San Joaquin Valley
Air Pollution Control District

APR - 1955

Policy for PSD Modeling
District Rule 2410
Guidance for Selecting a Representative Monitoring Site(s)

Approved By: _____ Date: June 25, 2014

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Director of Permit Services

I. Purpose

The purpose of this guidance is to provide the rationale for determining a representative monitoring site for use in PSD modeling.

II. Applicability

This policy applies to all PSD projects requiring a Cumulative Impact Assessment.

III. Definitions

Vicinity: for the purpose of this policy, is defined as 10 kilometers from the maximum impacted receptor found during the SIL (Significant Impact Level) assessment.

Significant Impact Area (SIA): is the area, more specifically the receptors, in which the modeled concentration is equal to or greater than the SIL value for a given regulated criteria pollutant.

IV. Background

Guidance on selection of a background monitor is provided in 40 CFR Part 51, Appendix W, 8.2.a & b[1] which states "... Background air quality includes pollutant concentrations due to: (1) Natural sources; (2) nearby sources other than the one(s) currently under consideration; and (3) unidentified sources." and "...Typically, air quality data should be used to establish background concentrations in the vicinity of the source(s) under consideration. ...".

[1] 40 CFR Part 51 Appendix W http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol2/pdf/CFR-2013-title40-vol2-part51-appW.pdf

40 CFR Part 51, Appendix W, 8.2.2 and 8.2.3[2] goes on to recommend two options 1) "Recommendations (Isolated Single Source)" and 2) "Recommendations (Multi-Source Areas)". Each of these options is broken down into two additional components by which to determine the appropriate background monitor for modeling purposes.

V. Representative Monitor Determination

When conducting modeling for determining compliance with District Rule 2410[3], the District considers several criteria in order to determine if the selected monitoring site is adequate to represent the background conditions in the vicinity of the proposed site. The determination of the representativeness of a site is done on a pollutant by pollutant basis.

CAUTION!!

1. The determination of one pollutant cannot be used as the basis for another pollutant.
2. With the most recent changes to the AERMOD dispersion model, more than one monitoring site may be utilized.

The criteria used by the District are listed below in no specific order. It must be noted that some criteria are based on professional judgment. Additionally, this list should not be taken as being all encompassing. The reviewing agency should be consulted to ensure that all needed information is considered.

- Regulatory Requirement;
  - The proximity of the monitoring site to the area under consideration;
- Sources impacting a Monitor
  - Natural sources;
  - Nearby sources;
- The period of time during which data are collected;
- The complexity of the terrain;
- Model Requirements;
- Area of Significant Impact (Using the SIL Assessment);
- Multiple Monitor Site Selection

a. Regulatory Requirement

As noted above Appendix W provides guidance for two options 1) Isolated Single Source and 2) Multi-Source Areas. Each of these is discussed below:

i. Isolated Single Source

The guidance provides for two options depending on the location of the proposed monitoring site.

- If the proposed monitor is located in the vicinity of the maximum impacted receptor, the monitor is considered to be representative.
  - If more than one monitoring site is located in the vicinity of the maximum impacted receptor then it is recommended that Appendix W section 8.2.2(b) be consulted for further guidance.

[2] 40 CFR Part 51 Appendix W http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol2/pdf/CFR-2013-title40-vol2-part51-appW.pdf

[3] District Rule 2410 http://www.valleyair.org/rules/currntrules/Rule_2410_eff_11.26.2012.pdf

- If no monitor is located in the vicinity of the maximum impacted receptor then a regional monitor may be selected with approval of the reviewing agency.

ii. Multi-Source Areas

The guidance for this scenario provides for two components 1) the contribution of nearby sources and 2) the contribution from other sources.

- As noted in the District's policy entitled "Guidance for Identifying Sources to be Evaluated for Inclusion in a Cumulative Impact Assessment"[4] nearby sources / other sources must be evaluated for inclusion in the cumulative impact assessment.

b. Sources Impacting A Monitor

When selecting a monitor it is import to understand the sources impacting the monitor. Having this understanding will ensure that the best monitor is being selected. A monitor can be impacted by nearby sources, natural sources, unidentified sources, and other major and/or minor sources. Comparing the sources impacting the monitor with those in the vicinity of the SIA will provide an indicator of the appropriateness of the monitor being selected.

