

San Joaquin Valley  
Air Pollution Control District

APR - 1940

Policy for PSD Modeling  
District Rule 2410  
Guidance for Determining Modeling Domain

Approved By:

  
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Director of Permit Services

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**I. Purpose**

The purpose of this guidance is to provide the rationale for requiring a minimum modeling domain of 10 kilometers for the PSD Significant Impact Level (SIL) Assessment and for requiring a minimum receptor grid spacing of 100 meters / modeling domain to be used when conducting a PSD Cumulative Impact Assessment.

**II. Applicability**

This policy applies to all PSD projects requiring a PSD Significant Impact Level (SIL) Assessment and/or a PSD Cumulative Impact Assessment.

**III. Definitions**

**Modeling Domain:** is the area surrounding the facility or the Significant Impact Area (SIA) represented by receptors.

**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.

**Significant Impact Level (SIL):** is a concentration threshold established by EPA to determine if the preliminary modeling concentration would be considered significant requiring further evaluation.

SIL Threshold Values				
Pollutant	Averaging Period	SILs (ug/m3)		
		Class I	Class II	Class III
PM2.5*	Annual	0.06	0.3	0.3
	24-Hour	0.07	1.2	1.2
PM10	Annual	0.32	1	
	24-Hour	0.2	5	
Carbon Monoxide (CO)	8-Hour		500	
	1-Hour		2000	
Nitrogen Oxide (NO2)	Annual	0.1	1	
	1-Hour	--	7.5 <sup>e</sup>	
Sulfur Dioxide (SO2)	Annual	0.08	1	
	24-Hour	0.2	5	
	3-Hour	1	25	
	1-Hour	†	7.8 <sup>e</sup>	

\*The District is currently non-attainment

**Significant Concentration Gradient:** before defining the term significant concentration gradient it is important to understand the meaning of the words significant and gradient. The Merriam-Webster online dictionary defines the word "Significant" as 1) having meaning; *especially:* Suggestive; [a *significant* glance], 2) *a:* having or likely to have influence or effect: important [a *significant* piece of legislation] *also:* of a noticeably or measurably large amount [a *significant* number of layoffs] [producing *significant* profits], *b:* probably caused by something other than mere chance [statistically *significant* correlation between vitamin deficiency and disease]

The Merriam-Webster online dictionary defines the word "Gradient" as 1) *a:* the rate of regular or graded ascent or descent, *b:* a part sloping upward or downward; 2) change in the value of a quantity (as temperature, pressure, or concentration) with change in a given variable and especially per unit distance in a specified direction; 3) the vector sum of the partial derivatives with respect to the three coordinate variables *x*, *y*, and *z* of a scalar quantity whose value varies from point to point; 4) a graded difference in physiological activity along an axis (as of the body or an embryonic field); 5) change in response with distance from the stimulus.

Therefore, taking the above into consideration the term significant concentration gradient, for the purposes of PSD modeling, is defined as meaning the receptor(s) and/or area(s) which has/or have a modeled concentration equal to or greater than the threshold of concern. For example, the significant concentration gradient for the 1-hour NO2 SIL assessment would be receptor(s) and/or area(s) which are equal to or greater than the NO2 1-hour SIL.

#### IV. Background

Historically, PSD modeling domain guidance has been based on the Draft October 1990 "New Sources Review Workshop Manual" which indicated that 50 kilometers from the project boundary was an appropriate distance for the preliminary modeling (SIL Assessment). The manual also stated that "EPA requires that at a minimum all nearby sources be explicitly modeled as part of the NAAQS analysis. The EPA Modeling Guideline "Appendix W" defines a "nearby" source as any point source expected to cause a significant concentration gradient in the vicinity of the proposed new source or modification. For PSD purposes, "vicinity" is defined

as the impact area. However, the location of such nearby sources could be anywhere within the impact area or an annular area extending 50 kilometers beyond the impact area.

