APPENDIX B

SAN LUIS OBISPO COUNTY
AIR POLLUTION CONTROL DISTRICT

2012 COMMUNITY PARTICULATE
MONITORING PROJECT

MONITORING PLAN

JANUARY 2012

Table of Contents

1.0 Project Description and Timeline 1

Study Design 1

Project Timeline 3

2.0 Monitoring Locations 4

Nipomo Mesa Saturation Monitoring Area 4

Oceano Saturation Monitoring Area 25

3.0 Monitor Siting Guidelines 27

Spacing from Obstructions 27

Spacing From Roads 28

Other Considerations 28

Site Evaluation 28

4.0 Sampler Operation and Quality Control Procedures 30

5.0 Project Quality Assurance and Methods Inter-Comparisons 34

6.0 Data Processing, Validation and Analysis 35

7.0 Final Report 37

Table of Figures

Figure 1 - Areas of Saturation Monitoring and Permanent Monitoring Stations 2
Figure 2 – Nipomo Mesa Monitoring Area with Grids Defined 5
Figure 3– Grid 1 6
Figure 4 – Grid 2 7
Figure 5 – Grid 3 8
Figure 6 – Grid 4 9
Figure 7 – Grid 5 10
Figure 8 – Grid 6 11
Figure 9 - Grid 7 12
Figure 10 - Grid 8 13
Figure 11 - Grid 9 14
Figure 12 - Grid 10 15
Figure 13 - Grid 11 16
Figure 14 - Grid 12 17
Figure 15 - Grid 13 18
Figure 16 - Grid 14 19
Figure 17 - Grid 15 20
Figure 18 - Grid 16 21
Figure 19 - Grid 17 22
Figure 20 - Easterly Extent Grid 23
Figure 21 - Southerly Extent Grid 24
Figure 22 – Region Surrounding Oceano Saturation Area 25
Figure 23 – Oceano Saturation Area and Potential Monitoring Sites 26

1.0 Project Description and Timeline

The San Luis Obispo County Air Pollution Control District (District) is undertaking a project to better understand the spatial distribution of the plume of particulates that originate from the Oceano Dunes State Vehicle Recreational Area (SVRA). The District plans to utilize saturation monitoring downwind from the OHV riding area and downwind from the Pier Avenue park entrance, focused on sensitive receptors and populated areas to map the spatial extent and concentration gradient of the windblown dust plume. Past studies by the District have clearly documented the plume presence immediately downwind from the riding area of the SVRA as well as the Pier Avenue area near the park entrance, this project will provide additional data that will be used by the District to better inform the public of the air quality impacts in sensitive receptors such as schools, environmental justice areas, and other populated areas downwind from the source.

Study Design

The core concept of saturation monitoring is siting monitors in a grid across the expected path of the plume being investigated. Data from the array of monitors is used to characterize the plume path and concentration gradient. Previous District studies have demonstrated that the plume of windblown particulate being investigated only occurs under conditions of strong northwesterly winds with the primary plume impacting the Nipomo Mesa. However, these studies have also documented high levels of particulate just downwind from the SVRA entrance on Pier Avenue, also when high northwesterly winds are present.

Therefore, for this project, there will be two saturation monitoring areas utilized, a large area in the populated portion of the Nipomo Mesa and a much smaller area in the community of Oceano. These general areas are depicted in Figure 1 below:

Figure 1 - Areas of Saturation Monitoring and Permanent Monitoring Stations

MetOne E-BAM samplers configured for PM-10 measurements will be utilized as saturation monitors for this project. The E-BAM measures PM-10 by beta attenuation and is capable of generating hourly PM-10 data. Most E-BAMs utilized will also be equipped with wind speed and direction sensors, allowing wind conditions across the study area to be characterized and related to the particulate values measured. The E-BAM is not a federally approved method for PM-10, so part of the study design is to document the relationship between federally approved monitors and the E-BAM monitors to allow data from the E-BAM to be compared to health standards as well as the data from the District permanent monitoring stations in the area that utilize federally approved methods.

Because sampling in the Oceano area is so close to the ocean, there is a high likelihood that the PM-10 mass measurements from the E-BAM samplers will be biased due to high salt conditions. Data from the Phase 2 study showed the highest bias of samples taken adjacent to the ocean due to salt under calm conditions and lower, but significant, contributions under high wind event periods. Therefore, the tape from approximately five wind events (comprising 4-5 hours in length each) from E-BAM samplers in the Oceano area will be analyzed for chloride ion to allow for sea salt contributions to the mass measurements to be calculated. These salt mass calculations will be used in analyzing all mass data for wind event periods collected in the Oceano area to account for sea salt contributions. Additionally, approximately 2-3 hours of high mass measurements while wind conditions are calm will also be analyzed for chloride ion to demonstrate the contribution of sea salt to the periods of calm, but high PM mass measurements.

Project Timeline

District monitoring in the area has shown that the windblown dust from the SVRA occurs during periods of strong northwesterly winds that tend to occur most often in the Spring season. In order to capture as many wind/dust events as possible, the sampling period for this project is proposed to be March 2012 through May 2012. The table below presents the major project milestones and expected timeline.