c. Model Requirements

An important consideration when selecting a background monitor is to ensure that the monitor complies with other requirements. For example, data completeness is one of the most import things to consider when addressing the NO2 standard. This standard requires that the monitor have three years of valid data. This requirement is even more stringent when performing a Tier III evaluation, which requires both NO2 and O3 data to be from the same monitor and from the same years.

d. Professional Judgment

Some factors used when considering if a monitor is representative of the vicinity of the maximum impacted receptor are considered professional judgment. It is recommended that the information needed/used in making a professional judgment be gathered into a table format such as in Table 1. This will provide a clear understanding of all the factors being considered. It is recommended that the reviewing agency be consulted to determine, at a minimum, what information may be required for a specific case. Table 1 below summarizes the criteria listed above to ensure the most appropriate / conservative monitoring site is selected. The example below shows how two sites compare based on the criteria used by the District to ensure that a representative site is selected. A blank table is provided at the end of this policy for convenience.

NOTE!!

The information provided in the table below is only an example of the data required. Additional information may be required by the reviewing agency based on the modeling scenario being considered.

[4] District Web Link Here

Table 1 Criteria for Background Monitor Selection

Requirements	*[Site Name 1]*	*[Site Name 2]*
Regulatory Purpose	*[Determine compliance with 1-hour NO2 NAAQS]*	
Meteorological Data Used	*[Indicate the years used for modeling]*	
Purpose of Background Data	*[Background data to be paired (Hour by Hour) with the meteorological dataset to determine the NO_2 concentration in the area of significant impact.]*	
Area of Significant Impact	*[The significant impact area extends out to ~8 miles from the facility, see Figure XXX.]*	
NO_2 / O_3 Data Availability	Yes	Yes
NO_2 / O_3 Data Completeness	Yes	No Shut down in 2010

NO_2 Design Value Validation Check (3-Year Average)

Year	Conc. (ppb)	Valid	Year	Conc. (ppb)	Valid
2006	61	Y	2006	39	Y
2007	64	Y	2007	38	Y
2008	63	Y	2008	34	N
2009	53	Y	2009	32	N
2010	48	Y	2010	30	N

O_3 Design Value Validation Check (3-Year Average)

Year	Conc. (ppm)	Valid	Year	Conc. (ppm)	Valid
2006	0.089	Y	2006	0.110	Y
2007	0.088	Y	2007	0.107	Y
2008	0.089	Y	2008	0.108	Y
2009	0.085	Y	2009	0.105	Y
2010	0.088	Y	2010	0.104	Y

Proximity to Project Site (mi)	~13	~34
Terrain	Flat	Flat
SIA Area	Rural	
Monitor Location	Rural-Urban / In Town / Farmland	Rural / Farmland
Natural Sources	---	---
Nearby Sources	Roads/ Farmland / Small Town / Railroad	Roads /Farmland / Small Town ~2.5mi W
Other Factors (Multiple Site Determination)	The natural wind flow patterns in the San Joaquin Valley would indicate that the***[Site Name 1]*** site would best represent current background concentration (summer) and would be the site impacted by the facility once it commences operation (winter), see figure 1 & 2.	

Conclusion:

When selecting a monitoring site for use in showing compliance with District Rule 2410, some criteria used are quantitative and some are qualitative in nature. It should be noted that the ***[Site Name 2]*** monitor did provide higher ozone values (~23%) than that of the ***[Site Name 1]*** monitor; however. when comparing the NO_2 concentrations ***[Site Name 2]*** was significantly lower (~56%) than the ***[Site Name 1]*** monitor.

Based on the information above the ***[Site Name 1]***, is the nearest upwind monitor, is a conservative estimate of current background in the vicinity of the SIA, has the best quality of data for both NO_2 and O_3 (the data quality is far superior to ***[Site Name 2]***, and is more appropriate geologically and meteorologically

Therefore, when taking all the parameters into consideration the District has determined that the ***[Site Name 1]*** site would provide a more conservative estimate of the background concentration in the vicinity of the SIA.

