APPENDIX C:

Bakersfield-Golden AMS Closure and Replacement

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In December 2009, the District was forced to close the Bakersfield-Golden State Highway (Bakersfield-Golden) air monitoring site (AMS) due to the expansion of Golden State Highway (compromising the siting criteria for proper distance from a roadway) and subsequent loss of the air monitoring site lease at the request of the landowner. This Appendix provides further information regarding the relocation, as outlined under 40 CFR Part 58.

40 CFR Part 58.14 paragraphs (c), and (c)(6), state that requests for discontinuation of a SLAMS monitoring station may be approved on a case-by-case basis if it does not compromise the data collection needed for comparison to the NAAQS and that the requirements listed in Appendix D of 40 CFR Part 58 continue to be met. A SLAMS monitor that is not eligible for removal under any of the criteria listed in 40 CFR Part 58, can be moved if logistical problems beyond the State's control make it impossible to continue operating at the current site. When that is the case, the SLAMS monitor may be moved to a nearby location with the same scale of representation. The District has met both of these conditions in the closure of Bakersfield-Golden.

The Bakersfield-Golden site was shut down due to termination of the lease by the landowner and highway expansion which would directly impact the siting criteria for the station. The District notified and kept EPA and CARB fully informed throughout the entire siting and relocation process via telephone calls and in the appropriate Network Plans. After an exhaustive effort, the Bakersfield-Golden monitoring site was relocated to the Bakersfield-Municipal Airport (Bakersfield-Muni) location.

The Bakersfield-Golden monitoring site operated from June 1994 until December 2009 and served primarily as a PAMS Type 2 site. PM10 equipment was installed in 1994 and PM2.5 equipment was installed in 1999. As Table 1 below shows, over the past five years, this site is not the design value site for ozone, PM2.5, or PM10 for the Bakersfield MSA which comprises the entire county of Kern. Additionally, the District is able to meet or exceed minimum NAAQS monitoring requirements for each of those pollutants without this site being operational as shown in Table 2. [1]

[1] Monitors from both the District and the Eastern Kern County Air Pollution Control District can be counted in determining compliance with minimum monitoring requirements for the Bakersfield MSA. However, only monitors located within the District's boundaries are included in this network plan.

Table 1 Design Value Comparisons for Kern County

1-hour Ozone Design Values (ppb)					
Monitoring Site	**2005-2007**	**2006-2008**	**2007-2009**	**2008-2010**	**2009-2011**
Arvin-Di Giorgio	-	-	-	120	118
Arvin-Bear Mountain	131	135	135	139	
Bakersfield- California Ave	117	120	117	114	111
Bakersfield-Golden State	108	110	-	-	-
Edison	135	136	135	134	124
Maricopa	100	97	97	97	102
Oildale	112	114	112	110	102
Shafter	105	106	106	106	102
8-hour Ozone Design Values (ppb)					
Monitoring Site	**2005-2007**	**2006-2008**	**2007-2009**	**2008-2010**	**2009-2011**
Arvin-Di Giorgio	-	-	-	-	73
Arvin-Bear Mountain	107	108	105	104	-
Bakersfield-California Ave	97	97	90	93	88
Bakersfield-Golden State	86	88	87	-	-
Edison	99	102	99	101	96
Maricopa	88	86	85	85	88
Oildale	95	98	93	94	89
Shafter	88	89	85	88	85
24-hour PM10 Design Values ($\mu g/m^3$)					
Monitoring Site	**2005-2007**	**2006-2008**	**2007-2009**	**2008-2010**	**2009-2011**
Bakersfield-California Ave	115	122	94.5	99	108
Bakersfield-Golden State	103	142	104	-	-
Oildale	104	107	117.5	88.6	100.2
24-hour PM2.5 Design Values ($\mu g/m^3$)					
Monitoring Site	**2005-2007**	**2006-2008**	**2007-2009**	**2008-2010**	**2009-2011**
Bakersfield-Golden	69	64	66	-	-
Bakersfield-California Ave	66	66	68	62	62
Bakersfield-Planz	68	70	70	65	55
Annual PM2.5 Design Values ($\mu g/m^3$)					
Monitoring Site	**2005-2007**	**2006-2008**	**2007-2009**	**2008-2010**	**2009-2011**
Bakersfield-Golden	19.2	18.8	19.3	-	-
Bakersfield-California Ave	19.6	20.9	21	18.4	16.5
Bakersfield-Planz	20.3	21.5	22.6	21.2	18.2

Table 2 Summary of Monitoring Requirements and Current Monitoring Sites in the District portion of Kern County