Task/Milestone	Expected Time Period
Site Selection and Equipment Acquisition	Expected period to be November 1, 2011 through February 1, 2012
QA Collocation of Samplers	February 1, 2012 through February 21, 2012
Sampler Installations	February 22, 2012 through February 29, 2012
Saturation Monitoring Period	March 1, 2012 through May 31, 2012
Analysis of Data and Final Report	June 1, 2012 through August 31, 2012

2.0 Monitoring Locations

Selecting appropriate locations such that a grid with sufficient density of monitors to characterize the plume as well as locations that are representative of the area around the monitor are essential in a successful saturation monitoring project. Siting of the individual monitors following guidelines to assure that the monitors are not unduly influenced by local sources and are representative of the general area the monitor location is described in Section 3 of this document. Selecting the appropriate general locations for the monitors is described below for each of the two saturation monitoring areas.

Nipomo Mesa Saturation Monitoring Area

Previous studies have demonstrated the northern boundary of the typical plume path over the Nipomo Mesa area to be south of Mesa Middle School. The southern boundary has not previously been defined, but the populated area stops just north of the Santa Maria River. The eastern boundary appears to be near to the District's Nipomo Regional Park permanent monitoring station, based on historical data.

With these approximate plume boundaries, the saturation monitoring area can be divided into approximately one square mile grids, as depicted in Figure 2 below. Locating a monitor in each grid will provide sufficient density to adequately define the plume extent and concentration gradient. It may not be possible to find a suitable location in each grid, but the overall goal should be to find a suitable location in as many grids as possible. Additionally, should it be impossible to find a suitable location in one grid, every effort possible should be made to ensure that a monitor is sited in grids adjacent to the grid without a monitor.

In addition to siting a monitor in each grid, it may be advantageous to locate at least one monitor in the populated area southeast of the grid area to demonstrate the eastern extent of the plume. Similarly, it would be advantageous to locate at least one monitor south of the grid area to demonstrate the southern extent of the plume.

As preliminary data is reviewed it may be advantageous to add or move one or more monitors to alternate locations based on the preliminary data. This flexibility will be utilized as a means of providing additional data that may be more representative of the plume rather than more localized conditions. If possible, it is advantageous to keep all monitors installed at the initial monitoring location to ensure that variations in plume path, that may not be apparent from the initial 6-10 dust events, are clearly documented. There may be situations where one or more site's data appears to not fit the overall plume pattern based on the grid of monitor's readings. In this case, if possible, a second monitor will be installed at an alternate location in the grid to confirm or disprove that the original monitor's data is not a representative measurement of the plume. Should there not be a spare monitor to perform this added monitoring, movement of an existing monitor to accomplish this second measurement can be considered.

The evaluation of moving site(s) will be made after at least 6-10 significant dust events have been captured by the original network of monitors. A site will only be moved if the data from the site to be moved either does not show any plume impact for any of the dust events, or the readings show a clear relationship to nearby permanent monitors. For a saturation site to show a clear relationship to a nearby permanent monitor, the correlation coefficient of a linear regression of the hourly averages during all dust events to date should approach 0.9 or greater.

Figure 2 – Nipomo Mesa Monitoring Area with Grids Defined

Figures 3 through 21 presented below present a close up of each grid by number with a discussion of potential monitoring locations and considerations in selecting an appropriate site for that grid. Note that these figures have been rotated about 20 degrees such that north is no longer up, but have been positioned so that the prevailing northwesterly wind direction moves from left to right across the grid. These figures will be used by project staff in searching for appropriate monitoring site locations.

Figure 3– Grid 1

Previous District monitoring in the Fall of 2011 at Lopez High School showed the plume presence at Lopez High School, but at PM-10 levels approximately ¼ of the PM-10 levels measured just over one mile south at the CDF station. The wind speeds at Lopez High were also 2 to 3 times lower than measured at the CDF station. It is possible that the dense eucalyptus trees upwind from the school were responsible for both the lower winds and PM-10 concentrations measured at the school.

Two general areas should be considered for this grid, and it may be a grid where two monitors should be located. Locating a monitor to the west of the eucalyptus groves would show whether the plume concentration is actually lower than the levels measured at CDF prior to encountering the dense trees, or whether the trees are responsible for the lower PM-10 measured at Lopez High School. A second potential location would be away from the groves of trees in the neighborhood in the northern section of the grid.

Figure 4 – Grid 2

The predominant feature of this grid is the Cypress Ridge residential development. This residential development is the most populated and is a location with citizens concerned about air quality. The best potential site would be in an open area or around the residential development.

Figure 5 – Grid 3

This grid has very little population and is mostly heavily vegetated open space and agricultural land. This grid may be a grid that does not get a monitoring location due to the lack of population as well as the lack of good potential locations. It may be possible to locate a monitor at one of the agricultural operations in the northern portion of the grid.

Figure 6 – Grid 4

The predominant feature in this grid is the Black Lake Golf Course and adjacent housing development. Unfortunately there are lots of trees surrounding many of the parts of this grid. The residential area near Woodgreen Way is quite dense and has a row of eucalyptus trees upwind making siting difficult in this area. The most likely potential sites in this grid would be one of the residences adjacent to the golf course or in the golf course itself.

Figure 7 – Grid 5

The most likely area in this grid for a suitable site is in the residential areas in the north or west portion of the grid. The areas with dense vegetation will likely be too obstructed to meet siting goals.

Figure 8 – Grid 6

This grid is mostly covered by low density residential areas, except the agricultural operations in the north. The most likely site in this grid would be in the open rural residential area.

