

#### **4.0 Addendum to the EPA Technical Support Document (TSD) for the Juneau, Alaska Area**

This chapter presents memos with technical information supporting the air quality designation for the Juneau, Alaska area.

This chapter includes two memos documenting:

- The recalculation of design values for the Federal Reference Monitor (AQS ID: 02-110-0004-88101-1), Floyd Dryden School, Mendenhall Valley, Juneau, AK and change in designation status for the Juneau, AK 24-hour PM<sub>2.5</sub> Nonattainment Area
- An update to document the 2006 actual monitoring schedule for the Federal Reference Monitor (AQS ID: 02-110-0004-88101-1), Floyd Dryden School, Mendenhall Valley, Juneau, AK

The signed memos have been placed in Docket ID NO. EPA-HQ-OAR-2007-0562.

Figure 1. Memorandum Documenting Recalculation of Design Value

**MEMORANDUM**

From: Rick Albright, Director, Office of Air, Waste and Toxics, US EPA Region 10

To: 2006 24 hour PM<sub>2.5</sub> National Ambient Air Quality Standard Designations Docket

Date: July 30, 2009

Subject: Recalculation of Design Values for the Federal Reference Monitor (AQS ID: 02-110-0004-88101-1), Floyd Dryden School, Mendenhall Valley, Juneau, AK and Change in Designation Status for the Juneau, AK 24 hour PM<sub>2.5</sub> Nonattainment Area.

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Summary: After then EPA Administrator Johnson signed a Federal Register notice relating to designations for the 24 hour PM<sub>2.5</sub> Standards in December 2008, which notice was never published and thus never became final or effective, the State of Alaska submitted data and analysis in support of a request to change the Juneau Nonattainment Area's (NAA) designation status to attainment/unclassified based on 2006-2008 data. The state's request was based on their ability to discard data from certain extra monitoring days and recalculating the design value. Based on monitoring regulations, it is not possible to discard extra monitoring days; therefore the state's request on this basis was not approvable. However, inconsistencies were discovered in the Air Quality Subsystem (AQS) database record, which when rectified allowed a recalculation of the design values based on 2006-2008 monitored data. This recalculation establishes that the Juneau, AK is now an attainment/unclassifiable area for the 2006 24 hour PM<sub>2.5</sub> NAAQS based on data from 2006-2008.

Background: The 2008 notice signed by Administrator Johnson for the 2006 24 hour PM<sub>2.5</sub> Designations, allowed states to submit 2006-2008 data, complete and certified by Feb. 20, 2009 and request a change to designation status based on the data. The State of Alaska submitted its 2006-2008 data from the Federal Reference Monitor (AQS ID: 02-110-0004-88101-1), at Floyd Dryden School, Mendenhall Valley, Juneau, AK and requested a change in designation status for the Juneau NAA based on the data and detailed analysis (see documents attached to this memorandum). There are two parts to this analysis, the state's request and results and EPA's review of data and results.

State's Request and Results

In these documents, the State submitted all monitoring data from 2006 to 2008. The focus of the analysis was to discard extra monitoring data that the state was collecting at that monitor and recalculate the design values. The state's air quality

management involved issuing burn bans or burn advisories to reduce wood based burning on days with potential for stagnations and therefore degraded air quality. For the state to be able to perform this effectively, they used continuous monitors to obtain instantaneous values of air quality. However, in order to ensure that continuous monitors provide the air quality and public health protections, these monitors are required to be calibrated to the Federal Reference Method (FRM) monitors. The State performed many such calibrations during all periods of 2006 and 2007. During these calibrations both the continuous monitor and the FRM were operated before and after high PM<sub>2.5</sub> events and all these values recorded in AQS. In many instances, states establish a collocated Special Purpose Monitor, which is an FRM similar to the official monitor so that the data is used solely for the studies. In this case, the state decided to use the official FRM to collect the data for calibrating the continuous monitor and thereby collected additional days of data, more than agreed to in annual monitoring plans, and recorded the additional data in AQS.

The State claimed that the extra monitored days, over and above what was officially agreed to in the official monitoring plan for the year, should not be considered in the calculations of design values. The state submitted detailed calculations excluding these extra days of data from 2006 and 2007 and were able to demonstrate that the design values would indicate that the standard was being attained. However, 40 CFR Part 50, Appendix N, 4.5(a)(1) states that "...Extra samples, however, are candidates for selection as the annual 98<sup>th</sup> percentile. [The creditable number of samples will determine how deep to go into the data distribution, but all samples (creditable and extra) will be considered when making the percentile assignment.]" Based on this and other sections of the regulations, the request to exclude extra days of monitoring data cannot be granted.

