.6
8/4/2016 0:00	14.2	3.4
8/7/2016 0:00	6.3	3
8/10/2016 0:00	8.5	4.3
8/13/2016 0:00	19.9	1.5
8/16/2016 0:00	14.7	4.2
8/19/2016 0:00	8	2
8/22/2016 0:00	9.4	2.1
8/28/2016 0:00	8.9	0.8
8/31/2016 0:00	10.9	1.8
9/3/2016 0:00	8.1	5.4
9/6/2016 0:00	6.3	3.4
9/9/2016 0:00	6.5	4
9/12/2016 0:00	12.7	10
9/15/2016 0:00	10	3.1
9/18/2016 0:00	4.2	1.2
9/21/2016 0:00	6	0.2
9/24/2016 0:00	8.1	3.4
9/27/2016 0:00	10.5	4.5
9/30/2016 0:00	8.3	5.8
10/3/2016 0:00	1.1	1
10/6/2016 0:00	8.1	2.6

10/9/2016 0:00	12.1	2
10/12/2016 0:00	7.1	3
10/15/2016 0:00	3.1	3.8
10/18/2016 0:00	5	3.8
10/21/2016 0:00	7.2	1.2
10/24/2016 0:00	1.2	1.7
10/27/2016 0:00	1.8	1
10/30/2016 0:00	1	1.2
11/2/2016 0:00	1.6	1.8
11/5/2016 0:00	2.5	2.6
11/14/2016 0:00	3.8	3.4
11/17/2016 0:00	3.1	3
11/20/2016 0:00	1.3	1.7
11/23/2016 0:00	1.3	1.7
11/26/2016 0:00	1.7	2.3
11/29/2016 0:00	6.2	8
12/2/2016 0:00	5.5	5.3
12/5/2016 0:00	4.2	3.2
12/8/2016 0:00	0.4	0.4
12/11/2016 0:00	3.4	2.6
12/14/2016 0:00	0.2	0.5
12/17/2016 0:00	4.4	3.8
12/20/2016 0:00	5.7	3.3
12/23/2016 0:00	1.9	1.7
12/26/2016 0:00	2.2	2.4

The District anticipates submitting a waiver application for this time period in the 2018 Annual Network Plan.