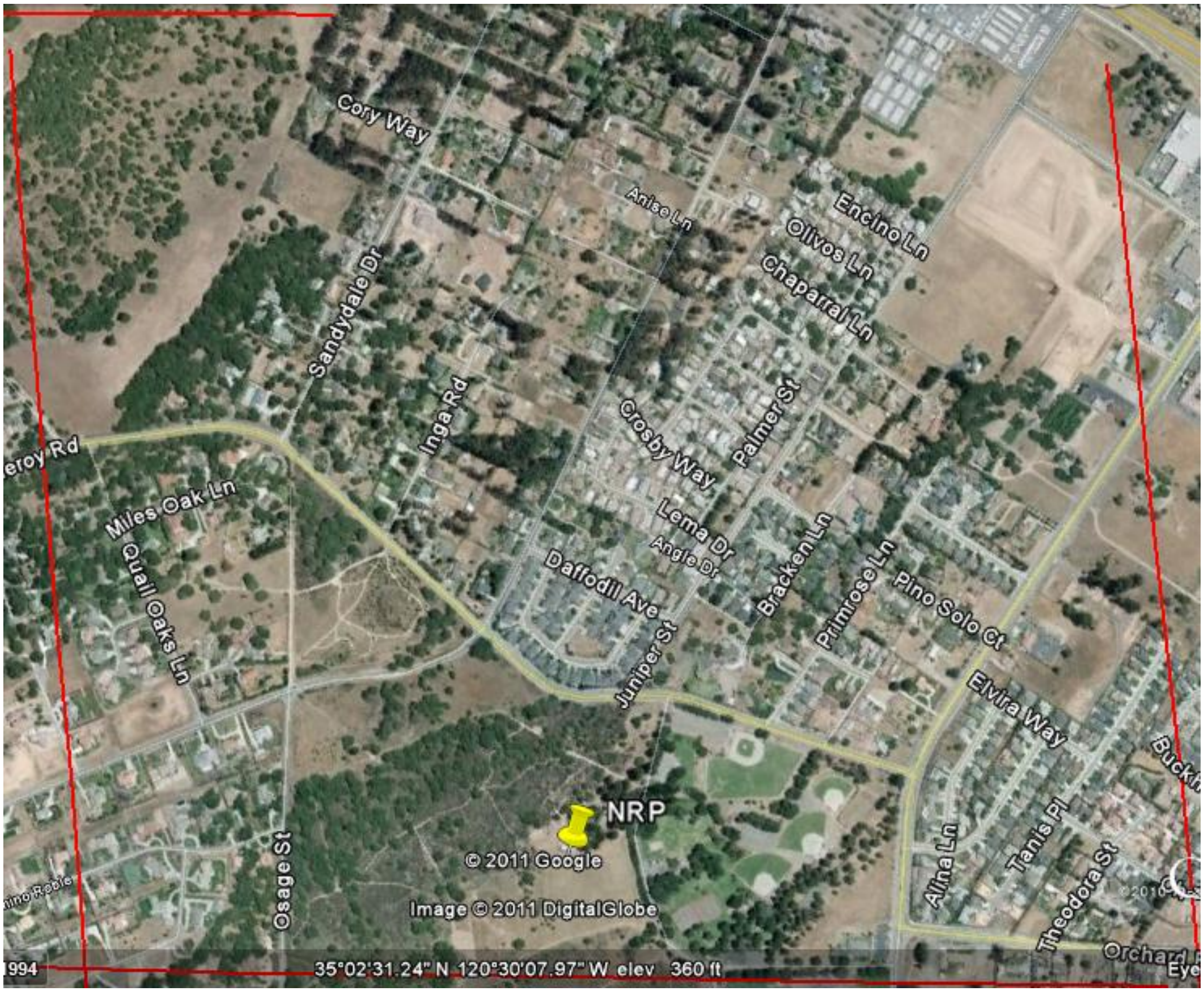

Figure 9 - Grid 7

This grid contains the District's Nipomo Regional Park permanent monitoring station. Data from this station shows it is only slightly impacted by the dust plume. Because there is a permanent monitoring station in this grid, there may be no need to locate a saturation monitor.