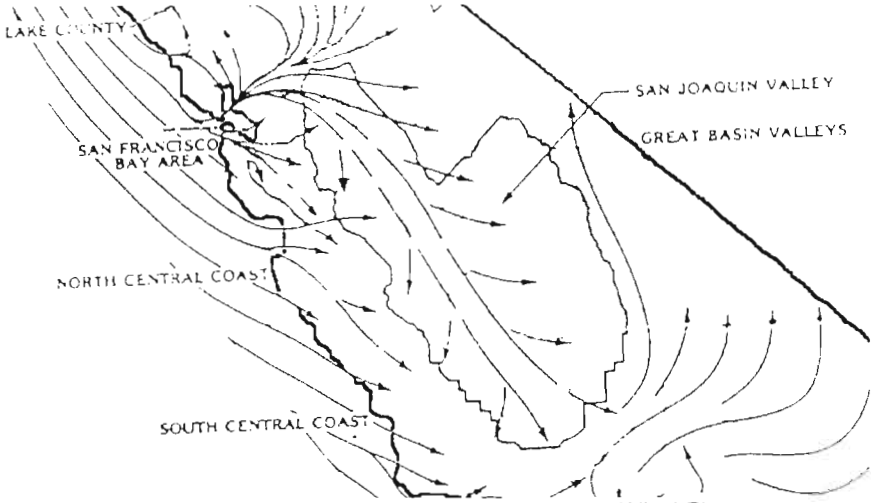

Figure -1 Summer Wind Flow

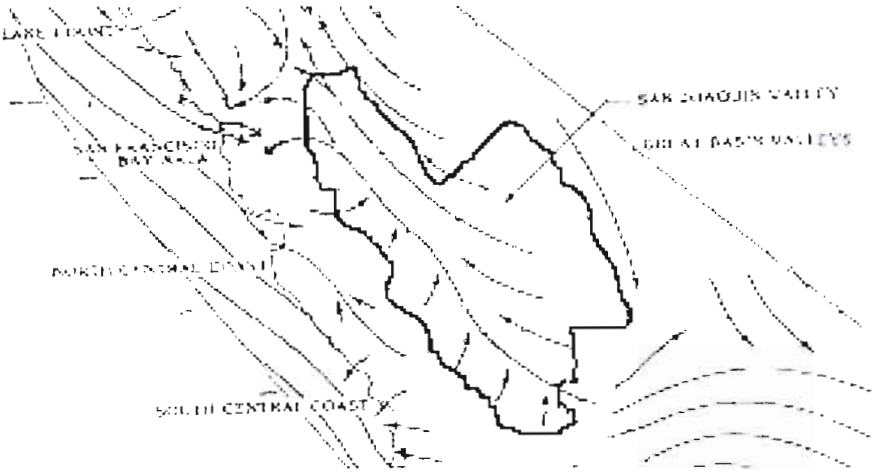
Figure -2 Winter Wind Flow

e. Multiple Monitor Site Selection

With the most recent changes to the AERMOD modeling system, multiple monitors may be selected to represent the different areas (sectors) that make up a modeling domain. If more than one site is being considered, the information in items a thru d above should be used to evaluate if one or more sites should be included in any modeling runs. If a monitor does not reasonably contribute to the project's impact then it should not be considered in the model runs. A monitor is considered to reasonably contribute to a receptor's impact if:

- Based on normal wind patterns and location the monitor would have detected emission concentrations from sources upwind of the modeling domain that potentially would contribute to a receptor's impact
    - This can be determined by plotting a monitor's meteorological data, if collected, using a Wind Rose program to determine the directionality (vector) of emissions being recorded.

- If no meteorological data is available normal wind patterns, the locations of the monitor and modeling domain can be used with professional judgment to determine if it is reasonable that emissions detected by a monitor would have an effect on the receptors being evaluated.

NOTE!!
In some situations, a monitor that does not reasonably impact receptors being modeled may be used if after consideration of the sources upwind it is determined that it would better represent that sector of the modeling and is more conservative than other monitors selected. The Reviewing agency should be consulted

CAUTION!!
Simply including a monitor because it's within 50 km may not be appropriate especially if the monitor does not reasonably contribute to receptors in the modeling domain. The reviewing agency should be consulted and justification provided before excluding any monitor.

Simple Example:
The following example uses the normal summer and winter patterns found in figure 1 & 2 above to determine if one or both sites should be utilized. Based on this information, monitoring site #1 would contribute to a receptors impact. Monitoring site #2 would not have a reasonable impact on receptors within the modeling domain and; therefore, would be considered not to reasonably contribute to an impact on receptors within the modeling domain.