#### EPA's Review of Data and Results

In reviewing the AQS record for the monitoring schedule for the Federal Reference Monitor (AQS ID: 02-110-0004-88101-1), at Floyd Dryden School, Mendenhall Valley, Juneau, EPA's Region 10 office noticed inconsistencies between its knowledge of factual monitoring based on monitoring plans and communications between the State and the Region, and the AQS database. EPA reviewed the record of monitoring for the Juneau monitor, specifically from 2005 to 2008 and found several inconsistencies related to the monitoring schedule for each year. In 2006, the Regional Office recollected having approved a lowered monitoring schedule in the 4<sup>th</sup> quarter. However, this was not reflected in the AQS database. EPA instructed the state to update the AQS database to be consistent with the record of actual monitoring schedules for all years. This is detailed in the attached Memorandum from Rick Albright to the PM<sub>2.5</sub> Designations Docket dated July 30, 2009.

After resolving these inconsistencies EPA recalculated the design values for the 2006-2008 as follows.

### Definitions of Terminology

*Required samples* are the number of samples required to complete the monitoring schedule for that quarter.

*Reported Samples* are samples that were recorded by the monitoring agency and reported to EPA's AQS database.

*Creditable samples* are samples that are given credit for data completeness. They include valid samples collected on required sampling days and valid "make-up" samples taken for missed or invalidated samples on required sampling days. The annual creditable number of samples is the sum of the four quarterly creditable number of samples.

*Percent Capture* is important to satisfy the requirements of 40 CFR part 50, Appendix N, 4.2, "A year meets data completeness requirements when at least 75 percent of the scheduled sampling days for each quarter have valid data."

Calculation Methodology: The calculation is done based on 40 CFR part 50, App N. 40 CFR part 50, App N, 4.2(a), states that the 24-hour PM<sub>2.5</sub> NAAQS is met when the 24-hour standard design value at each monitoring site is less than or equal to 35 µg m<sup>-3</sup>. The table below provides the data that was used for the design value calculation.

Sampling frequency 1-6 for 4th Q 2006 (1-3 for Q1, Q2, Q3 of 2006; 1-3 for 2007 and 1 <sup>st</sup> Q 2008; 1-1 last 3 Qs 2008)				
Quarters	Required samples	Reported samples	Creditable samples	Percent capture
<b>2006</b>				
1	30	28	<b>27</b>	<b>90%</b>
2	30	30	<b>30</b>	<b>100%</b>
3	31	30	<b>30</b>	<b>97%</b>
4	16	18	<b>16</b>	<b>100%</b>
<b>Total Creditable Samples for 2006</b>			<b>103</b>	
<b>2007</b>				
1	30	36	<b>28</b>	<b>93%</b>
2	30	29	<b>28</b>	<b>93%</b>
3	31	29	<b>29</b>	<b>94%</b>
4	30	36	<b>28</b>	<b>93%</b>
<b>Total Creditable Samples for 2007</b>			<b>113</b>	
<b>2008</b>				
1	31	41	<b>29</b>	<b>94%</b>
2	91	73	<b>73</b>	<b>80%</b>
3	92	78	<b>78</b>	<b>85%</b>
4	92	80	<b>80</b>	<b>87%</b>
<b>Total Creditable Samples for 2008</b>			<b>260</b>	

Design Value Calculation:

The design value is computed by first estimating the number of creditable samples of data for each year in consideration. For example, in the table above, the number of creditable samples for all 4 quarters of 2006 would be the sum of quarter 1 (27), quarter 2 (30), quarter 3 (30) and quarter 4 (16) samples, for a total of 103 samples. Of the set of data with 103 samples, the 98<sup>th</sup> percentile is computed from a descending order sorted list. As the number of creditable samples is different for each year, the 98<sup>th</sup> percentile value will be in a different rank order from year to year. In the table below, for 2006, the 98<sup>th</sup> percentile sample is the 3<sup>rd</sup> highest creditable sample of the 103 creditable samples from that year, and the value is 33  $\mu\text{gm}^{-3}$ , and so on. So the 98<sup>th</sup> percentile value for any year is a function of the number of creditable samples for that year, which in turn is directly dependent on the monitoring schedule for that year. This is repeated for each year in consideration to yield a 98<sup>th</sup> percentile value for each year.

Once the 98<sup>th</sup> percentile values are derived using this method, they are averaged for the three years in consideration, and this is demonstrated in the table below. The result as rounded according to 40 CFR part 50, Appendix N, is 34  $\mu\text{gm}^{-3}$ . Therefore, the Juneau monitor AQS ID: 02-110-0004-88101-1, attains the 2006 24 hour  $\text{PM}_{2.5}$  NAAQS and the area is an attainment/unclassifiable area.

Design Value Summary			
Year	Number of Creditable samples	98th percentile rank in sample	98th percentile value
<b>2006</b>	<b>103</b>	<b>3</b>	<b>33.0</b>
<b>2007</b>	<b>113</b>	<b>3</b>	<b>39.6</b>
<b>2008</b>	<b>260</b>	<b>6</b>	<b>30.2</b>
		<b>Unrounded</b>	<b>34.2666667</b>
		Rounded	34
		<i>complete</i>	

Supporting Attachments:

1. Letter from State of Alaska, Requesting change in Designation Status for Juneau, AK, dated February 20, 2009
2. 2008 data certification for Juneau, AK, dated February 25, 2009
3. Juneau PM<sub>2.5</sub> Reconsideration Request from the State of AK, dated June 18<sup>th</sup>, 2009.
4. Mendenhall Valley, Juneau Reconsideration Technical Information, dated June 18<sup>th</sup>, 2009.
5. Memorandum from Rick Albright to the PM<sub>2.5</sub> Designations Docket dated July 30, 2009