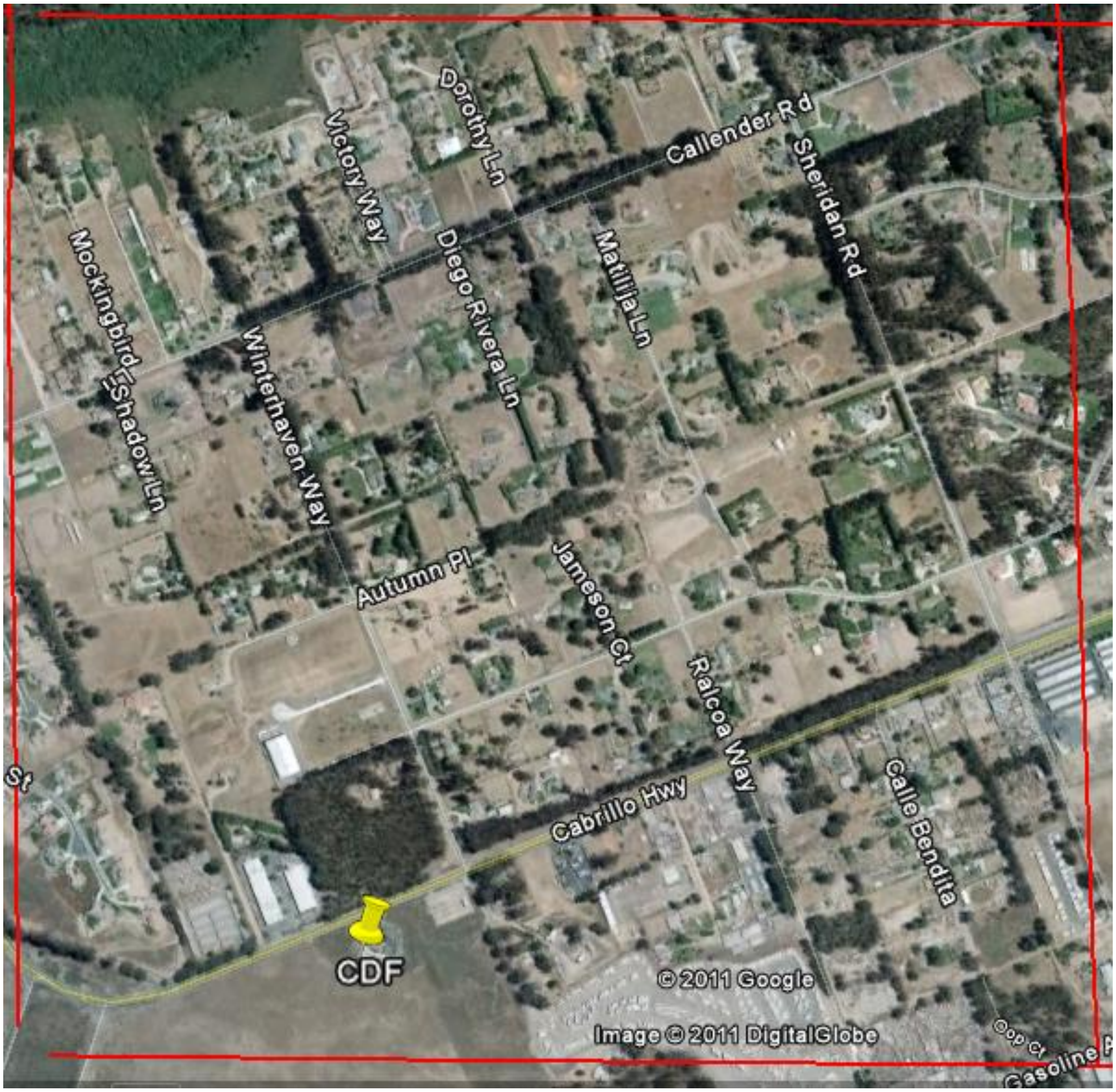

Figure 10 - Grid 8

This grid contains the District's CDF permanent monitoring station. The Phase 1 PM study had a monitor located on Calle Bendita that showed slightly lower concentrations than were measured at CDF. Even with the CDF monitor present in the grid, it would be advantageous to locate a monitor in the rural neighborhood north of the CDF site.

Figure 11 - Grid 9

This grid contains the location where the District's old Hillview site was located. Historical data from this site showed high concentrations of PM-10, but also appeared to be influenced by the dirt road running next to the monitoring site. This grid monitor should be located away from dirt roads and active agricultural operations to avoid the influence of local sources.

Figure 12 - Grid 10

This grid contains the northern portion of the Woodlands development. This residential development and the adjacent golf course is the preferred location for a monitor in this grid.

Figure 13 - Grid 11

The southwestern portion of this grid has the open area for the planned Woodland development that has yet to be built, with the exception of a few houses in the open area. Another area would be near the agricultural operations in the northern portion of this grid or the rural areas in the eastern area.

Figure 14 - Grid 12

The potential monitoring locations in this grid are the residential area in the north or non-active agricultural areas.

Figure 15 - Grid 13

This grid is just south of the grid with the Nipomo Regional Park (NRP) site. The NRP site is near the southern border of Grid 7, so it would be best to locate a monitor in the southerly portion of this grid.

Figure 16 - Grid 14

The predominant feature in this grid is the Woodlands development. Due to the population center of Woodlands and the concern of residents, a monitor should be located within the Woodlands development or the adjacent golf course. Care should be used to avoid any open un-vegetated areas yet to be developed as these areas could be localized windblown dust sources and areas downwind from eucalyptus trees.

Figure 17 - Grid 15

This grid is covered in many areas by thick dense vegetation that should be avoided. The best potential locations in this grid would be an open area in the rural neighborhoods of this grid or the extreme southern areas on the bluff overlooking the Santa Maria Valley.

Figure 18 - Grid 16

The western portion of this grid is densely vegetated and should be avoided. The only potential locations appear to be in the open areas of the rural neighborhood. Monitoring was performed in the Fall of 2011 at Lange Elementary School that is located on the eastern border of this grid. Data from Lange showed plume presence similar or slightly higher than at the Nipomo Regional Park permanent monitoring site.

Figure 19 - Grid 17

Lange Elementary School is located on the western border of this grid. Locating a site on the ridge overlooking the farmland would be a good location.

Figure 20 - Easterly Extent Grid

The best potential site location in this grid is the southern portion of the residential areas.