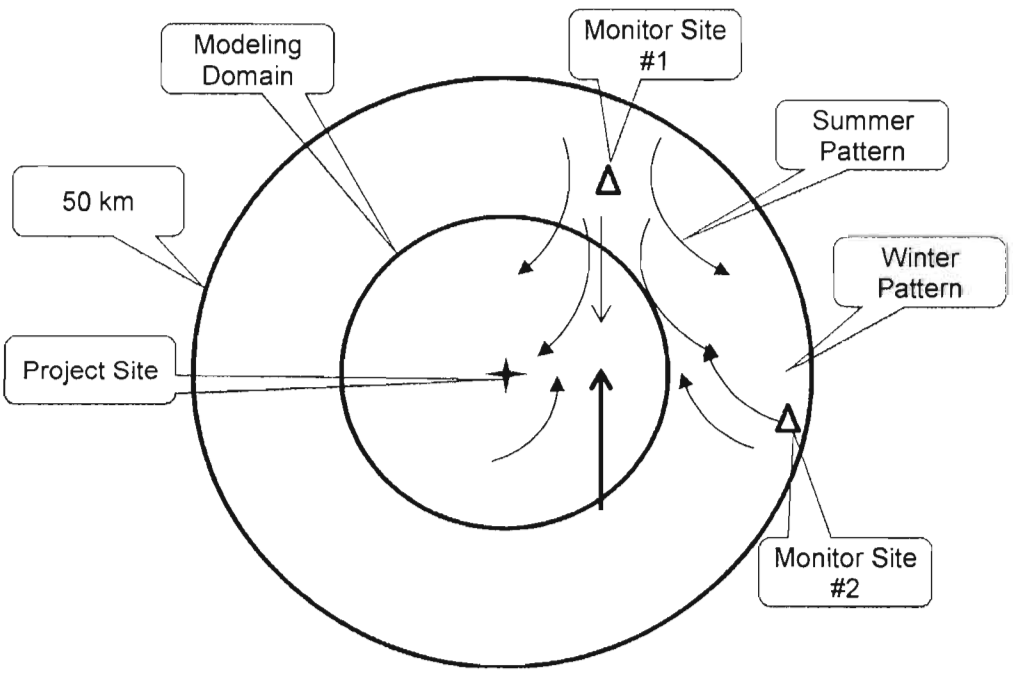

Figure 3 - Multiple Monitor Select Example

VI. Conclusion

There are numerous factors that must be considered when determining which monitoring sites or site is selected for use in a cumulative impact assessment. Several of those have been discussed above and are summarized in Table 1, which provides an example how this information can be presented in order to make a final determination of the appropriateness of a given site for inclusion in a cumulative impact assessment.

With the changes in AERMOD allowing for multiple monitors to be included in a single run, the selection of an appropriate monitor has become simpler and more complex at the same time. Just including all monitors that are within a 50 km radius should not be the first step. This approach may under or even overestimate the impacts from upwind and downwind sources to the receptors in the modeling domain. Therefore, care should be taken when selecting more than one site for inclusion in any modeling run.

VII. Guidance

When conducting a cumulative impact assessment, the following should be considered when selecting/determining the appropriateness of a monitoring site. At a minimum, the following should be addressed (this would include the table below):

- Regulatory Requirement;
  - The proximity of the monitoring site to the area under consideration;
- Sources impacting a Monitor
  - Natural sources;
  - Nearby sources;
- The period of time during which data are collected;
- The complexity of the terrain;
- Model Requirements
- Area of Significant Impact (Using the SIL Assessment)
- Multiple Monitor Site Selection

Table XX Criteria for Background Monitor Selection

Requirements	*[Site Name 1]*			*[Site Name 2]*		
Regulatory Purpose						
Meteorological Data Used						
Purpose of Background Data						
Area of Significant Impact						
[*Pollutant*] Data Availability	Yes/No			Yes/No		
[*Pollutant*] Data Completeness	Yes/No			Yes/No		
[*Pollutant*] Design Value Validation Check (3-Year Average)	Year	Conc. (ppm)	Valid	Year	Conc. (ppm)	Valid
[*Pollutant*] Design Value Validation Check (3-Year Average)	Year	Conc. (ppm)	Valid	Year	Conc. (ppm)	Valid
Proximity to Project Site (mi)						
Terrain	Flat/Elevated			Flat/Elevated		
SIA Area						
Monitor Location						
Natural Sources						
Nearby Sources						
Other Factors (Multiple Site Determination)						