Pollutant/Program	Required # of Sites	Current # of Sites
State and Local Air Monitoring Stations (SLAMS)		
Ozone	2	6
PM10	2-4	2
PM2.5	2	2

The Bakersfield-Muni site is intended to be a long term site that will serve as the replacement PAMS Type 2 site for Bakersfield-Golden (measuring ozone, NO2, and other PAMS compounds). PAMS stations can be used to meet minimum monitoring requirements, if the site meets NAAQS siting criteria for that pollutant. The ozone, carbon monoxide, and nitrogen dioxide analyzers required as part of the PAMS program may be used for regulatory purposes after two years of operation provided the site meets NAAQS siting criteria for each of pollutants. Currently, the site does not meet NAAQS siting criteria for CO (near-road) and it does not meet NAAQS siting criteria for NO2 (area-wide, near-road, or RA40).

Finding an appropriate replacement location took a considerable amount of time and staff effort (approximately two years) and proved very difficult. The District was unsuccessful in finding a location within a couple of kilometers of the Bakersfield-Golden site, so the siting radius was expanded which enabled the District to find a suitable location approximately 6 km away. The Bakersfield-Muni site is located at the northern end of the Municipal Airport in a light commercial/industrial area downwind from freeways, which is similar to the Bakersfield-Golden site's location.

Construction of the site was also delayed in order to obtain the proper operating permits from the Federal Aviation Administration (FAA), approval from the City of Bakersfield, and electrical power installed. Once power was installed, construction of the platform to support the air quality monitoring equipment commenced and installation of the necessary equipment both inside the shelter and on the platform followed. Since the structure and power at Bakersfield-Golden have been removed and the site is closed, it is impossible to conduct parallel monitoring. As more data becomes available at the new Bakersfield-Muni site, the District will conduct ongoing comparative evaluation of the various Bakersfield monitoring sites.

PAMS Program

EPA's PAMS program is designed to provide enhanced information of ozone and its precursors to aid in modeling and development control strategies for Serious, Severe, and Extreme non-attainment areas. The speciated VOC equipment for PAMS and the PAMS related meteorological equipment became operational at Bakersfield-Muni AMS in June 2012. The station's carbonyl and meteorological equipment for PAMS began operating in July 2012. The NMHC equipment was installed in October 2012. Table 3 below compares the PAMS PAMS Type 2 equipment at the Bakersfield-Golden site to the Bakersfield-Muni site. Method code refers to the actual measurement method each piece of equipment.

Table 3 Bakersfield-Golden and Bakersfield-Muni Comparison Table

Site			Latitude		Longitude	
Bakersfield-Golden			35.385269		119.014733	
Bakersfield-Muni			35.331572		118.999995	
Parameters	Site		Sampling Schedule		Method Code	
	Golden	Muni	Golden	Muni	Golden	Muni
Ozone	x	x			087	087
CO	x	x			054	054
NO	x	x			074	074
NO2	x	x			074	074
NOx	x	x			074	074
Speciated-VOC	x	x	1:3 (Seasonal)	1:3 (Seasonal)	011	011
NMHC	x	x			011	011
Carbonyls	x	x	1:3 (Seasonal)	1:3 (Seasonal)		
IT	x	x			014	014
OT	x	x			040	040
BPR	x	x			014	014
WS	x	x			020	020
WD	x	x			020	020
RH	x	x			011	011
SRAD	x	x			011	011

PM10 and PM2.5 Monitoring

The District already meets the minimum monitoring requirements in Kern County without the PM10 and PM2.5 monitors at the Bakersfield-Muni site. The District attempted to utilize the air monitoring station to monitor both PM10 and PM2.5 to provide information for forecasting, in addition to conducting monitoring as a PAMS Type 2 site. Installation and initial operation of the PM monitoring equipment began in July 2012. However, it soon became apparent that this site was not acceptable as a PM10 and PM2.5 site because site specific emissions from nearby sources were impacting the site, and the site was therefore not measuring ambient particulate concentrations.