Figure 21 - Southerly Extent Grid

Most of this grid is composed of active agricultural fields. Locating a monitor in this location will require that the fields upwind of the location be planted to avoid the possibility of the upwind fields being a possible local source. Additionally, as the site is serviced, records will need to be maintained documenting that the upwind fields continue to be planted ensuring that they don't become a local source. The Bonita School was used as a monitoring site by Santa Barbara County APCD in the early 1990's. Wind data from the school site showed wind speeds significantly higher than measured at Mesa2.

Oceano Saturation Monitoring Area

Data from the Phase 2 monitoring site located at the Elks Lodge adjacent to Pier Avenue showed high 24 hour PM-10 concentrations on days with significant northwesterly wind events. Additionally, high values were also measured on days with calm winds. However, after analyzing the sample filters for chloride and subtracting out the contribution from sea salt, it was only days with high northwesterly wind events that recorded high 24 hour PM-10 values.

The region around the Oceano Saturation Monitoring Area is presented in Figure 22 below.

Figure 22 – Region Surrounding Oceano Saturation Area

District monitoring in the late Spring of 2011 at the Oceano Elementary School showed no detectable plume presence at the school. The plume of windblown dust appears to be present at high concentrations at the Phase 2 site on Pier Avenue, but undetectable less than a mile downwind at Oceano Elementary School. This suggests the possibility that the Phase 2 monitor was measuring a localized source in the area, possibly the sand tracked out onto Pier Avenue.

Monitoring locations in the Oceano Saturation Area should begin with a monitor at the same location as was used in the Phase 2 study at the Elks Lodge. Initially, two additional monitors could be deployed with one located to the south (Southerly #1) and one downwind (Downwind #1) as depicted in Figure 23 below. Note that the locations of these southerly and downwind monitors are only approximate; the exact location will need to be determined by availability as well as on site surveys. The Southerly #1 site will provide initial data demonstrating if the PM-10 concentration falls off quickly to the south of Pier Avenue. The Downwind #1 site will provide initial data demonstrating how far downwind from the Phase 2 site the plume of high concentration extends inland. After 5-10 strong wind events have been measured, the preliminary data will be evaluated and decisions on if moving any of the monitors is advantageous. Should the initial data show similarly high PM-10 concentration at either the Southerly #1 site and/or the Downwind #1 site as compared to the Phase 2 site, the two monitors could be moved to the Southerly #2 and Downwind #2 sites. Additionally, it may be advantageous to move one or more monitors in the dense residential areas adjacent to the beach to assess the levels of PM-10 present in this populated area in order to document the PM10 concentrations in the most populated portion of this area.

Figure 23 – Oceano Saturation Area and Potential Monitoring Sites

3.0 Monitor Siting Guidelines

These siting guidelines will assist in the selection of the approximately 20 specific monitoring locations that will be used for this study. The goal in siting the monitors in the populated area of the Nipomo Mesa, will be to select a location that is representative of the average particulate concentration of the surrounding area of approximately 1 square mile. The goal in siting the monitors in Oceano is to select monitoring locations that will help understand the source area/mechanism as well as the spatial extent of the area of high particulate concentration. Because the entire community of Oceano is approximately one square mile, the monitors' area of representativeness will be smaller than the monitors on the Nipomo Mesa.

EPA provides ample guidance for adequate siting criteria for locating an ambient air monitor. For this special purpose monitoring project, we are defining the guidelines based on EPA guidance and the manufacturer's recommendations, but with flexibility to accommodate the sampling needs according to the goals of this project. The proposed spatial distribution of the E-BAMs on the Nipomo Mesa is approximately 1 mile apart, and will aim to measure PM10 and meteorological conditions that are as representative as possible for the majority of the one square mile area covered by each monitor. For these reasons, it is appropriate to incorporate EPA 40CFR Appendix E guidelines for the middle scale (100 meters to 0.3 miles) and neighborhood scale (0.3 to 2.5 miles). The spatial distribution of the E-BAMs in Oceano will be much smaller, so the microscale to middle scale guidelines should be utilized for this portion of the project. In addition, for this project, the optimal location for ambient monitoring is where the E-BAM is near the breathing zone and based on EPA guidance if at all possible between 2-5 meters above ground level.

There are other practical considerations such as prevention of vandalism, security, accessibility, availability of electricity that should be noted when selecting final location for the sampler. Because previous studies have clearly demonstrated that windblown dust and sea salt are the overwhelming particulate sources in this area siting should focus on representative measurements of these sources. So while every attempt will be made to adhere to EPA guidance, it may be necessary for some monitors to be sited in locations that do not exactly meet the EPA criteria. For all locations whether or not the EPA criteria is met, the site conditions will be documented on the site evaluation checklist.

SAFETY NOTE: IF THE SAMPLER IS TO BE PLACED ABOVE GROUND LEVEL, THE SAMPLER MUST BE POSITIVELY SECURED TO PREVENT IT FROM FALLING. IF A SAMPLER IS DROPPED OR FALLS FROM HEIGHTS ABOVE 3 METERS, MET ONE RECOMMENDS HAVING THE SAMPLERS SENT BACK FOR RADIATION LEAK TESTING.

Spacing from Obstructions

In general, the E-BAM should be placed in an area free of obstructions; also, there must be unrestricted arc airflow of no less that than 270 degrees around the E-BAM. Under any circumstances, no part of the prevailing (northwesterly) wind direction should be obstructed.

