

**DEPARTMENT OF  
ENVIRONMENTAL CONSERVATION**



**Performance Audits for COMS**

**Adopted by Reference in 18 AAC 50.030**

**April 1, 2002**

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## **Alaska Department of Environmental Conservation Performance Audits for COMS**

**Performance audits.** The following elements shall be included in performance audits for Continuous Opacity Monitoring Systems (COMS), unless the department gives written approval for unit-specific audit procedures.

- 1 Optical Alignment Assessment.** The status of the optical alignment of the monitor components shall be checked and recorded according to the procedures specified by the monitor manufacturer. Realign as necessary.
- 2 Zero and Upscale Response Assessment.** The zero and upscale response errors shall be determined and recorded according to the calibration drift procedures of 8.1(4)(i) and (ii) in 40 C.F.R. 60, Appendix B, Performance Specification 1 (PS-1), adopted by reference in 18 AAC 50.040(a). The error is defined as the difference (in % opacity) between the correct value and the observed value for the zero and high-level calibration checks.
- 3 Zero Compensation Assessment.** The value of the zero compensation applied at the time of the audit shall be calculated as equivalent opacity, corrected to stack exit conditions as necessary, according to the procedures specified by the manufacturer. Record the compensation applied to the effluent recorded by the monitor system.
- 4 Calibration Error Check.** Conduct a three-point calibration error test using three calibration attenuators that produce outlet pathlength corrected, single-pass opacity values shown in ASTM D 6216-98, section 7.5, adopted by reference in 18 AAC 50.035(c). If the applicable limit is less than 10 percent opacity, use attenuators as described in ASTM D 6216-98, section 7.5 for applicable standards of 10 to 19 percent opacity. Confirm the external audit device produces the proper zero value on the COMS data recorder. Separately, insert each calibration attenuator (low, mid, and high-level) into the external audit device. While inserting each attenuator, (1) ensure that the entire light beam passes through the attenuator; (2) minimize interference from reflected light; and (3) leave the attenuator in place for at least two times the shortest recording interval on the COMS data recorder. Make a total of five nonconsecutive readings for each attenuator. At the end of the test, correlate each attenuator insertion to the corresponding value from the data recorder. Subtract the single-pass calibration attenuator values corrected to the stack exit conditions from the COMS responses. Calculate the arithmetic mean difference, standard deviation, and confidence coefficient of the five measurements value using equations 1-3, 1-4, and 1-5 of PS-1. Calculate the calibration error as the sum of the absolute value of the mean difference and the 95 percent confidence coefficient for each of the three test attenuators using equation 1- 6 of PS-1. Report the calibration error test results for each of the three attenuators.

- 5 Zero Alignment Assessment.** Compare the COMS simulated zero to the actual clear path zero of the installation. The assessment may be conducted in conjunction with, but prior to, other performance audit elements.
- A. Primary Zero Alignment Method.** The primary zero alignment shall be performed under clear path conditions. This may be accomplished if the process is not operating and the monitor pathlength is free of particulate matter or the monitor may be removed from its installation and set up under clear path conditions. The absence of particulate matter shall be demonstrated prior to conducting the test at the installed site. No adjustment to the monitor is allowed other than the establishment of the proper monitor pathlength and correct optical alignment of the monitor components. Record the monitor response to a clear path condition and to the monitor's simulated zero condition as percent opacity corrected to stack exit conditions as necessary. For monitors with automatic zero compensation, disconnect or disable the zero compensation mechanism or record the amount of correction applied to the monitor's simulated zero condition. The response difference in percent opacity to the clear path and simulated zero conditions shall be recorded as the zero alignment error. Adjust the monitor's simulated zero device to provide the same response as the clear path condition. Restore the COMS to its operating mode.
- B. Alternate Zero Alignment Method.** Monitors capable of allowing the installation of an external, removable zero-jig may use the equipment for an alternative zero alignment provided that the zero-jig setting is established for the monitor pathlength and recorded for the specific COMS by comparison of the COMS responses to the installed zero-jig and to the clear path condition. The zero-jig is shown to be capable of producing a consistent zero response when it is repeatedly (i.e., three consecutive installations and removals prior to conducting the final zero alignment check) installed on the COMS. The zero-jig setting shall be permanently set at the time of the initial COMS zeroing to the clear path zero value and protected when not in use to ensure that the setting equivalent to zero opacity does not change. The zero-jig setting shall be checked and recorded prior to initiating the zero alignment. Emission unit owners and operators that employ a zero-jig shall perform a primary zero alignment audit once every three years.
- C. Failure Criteria for Zero Alignment.** The zero alignment is acceptable if the error at the simulated zero check is less or equal than 2% opacity prior to adjustment (i.e. if the zero alignment error is 0% the analyzer does not need servicing solely based on this test).