Notwithstanding the above, Current guidance from EPA is that 10 kilometers would be adequate to identify areas of high concentration based on 40 CFR Part 51 Appendix W Section 8.2.2, entitled "Critical Receptor Sites" which states "...where violations of the NAAQS or PSD increment are likely, 360 receptors for a polar coordinate grid system and 400 receptors for a rectangular grid system, where the distance from the source to the farthest receptor is 10km, are usually adequate to identify areas of high concentration."<sup>1</sup>

## V. Modeling Domains

The following section provides the rationale used by the District to determine that a 10 kilometer modeling domain would be adequate to determine the maximum impacted receptor and SIA. The following section also provides the guidance on the modeling domain to be used for conducting a Cumulative Impact Assessment.

### a. SIL Assessment Modeling Domain

As stated above, a project's modeling domain should extend out to 10 kilometers, see Figure 1. If the maximum impacted receptor and/or the SIA(s) is/are found on the edge of the 10 kilometer grid then the grid must be extended to ensure that the maximum impacted receptor and/or the SIA(s) is/are identified. This process should be repeated until the maximum impacted receptor and/or SIA(s) is/are identified within the modeling domain.

#### Please note:

1. When identifying the extent of the SIA a refined grid is required. A receptor grid spacing of no greater than 100 meters should be used. The reviewing agency should be consulted to determine if this receptor spacing is appropriate on a case by case basis.
2. Depending on the terrain surrounding a project more than one SIA may be identified in the SIL assessment. In this case each SIA must be evaluated and a determination made for each when performing the cumulative impact assessment.

### b. Cumulative Impact Assessment Modeling Domain

If the SIL assessment identifies an exceedance of a pollutant's SIL level a cumulative impact assessment must be conducted. A cumulative impact assessment requires that only the area defined by the SIA(s) be evaluated. Therefore, the cumulative impact assessment may utilize the same modeling grid as used in the SIL assessment as long as the receptor spacing is no greater than 100 meters within and surrounding the SIA.

If the SIL assessment used a receptor grid spacing greater than 100 meters the following procedure should be used to ensure that the SIA has been clearly identified. The applicant will be required to generate a new polar receptor grid that is centered on the

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<sup>1</sup> This section is an excerpt of the 7-1-03 version of the CFR which was removed in error in the latest version ([http://www.epa.gov/scram001/guidance/guide/appw\\_03.pdf](http://www.epa.gov/scram001/guidance/guide/appw_03.pdf) or <http://www.gpo.gov/fdsys/pkg/CFR-2005-title40-vol2/pdf/CFR-2005-title40-vol2-part51-appW.pdf>). EPA is working on updating the CFR to reincorporate this section.

maximum impacted receptor, identified in the SIL assessment, extending out to the farthest edge of the SIA plus 100 meters with a grid spacing no greater than 100 meters, see Figure 2. If multiple averaging periods are being evaluated for a given pollutant the receptor grid can be extended so that the receptor grid encompasses the farthest edge of all the SIAs for that pollutant. The reviewing agency should be consulted to determine if this receptor spacing and method is appropriate on a case by case basis.