If the E-BAM is placed within an enclosure, the sampler must be at least 2 meters away from wall(s), parapets, etc. The sampling inlet head must be at least 1 meter above the highest point of wall(s) or parapet.

Vegetation (trees or shrubs that protrude above the height of the sampler inlet) provide surfaces for particulate deposition and also restrict flow; therefore the sampler should be at least 20 meters away from the vegetation drip line and/or at a distance equivalent to two and half times the maximum height of the vegetation or the structure protrudes above the sampler inlet.

Spacing From Roads

In general, ambient monitors should be placed beyond the concentrated particle plume generated by the traffic. However, for this project attention must be paid not to be in the path of other potential sources like roads, chimneys, fire places, exhaust of any kind, boilers, combustion engines, air conditioners, dirt roads, etc. If the selected location is upwind of the road, the distance to the edge of the road should be greater than 5 meters. However, if the location is downwind of a road, the distance to the edge of the road should be no less than 20 meters. Under well documented circumstances flexibility will need to be utilized in siting monitors near roads. Considerations can be made based on the typical traffic count and whether the roadway is paved or not. It is important to remember that the windblown dust source is only present under high northwesterly winds and these same high winds will cause a dramatic decrease to near-roadway PM concentrations due to increase atmospheric mixing.

Other Considerations

The sampler is not to be placed in an unpaved area, unless there is sufficient material(s) in place to help with dust mitigation.

Site Evaluation

The attached form presented below as Figure 23 is used to summarize the applicable site conditions needed to evaluate, approve, or reject each potential monitoring location. In addition to prompting the evaluation of the most important site conditions, the form and attached photographs will be useful in evaluating the data from each monitoring site.

SITE EVALUATION CHECK LIST

Notes by:				Date:	
Grid #		Address:		Latitude:	
Site ID#		Contact Name:		Longitude :	

DESCRIPTION	NOTES		
Safe Access to Location: (Good, Excellent, Not Sure)			
Recommended EBAM Location: (ground, scaffold)			
Location's Ground Cover: (dirt, grass, asphalt, etc.)			
Wind Flow Arc: (270°, >270°, <270°)			
Height of Tallest Obstruction above proposed sampler inlet:		Describe:	
Distance from closest Vegetation(s):			
Distance from Closest Structure:			
Closest Traffic Description:		Road Type:	
Distance to Closest Edge of Road:		Traffic Count < 30,000 AADT:	
Identify Potential nearby PM Sources: Yes NO		Describe:	
Distance to Potential PM Source:			
Photos Taken of site and in the four cardinal directions?	YES/NO		
Site Recommended:	YES/NO		
Comments:			

Figure 23 – Site Evaluation Form

4.0 Sampler Operation and Quality Control Procedures

The specific details of sampler operation are contained in the SLO APCD Standard Operating Procedures (SOP) for MetOne E-BAM a sampler that is attached as Appendix A of this document. This SOP will be followed for the Community Monitoring Project.

The general protocol for sampler operation including quality control checks for this project is as follows:

Task	Interval
Review Data	Daily
Flow, Temp, Press Verification	Bi-Weekly
Confirm Operation of auxiliary sensors	Bi-Weekly
Review overall sampler set-up	Bi-Weekly
Clean Inlet and SCS if used	Monthly
Pump Test	Bi-Monthly
Replace Tape	Bi-Monthly
Clean inlet tube and cabinet	Semi-Annually
Perform Mass Calibration/Verification	Semi-Annually
Perform Full Calibration	Annually

The specific procedures for these tasks are presented in Appendix A.

The table below presents an approximate timeline for performing these checks for this project:

TASK	APPROXIMATE DATE PERFORMED	COMMENT
Initial Check out and Full Calibration of EBAM including Mass calibration, configuration and cleaning.	1/25/12 to 2/1/12	Performed at District Office
Install at Mesa2/NRP for Collocation. Perform verification and overall sampler checkout	2/1/12	Upon installation at Mesa2/NRP for QA comparison
Verifications, confirm operation of aux sensors	2/14/12	While Samplers are at Mesa2/NRP
Verification, clean inlet, and confirm overall operation	2/21/12	Just prior to shutdown
Verifications, confirm operation of aux sensors, overall sampler set up. Begin saturation monitoring.	3/1/12	Upon installation for saturation monitoring
Verifications, confirm operation of aux sensors, overall sampler set up, clean inlet, perform pump test and replace BAM tape	3/14/12	While sampler is installed for saturation sampling.

TASK	APPROXIMATE DATE PERFORMED	COMMENT
Verifications, confirm operation of aux sensors, overall sampler set up	3/28/12	While sampler is installed for saturation sampling.
Verifications, confirm operation of aux sensors, overall sampler set up, and clean inlet	4/11/12	While sampler is installed for saturation sampling.
Verifications, confirm operation of aux sensors, overall sampler set up	4/25/12	While sampler is installed for saturation sampling.
Verifications, confirm operation of aux sensors, overall sampler set up, perform pump test, clean inlet, and replace BAM tape	5/9/12	While sampler is installed for saturation sampling.
Verifications, confirm operation of aux sensors, overall sampler set up	5/23/12	While sampler is installed for saturation sampling.
Verifications, confirm operation of aux sensors, overall sampler set up. Perform Mass Calibration.	6/1/12	Just prior to shut down
Equipment shutdown calibration and sampler removal	6/1/12 to 6/5/12	Bring samplers and equipment to District office for final cleaning and EBAM reconfiguration for return to owner

In addition to performing the QC checks on the approximate schedule presented above, any time a verification QC check shows an out of tolerance condition or following a major repair of the sampler, a full calibration will be performed on the sampler.