Under federal regulation, the purpose of particulate matter monitoring sites is to capture ambient (or neighborhood level) air quality. The siting requirements for both PM10 and PM2.5 state that the ideal monitoring site for these pollutants is of "neighborhood scale". For PM10, the regulation states, in part,

> *(b) Although microscale monitoring may be appropriate in some circumstances, the most important spatial scales to effectively characterize the emissions of PM_{10} from both mobile and stationary sources are the middle scales and neighborhood scales. (Appendix D to Part 58 4.6 (b))*

Likewise, for PM2.5, the regulation states in part,

> *(b) Specific Design Criteria for $PM_{2.5}$. The required monitoring stations or sites must be sited to represent community-wide air quality. These sites can include sites collocated at PAMS. These monitoring stations will typically be at neighborhood or urban-scale; however, in certain instances where population-oriented micro-or middle-scale $PM_{2.5}$ monitoring are determined by the Regional Administrator to represent many such locations throughout a metropolitan area, these smaller scales can be considered to represent community-wide air quality. (Appendix D to Part 58 4.7 (b))*

After building the site, problems with the site location became apparent. During detailed surveillance of the area (particularly during periods of peak emissions readings), the District discovered that nearby sources, including regular airport operations, were impacting PM levels at the site. For example, activities such as street sweeping, taxiing of aircraft, and soil disking were causing PM to be entrained immediately adjacent to or near the site. Figure 1 shows the location of the site from an aerial perspective. Figures 2 through 5 show nearby sources from various directions. Figures 6 through 11 are pictures that show sources of dust near the site that is impacting both PM10 and PM2.5 concentrations.

The Bakersfield-Muni AMS is surrounded by asphalt and the District is now aware that street sweeping activities occur regularly next to and around the structure. While conducting surveillance of the area, District staff observed a layer of dust coating flat surfaces at site. The plume generated by the street sweeper does not impact adjacent property owners but it directly impacts the Bakersfield-Muni AMS because the plume generated by the street sweeper engulfs the site. When this occurs, the analyzer measures the plume from the street sweeper (a point source) rather than the ambient air. Additionally, taxiways are nearby and planes using them entrain dust as they go by.

Vacant land that occupies areas within and surrounding the airport is comprised of very fine, silty soil. Over 60% of this native soil consists of particles between 5 and 50 microns in diameter. Such areas on the airport property that are next to the Bakersfield-Muni AMS are routinely disked and mowed for weed control abatement which causes a considerable of dust to be deposited on the runway, taxiways, and other asphalt surfaces. Additionally some of the light industrial and commercial businesses located

adjacent to the airport have large unpaved areas that can contribute to PM levels in the area.

In addition to the visual observations of the nearby sources, the District also installed additional PM monitoring equipment to help confirm that the aforementioned activities led to higher PM10 and PM2.5 measurements than would be normally found in ambient air, and to verify the that the suspect analyzers were operating properly. Through the extensive efforts of District staff, it was determined that this site was measuring nearby sources rather than measuring ambient air. Therefore, the site does not represent a "neighborhood scale" PM site and does not qualify as a SLAMS site due to near-source emission impacts that were unknown at the time of initial installation.

Given the PM10 and PM2.5 measurements at this site were not representative of ambient air quality and the PM monitors are not required regulatory monitors, the District removed the PM analyzers at the Bakersfield-Muni AMS and is seeking another location in which to place them for continued forecasting support. Additionally, there is a nearby air monitoring site (Bakersfield-Planz) that currently measures PM2.5 concentrations in the Municipal Airport area. The District will continue to operate the Bakersfield-Muni AMS for PAMS Type 2 purposes and will continue monitoring gaseous pollutants.

Next Steps

After the District determined that the site was not suitable to measure PM10 and PM2.5, the District began the search for a replacement site. During its investigation, the District discovered that the planned road expansion of Golden State Highway, which caused the closure of the original Bakersfield-Golden AMS, did not take place and the prior location would still meet appropriate siting criteria. Therefore, the District may be able to locate the replacement site at or near the old Bakersfield-Golden air monitoring site, which would be the preferred option since there is almost 15 years of air monitoring data that already exists for that area in Bakersfield. In fact, the District is now in talks with Kern County to place these two analyzers on the property where the previous Bakersfield-Golden AMS was sited. If the recommended location on the property meets appropriate siting criteria, the new PM site will be 40 feet away from the original site. If this location is determined to be infeasible, the District will continue its search for a new site.

Figure 1: Aerial View of Bakersfield-Municipal Site

Figure 2: Looking North from the Probe

Figure 3: Looking East from the Probe

Figure 4: Looking South from the Probe

Figure 5: Looking West from the Probe

Figure 6: Panoramic view of asphalt that is regularly cleaned by street sweepers adjacent to the site.

Figure 7: Additional photo of asphalt that is regularly cleaned by street sweepers adjacent to the site.

Figure 8: Dirt and debris near the site, in areas that the street sweeper cannot reach

Figure 9: Looking south east from the probe. Unpaved areas that are disked and mowed to keep the area weed free. Much of the airport property is unpaved.

Figure 10: A disking operation being conducted on one of the large unpaved areas. Due to the sun angle, the plume is almost not visible.

Figure 11: Visible dust plume from disking operation