Figure 2. Memorandum updating the monitoring Schedule for the Floyd Dryden School Federal Reference Monitor

**MEMORANDUM**

From: Rick Albright, Director, Office of Air, Waste and Toxics, US EPA Region 10

To: 2006 24 hour PM<sub>2.5</sub> National Ambient Air Quality Standard Designations Docket

Date: July 30, 2009

Subject: Update to document the 2006 actual monitoring schedule for the Federal Reference Monitor (AQS ID: 02-110-0004-88101-1), Floyd Dryden School, Mendenhall Valley, Juneau, AK.

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Summary: EPA Region 10 approved the State of Alaska's request to lower the monitoring frequency for the 4<sup>th</sup> quarter of 2006 in consultation with EPA's Office of Air Quality Planning and Standards (OAQPS). However, soon after this decision was implemented, the 2006 24 hour PM<sub>2.5</sub> National Ambient Air Quality Standards (NAAQS) were finalized and the state was required to return to the higher monitoring frequency. The Air Quality Subsystem database (AQS) will be updated to reflect the actual schedule for 2006.

Background: In 2006, the State of Alaska was monitoring at a schedule of 1 in 3 days for the Floyd Dryden Federal Reference Monitor (AQS ID: 02-110-0004-88101-1) for three quarters of the year. Prior to the 4<sup>th</sup> quarter, the State of Alaska requested that they be allowed to reduce the monitoring frequency for the Floyd Dryden Federal Reference Monitor (AQS ID: 02-110-0004-88101-1) from a 1 in 3 to a 1 in 6 schedule. Specifically, in August of 2006, the State of Alaska's monitoring manager Mr. Gerald Guay approached the Manager of the State and Tribal Air Programs Unit, Office of Air Waste & Toxics, EPA Region 10, Seattle, Mr. Mahbubul Islam with this request. Mr. Islam advised that Mr. Guay work with EPA's Regional Air Monitoring Network Analyst, Mr. Keith Rose regarding this, with technical information supporting the request. The State of Alaska based their request on the design value calculation for the 2003-2005 (30 µgm<sup>-3</sup> compared to the 1997 24 hour NAAQS of 65 µgm<sup>-3</sup>). Mr. Rose analyzed the data and found that the area's highest monitored values were well below the applicable NAAQS (about 50% of the standard). In September 2006, the Regional office, in consultation with OAQPS monitoring staff agreed to the request to lower the monitoring schedule. It was also agreed that the resources saved by the lowered monitoring schedule would be diverted to areas in the State with more significant air quality problems. These communications were conducted verbally and through email and not through formal submissions or changes to annual network monitoring plans.

Based on this agreement, the State reduced its monitoring schedule to 1 in 6 for the 4<sup>th</sup> quarter of 2006. However, the 2006 monitoring schedule was not accurately recorded in the AQS database (for a record of what was reflected in the AQS database for the years 2005 through 2008, see excerpt below). In October 2006, EPA promulgated the revised 24 hour PM<sub>2.5</sub> NAAQS of 35 µgm<sup>-3</sup>. As monitored values at the Juneau monitor were closer to the newly revised NAAQS, the Region advised the State of Alaska to increase the monitoring frequency to 1 in 3 days to comply with new standards, in accordance with regulations and OAQPS guidance. The State complied with this request and commenced 1 in 3 day monitoring in the first quarter of 2007.

This memorandum documents two aspects of this issue, the first being that the state of Alaska's request to reduce the monitoring frequency for the Floyd Dryden Federal Reference Monitor (AQS ID: 02-110-0004-88101-1) from a 1 in 3 to a 1 in 6 schedule was approved by the EPA Regional Office. Secondly according to EPA's instruction to the state, AQS will be updated to reflect this schedule for 2006 (1 in 3 for the first 3 quarters of 2006, and 1 in 6 for the 4<sup>th</sup> quarter of 2006).

In 2005, it was 1:3 for the first 3 quarters, then 1:6 in the last quarter. AQS entry stayed 1:6.

In 2006, it as 1:3 for the first 3 quarters, then 1:6 for the last quarter. AQS entry stayed 1:6.

In 2007, it was 1:3 all year, with some extra samples when bad air quality was expected. AQS entry stayed 1:6.

In early 2008, OAQPS noticed that the actual frequency was higher than the 1:6 schedule still recorded in AQS, as part of a general review, and Region 10 was alerted and asked to get the State to review their AQS entries. Subsequently, the state corrected the frequency entries in AQS to match all the back-and-forth changes that had actually occurred except for the one-quarter reductions from 1:3 to 1:6 in the 4th quarters of 2005 and 2006.

In early 2008, frequency was changed to 1:1 and AQS was changed to match.

In the summer of 2009, the state was asked to rectify the entries in 2005, 2006, and 2007 in AQS to reflect the actual monitoring schedules for those years.