The initial checkout and full calibration performed prior to deployment in the District laboratory will include operating all samplers for a few days and analyzing the data from each sampler to identify problems or issues such as noisy detectors or other sampling problems not identified in the initial evaluation and calibration of the samplers. Additionally, each sampler will be given a unique two digit sampler ID and this ID shall be input into the samplers memory following the procedure described in section 3.2 of the E-BAM SOP. Note that some samplers borrowed from other agencies may not allow changing the ID due to data acquisition issues, in these cases keep the original ID and ensure that no other sampler used for the project is configured with this ID. After each sampler has been assigned a unique ID, a listing of all samplers ID shall be entered into a spreadsheet that will be utilized to keep track of each sampler's location over the course of the project.

A paper form, presented below as Figure 24 will be attached to the inside of each E-BAM door and will be utilized to keep track of both the E-BAM location over the course of the project as well as QC checks. In addition to the records on Figure 24, the details and results of each check of the sampler will be documented on a paper form in the field that is later entered into a spreadsheet as described in the E-BAM SOP.

SAN LUIS OBISPO COUNTY APCD
COMMUNITY MONITORING PROJECT
EBAM RECORD OF LOCATION AND QUALITY CONTROL CHECKS

EBAM SAMPLER ID	

SAMPLER LOCATION		INSTALLATION		REMOVAL	
Street Name:		Date:		Date:	
Grid#		Time:		Time:	
Street Name:		Date:		Date:	
Grid#		Time:		Time:	
Street Name:		Date:		Date:	
Grid#		Time:		Time:	

QUALITY CONTROL VERIFICATIONS																
QC PERFORMED BY:																
QC ITEMS	**DATE**		**DATE**		**DATE**		**DATE**		**DATE**		**DATE**		**DATE**		**DATE**	
	As-is	Final	As-is	Final	As-is	Final	As-is	Final	As-is	Final	As-is	Final	As-is	Final	As-is	Final
LEAK CHECK																
SAMPLE FLOW																
AMB. TEMP.																
AMB. PRESS.																
WD 180˚ & AMB.																
WS 0 & AMB.																
VERTICAL																
PUMP TEST																
ERRORS DETECTED																

COMMENTS

ADDITIONAL QUALITY CONTROL								
QC PERFORMED BY:								
QC ITEMS	**DATE**	**DATE**	**DATE**	**DATE**	**DATE**	**DATE**	**DATE**	**DATE**
2-W SELF TEST								
4-W INLET CLEAN								
4-W CABINET CLEAN								
8-W TAPE CHANGE								
8-W CABINET CLEAN								
8-W MASS CALIB.								
#-W FULL CALIB.								
COMMENTS								

Figure 24 – Field Record of EBAM Location and QC checks

As mentioned in section 1 of this document, quartz tapes from samplers operated in the Oceano Saturation Area will have some of the tape deposits analyzed for chloride ion. In order to be able to accurately identify the specific deposition spot on the tape and relate it to the corresponding mass measurement performed by the E-BAM sampler, the quartz tape on all E-BAM samplers used for this project shall be annotated with site name as well as date and time. This annotation will be performed when a new quartz tape is installed, whenever the E-BAM sampler is visited, and when the quartz tape is removed. Exposed quartz tapes will be stored in the plastic bag and box from the original unexposed tape. The box will be labeled with the sampler ID, beginning date/time of tape, and ending date/time of the tape. Exposed tapes shall be stored in a designated location in the District laboratory at room temperature prior to selection of tapes to be analyzed. Annotating and storing tapes from all samplers will allow both the chloride analysis of selected portions of tapes from the Oceano Saturation area but visual inspection of tapes from all locations. Tape section to be analyzed shall be sent for analysis with the laboratory chain of custody form utilized by the analyzing laboratory.

In order to account for trace levels of chloride present in the quartz tape a series of field and trip blanks will be taken and analyzed by the laboratory. A field blank will be performed by replacing the E-BAM sampler's inlet with a HEPA filter and allowing the sampler to sample normal ambient air for at least 5 hours. The first 3 hours tape deposits will be discarded and one or more of the remaining tape deposits will be utilized as field blanks. Trip blanks will simply be portions of the quartz tape that were not sampled, but were present in the sampler while the sampler was deployed.

5.0 Project Quality Assurance and Methods Inter-Comparisons

Independent quality assurance oversight for this project will be performed by separate QC-staff of the San Luis Obispo County APCD. QC-staff will review all QC check documentation for accuracy as well as assuring that the procedures utilized follow those outlined in this document as well as the E-BAM SOP. In addition, QC-staff will review and approve the analysis of the methods inter-comparison between the E-BAM samplers and the federally approved monitoring method that will be performed at the District's Mesa2 and Nipomo Regional Park (NRP) monitoring stations prior to the saturation sampling, including approval of any correction factors to the data. And finally, QC-staff will review and approve the validation of all data utilized in the analysis of data for this project.

