Defining the 10 Baseline Days of 2013

At the last SAG meeting a comparison of three sets of days that could define the 10 Baseline days of 2013 was left as an action item. Set one represents the 10 days that are associated with the 10 highest observed 24-hour mean PM_{10} concentration measured at the CDF site. Set two represent the 10 days that are associated with the highest-model predicted emission days (a product based only on the CALMET generated hourly wind fields and the PI-SWERL [interpolated] emission grid). Set three represents the days identified in Table 4-3 of the PMRP. The period of time from which sets one and two were drawn (May 15-August 31, 2013) was constrained arbitrarily by the availability of the highest quality meteorological data during that period. We make the assumption that the more complete the available meteorological data (i.e., spatial coverage and all other external parameters [e.g., upper air data]), the closer the model-generated wind fields will be to the actual conditions. The three sets of days are shown in Table 1, with paired days shown by the same color cells. Eight of the same days are shared by sets 1 and 2, and 2 and 3. Seven of same days are shared between sets one and three. Based on the selection method, the mean and standard deviation of the 10 days are 129 µg m^{-3} (±18 µg m^{-3} [model-predicted]), 134 µg m^{-3} (±15 µg m^{-3} [measured]), 136 µg m^{-3} (±19 µg m^{-3} [PMRP Table 4-3]). Results from an ANOVA test (Table 2) indicate that the difference in the means among the three sets is not significant (i.e., F (0.52) < F Critical (3.35), therefore null hypothesis not rejected, means are equal).

Based on this analysis, the choice of which 10 days to choose will have no measurable effect on the quantification of the baseline conditions. As the SOA identifies the highest emission days be used, it suggests that the decision should favor the days identified in the first column in Table 1, and because these data are within the time frame of the best-quality meteorological data. This needs to be codified by the SAG, Parks, and APCD so that DRI can move forward with the modeling to quantify dust control area effects on mass emissions, PM_{10} as measured at CDF and Mesa2, and identify the relative importance of non-dust controlled areas that affect PM_{10} concentrations at CDF.

Table 1. The 24-hour mean PM_{10} concentrations measured at the CDF based on selecting the 10 days that are associated with the highest-model predicted emission days and the 10 days that are associated with the 10 highest observed 24-hour mean PM_{10} concentration measured at the CDF site during the period May 15 to August 31, 2013, and for a wider time window of April 4th to August 31, 2013 as identified in PMRP Table 4-3..

Date*	PM_{10} Concentrations at CDF [µg m^{-3}]	Date**	PM_{10} Concentrations at CDF [µg m^{-3}]	Date***	PM_{10} Concentrations at CDF [µg m^{-3}]
				4/8/2013	165
				4/15/2013	136
		5/18/2013	136	**5/18/2013**	136
5/19/2013	112				
5/22/2013	169	**5/22/2013**	169	**5/22/2013**	169
5/23/2013	140	**5/23/2013**	140	**5/23/2013**	140
5/26/2013	108			**5/26/2013**	108
5/27/2013	122	**5/27/2013**	122	**5/27/2013**	122
5/29/2013	120	**5/29/2013**	120	**5/29/2013**	120
5/30/2013	133	**5/30/2013**	133	**5/30/2013**	133
6/17/2013	116	**6/17/2013**	116		
6/18/2013	134	**6/18/2013**	134	6/18/2013	134
		6/19/2013	138		
6/20/2013	134	**6/20/2013**	134		
Mean PM_{10} Concentration	**129**		**134**		**136**
Std. Dev of the mean	**18**		**15**		**19**
*Identified from model-predicted mass emission estimates					
**Identified from measurements at CDF					
***PMRP Table 4-3					

Table 2. Results of the Analysis of Variance (ANOVA) comparing the three sets of 10 days of PM_{10} 24-hour mean PM_{10} concentrations shown in Table 1.

SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
PMRP	10	1363	136	355		
Model-Derived	10	1287	129	312		
CDF Measured	10	1342	134	216		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	304.3778	2	152.19	0.52	0.60	3.35
Within Groups	7948.524	27	294.39			
Total	8252.902	29				