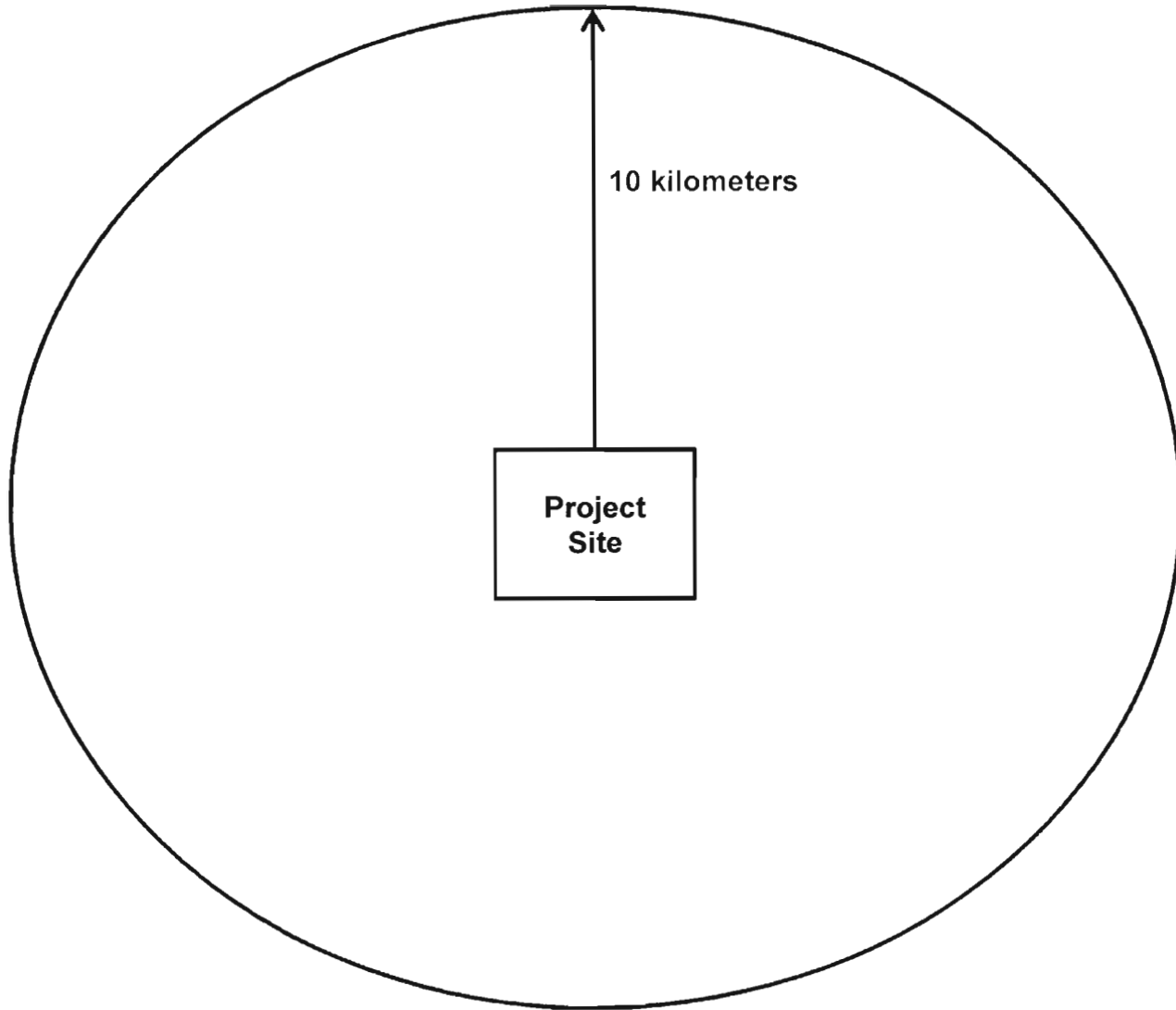
## **VI. Conclusion**

Based on the information provided above and the District's modeling experience, a modeling domain of 10 kilometers is usually sufficient to identify the area(s) with the highest concentration. Therefore, the District concurs with EPA's conclusion that a minimum modeling domain of 10 kilometers should be sufficient to identify a project's maximum concentration.

## **VII. Guidance**

When conducting PSD modeling the following procedures should be followed:

- SIL Assessment Modeling Domain:
  - Use a telescoping receptor grid out 10 kilometers from project boundary.
  - If the maximum impacted receptor and/or the SIA are found on the edge of the 10 kilometer grid, the grid must be extended to ensure the maximum impacted receptor and/or the SIA is identified. This process is repeated until the maximum impact is within the modeling domain.
- Cumulative Impact Assessment Modeling Domain:
  - Utilize the SIL assessment receptor grid as long as the spacing within and outside to the SIA is no greater than 100 meters
  - or
  - Generate a new polar grid centered on the maximum impacted receptor extending out to the farthest edge of the SIA plus 100 meters, as defined by the SIL assessment.