All E-BAM samplers utilized for this project will be operated adjacent to the District's Mesa2 or NRP monitoring stations for the approximate period of February 1, 2012 through February 21, 2012. This period of collocation of all E-BAM samplers with the Met One BAM 1020 (Federal Equivalent Method FEM) will establish the relationship between each E-BAM sampler and the FEM. This comparison will focus on the relationship between the two methods when dust events are being measured. The results of the comparison will be used to calculate correction factor(s) to E-BAM data to make the E-BAM data equivalent to the federally approved PM-10 method.

Initially two E-BAM samplers will be collocated at the NRP monitoring site with the remainder of E-BAM samplers collocated at the Mesa2 monitoring site. After sufficient wind events have occurred to see a consistent relationship between the monitors at the NRP and Mesa 2 sites, the two E-BAM samplers at NRP will be replaced with two samplers from the Mesa 2 monitoring site. Cycling of E-BAM samplers between the Mesa 2 site and the NRP site will be performed to establish a consistent relationship between the E-BAM monitors and the FEM monitors at both the Mesa2 and NRP monitoring locations.

6.0 Data Processing, Validation and Analysis

After the saturation sampling begins, as the raw data from the EBAM samplers is collected it will be reviewed in a routine basis seeking to assess normal instrumentation operation and to identifying and documenting values of concern. A more in depth data processing and validating will begin as soon as feasible and will continue as more EBAM data is retrieved. The data processing and validation steps are outlined below:

1) Validate sampler data using the results of QC checks, operational data from the EBAM data file and other documentation that describes sampler operation.
    a. Any data not bracketed by checks showing the sampler to be operating within allowable tolerance shall be invalidated. Should the data be bracketed by one valid check and a clear failure of the sampler that can be documented, the data is validated (up to the point of failure of the sampler) only if the analyst has no reason to question if the sampler was operating within tolerance just prior to the failure.
    b. Any data with a raw data file demonstrating that the sampler was operating outside allowable tolerances shall be invalidated.
    c. Any data that shows unrealistic or unusual values will be investigated and a determination made as to the likely validity of the data in question.
2) Apply any needed correction factor(s) identified in the methods comparison discussed in Section 5 of this document.

After thorough data analysis from the saturation monitoring that contains sufficient wind events has been validated, analysis of the relationship between the array of saturation monitors (and as well the permanent monitors) in the area will begin. This preliminary analysis will be utilized to:

1) Identify any monitoring locations that do not conform to the overall spatial distribution of particulates across the study area. Should these "outliers" be observed in the preliminary data analysis, an investigation will be made of those locations to try and understand the cause of the outlying data. If the cause is likely due to siting deficiencies, every attempt will be made to correct that deficiency and/or locate an additional monitor in a more suitable location.
2) Identify monitors that have served their purpose at the initial location to describe the plume and would better serve the overall study goals to be moved to a new location.
3) For the Oceano study area, determine if moving the southerly or downwind monitors farther to the south or downwind to help determine the extent of the plume.

As this "on the fly" analysis is being performed, some monitors may be moved to new site locations or additional spare monitors may be sited. See the discussion on adding/moving monitors in Section 2.0.

Following completion of the saturation monitoring and validation of the entire data set, the following analysis steps will be performed for the Nipomo Mesa saturation area sampler data:

1) Analyze the data to identify if different wind events produce significantly different spatial distribution of particulate concentrations. If possible, determine what factors cause the different distribution of particulate concentrations.

2) Explore the influence of factors other than the normal dispersion of particulates. For example, investigate the influence of dense groves of trees on wind speeds, and particulate concentrations.
3) Produce graphs of each sampler's data in relation to nearby permanent District particulate concentrations.
4) Produce plots of maximum particulate concentrations from each sampler and approximated isopleths on a map of the study area.

Following completion of the saturation monitoring and validation of the entire data set, the following analysis steps will be performed for the Oceano saturation area sampler data:

1) Calculate the sea salt contribution from chloride analysis performed on selected wind event periods from the Oceano monitoring area. Evaluate the sea salt data in relation to all wind event data, calculating the levels and variability of the sea salt contribution. If possible, calculate and apply a correction factor to all wind event PM-10 data from the Oceano study area that subtracts the approximate sea salt contribution from the total mass. Note this correction factor will only be utilized if the results of the sea salt measurements demonstrate a low variability of the salt concentration between the samples analyzed.
2) Perform an analysis of the data from the area to identify the typical spatial distribution, and spatial variability of PM-10 concentrations in the area.
3) Based on the analysis in step #2 above, attempt to determine the source or sources of the PM-10 impacting the area.

7.0 Final Report

Following analysis of data, a final report will be produced that summarizes the results of the project. This main body of the report will include:

1) Summary of Project and Study Design
2) Results of the data analysis (including graphs and plots)

    a. Discussion on how different wind events produce different spatial distribution of plume concentrations or if the data shows little difference between events.
    b. Discussion of any observations from the data on other factors influencing concentration distributions such as trees.
    c. Graphs of each saturation monitor in relation to nearby permanent monitor.
    d. Plots of data including isopleths.

3) Discussion on the major findings of the project.

The report will also have Appendices that include:

1) Documentation of the conditions at each monitoring site utilized for the project.
2) A summary of the analysis of the methods inter-comparison and any correction factors that were used in the project.
3) Summary of all QC checks and other sampler operation documentation from all samplers utilized for the project.
4) Complete listing of the validated data from each sampler used in the saturation monitoring portion of the study.