**Figure 1 SIL Modeling Domain**

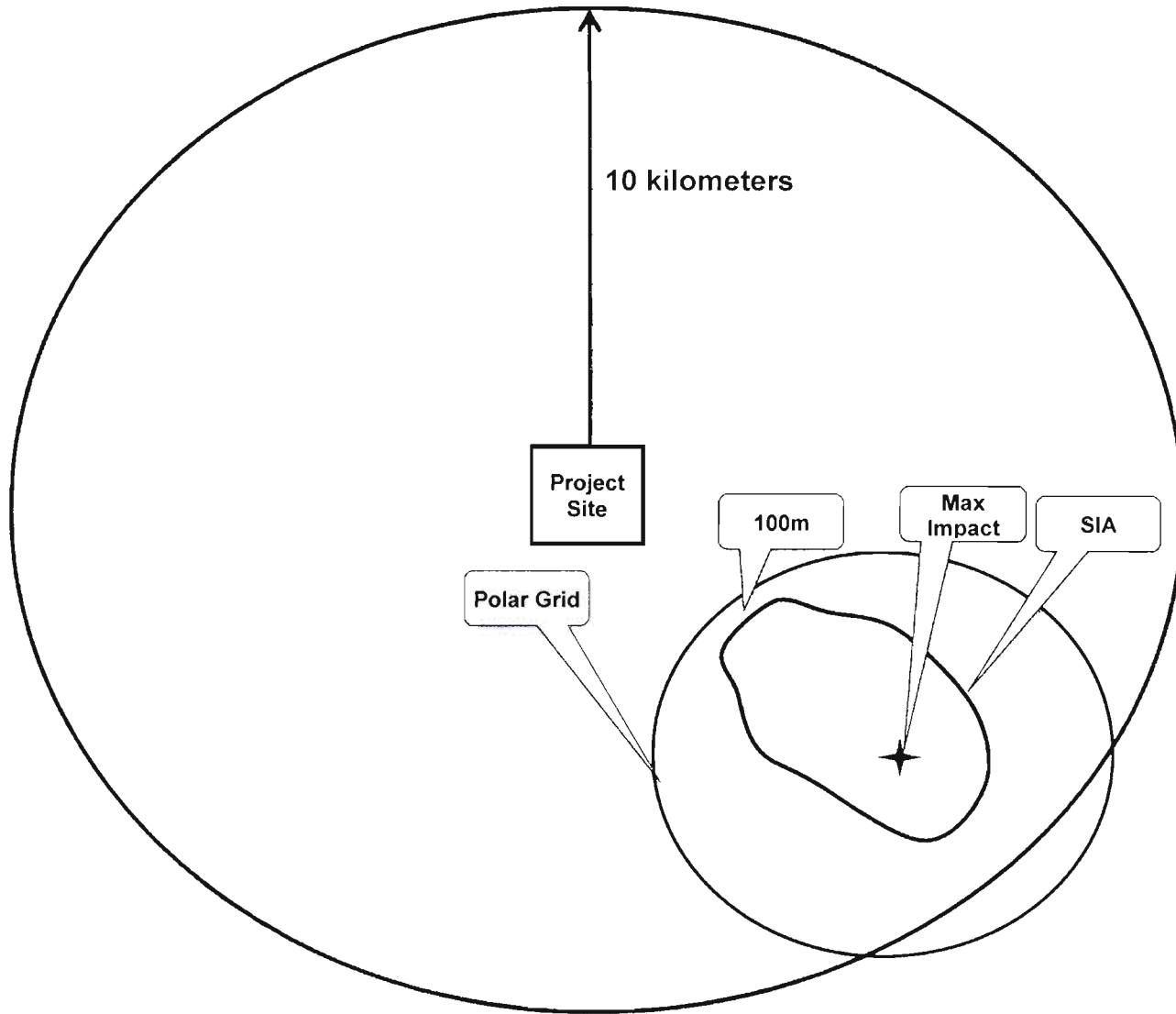


Figure 2 Significant Impact Area (SIA)