**Quality Assurance / Quality Control (QA/QC) Plan**

**Continuous Opacity Monitoring System at Dryer RTO Exhaust Stack**

**Weyerhaeuser NR Company**

Grayling OSB

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This COMS QA/QC Plan has been developed and submitted to the Environmental Great Lakes and Energy for review and approval.

Effective Date: June 20, 2013

**TABLE OF CONTENTS**

**­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­**

[APPLICABILITY AND PRINCIPLE 3](#_Toc359002407)

[QUALITY POLICY AND OBJECTIVES 3](#_Toc359002408)

[DOCUMENT CONTROL SYSTEM 4](#_Toc359002409)

[COM REGULATORY MANDATES AND COM SYSTEM DESCRIPTION 4](#_Toc359002410)

[ORGANIZATION AND RESPONSIBILITIES 6](#_Toc359002411)

[FACILITIES, EQUIPMENT, AND SPARE PARTS INVENTORY 6](#_Toc359002412)

[METHODS AND PROCEDURES, ANALYSIS AND DATA ACQUISITION 7](#_Toc359002413)

[AIR PURGING SYSTEM 8](#_Toc359002415)

[CONTROL UNIT 8](#_Toc359002416)

[DATA ACQUISITION SYSTEM 8](#_Toc359002417)

[COMS SECURITY 9](#_Toc359002418)

[DATA BACKUP PROCEDURES 9](#_Toc359002419)

[START-UP OPERATION 9](#_Toc359002420)

[CALIBRATION AND QUALITY CONTROL CHECKS 9](#_Toc359002421)

[PERFORMANCE AUDITS: QUARTERLY, ANNUAL 10](#_Toc359002422)

ANNUAL ON STACK AND OFF STACK ZERO ALIGNMENT 11

[COM SYSTEM INSPECTION AND PREVENTIVE MAINTENANCE 12](#_Toc359002425)

[MALFUNCTION RESPONSE AND REPORTING 13](#_Toc359002426)

[CORRECTIVE MAINTENANCE PROCEDURES 14](#_Toc359002427)

[TRAINING PROCEDURES 1](#_Toc359002428)5

[Appendix A: Teledyne LightHawk model 560 Operation and Maintenance Manual](file:///S%3A/Environmental/Section%203%20Air/300%20Plans/Monitor%20Plan%20Documentation/LightHawk%20COM-2013)

Appendix B: Spare Parts for COMS (on hand)

**(Note: Appendix A is maintained electronically in S:\\Environmental\Section 3 Air\300 Plans\Monitor Plan Documentation. The manual also includes the recommended spare parts list. Print out for hard copies or attach separately in electronic communications.)**

This COMS Quality Assurance/Quality Control (QA/QC) Plan is based on the requirements located in 40 CFR Part 60 Appendix F – Quality Assurance Procedures; 1. Applicability and Principle, and 3. QC Requirements. As detailed in 40 CFR Part 60 Appendix F, this COMS QA/QC Plan is subject to and comprised of, respectively, the information detailed in section 1 (Applicability and Principle) of Procedure 1.

### Applicability and Principle

**Applicability**: Procedure 1 in this context is being used to evaluate the effectiveness of QA and QC procedures and the quality of data produced by the facility’s COMS. These data are used for determining compliance with emission standards on a continuous basis as specified in the applicable regulation.

Data collected as a result of QA and QC measures required in this procedure are kept on file and can be made available to the Environmental Great Lakes and Energy (EGLE) at any time. These data can be used by EGLE and are used by the facility is assessing the effectiveness of the COMS QA and QC procedures in the maintenance of acceptable COMS operation and valid emission data. Consistent with the Clean Air Act these data will be retained for a five-year period.

The implementation of this QA/QC Plan is subject to EGLE rules and regulations.

**Principle**: The QA procedures consist of two distinct and equally important functions. One function is the assessment of the quality of the continuous opacity monitoring system (COMS) data by estimating accuracy. The other function is the control and improvement of the quality of the COMS data by implementing QC policies and corrective actions. These two functions form a control loop: When the assessment function indicates that the data quality is inadequate, the control effort must be increased until the data quality is acceptable. In order to provide uniformity in the assessment and reporting of data quality, this procedure explicitly specifies the assessment methods for response drift and accuracy. The methods are based on procedures included in the applicable performance specifications in Appendix B of 40 CFR Part 60. Procedure 1 also requires the analysis of the Environmental Protection Agency (EPA) audit samples concurrent with certain reference method analyses as specified in the applicable reference methods.

Because the control and corrective action function encompasses a variety of policies, specifications, standards, and corrective measures, this procedure treats QC requirements in general terms to allow each source owner or operator to develop a QC system that is most effective and efficient for their circumstances.

### QUALITY POLICY AND OBJECTIVES

The following QA/QC Plan is designed to assure that the COMS located on the dryer stack operates in accordance with guidelines outlined in Appendix F of 40 CFR Part 60 “Quality Assurance Procedures”. The following are the operations, maintenance, and documentation procedures for the COMS located on the dryer stack at the Weyerhaeuser facility in Grayling Michigan. The objectives of the QA/QC Plan are to:

a) Assure compliance with all applicable emission limitations established by the Environmental Great Lakes and Energy – Air Quality Division;

b) Assure that effective preventive maintenance procedures for source and control devices are in place to minimize any malfunctions;

c) Provide for proper documentation of operating conditions and equipment inspections and to assure the correct procedures are followed for compliance reporting malfunction notification.

# Furthermore; as required by Procedure 3, Quality Assurance Requirements for Continuous Opacity Monitoring Systems at Stationary Sources used to demonstrate continuous compliance with opacity standards specified in new source performance standards (NSPS) promulgated by EPA pursuant to section 111(b) of the Clean Air Act, 42 U.S.C. 7411(b)—Standards of Performance for New Stationary Sources., the QA/QC Plan must adequately address the following activities:

* Procedures for performing daily drift checks, including daily instrument zero and upscale drift checks of COMS and the status indicators check
* Preventative maintenance of COMS including spare parts inventory
* Data recording, calculations, and reporting
* Quarterly performance audit procedures including optical alignment, calibration error, and zero compensation
* Program of corrective action for malfunctioning COMS
* A means of annually checking the zero alignment of the COMS

### DOCUMENT CONTROL SYSTEM

All data collected by way the QA/QC Plan and its procedures will be maintained in a manner that maintains its integrity and where applicable, consistent with Company document retention standards.

### COMS REGULATORY MANDATES AND COMS DESCRIPTION

One Teledyne *LightHawk* Opacity/Dust Monitor Model 560, Serial Number 5602516 is installed, calibrated, maintained and operated on the dryer systems stack, in accordance with the requirements set forth in 40 CFR § 60.13, 60.7, 40 CFR § 60, Appendix B, PS 1 “Specifications and Test Procedures For Opacity Continuous Emission Monitoring Systems in Stationary Sources” and 40 CFR § 60, Appendix F, Procedure 3-Quality Assurance Requirements for Continuous Opacity Monitoring Systems at Stationary Sources.

The COMS is located on the dryer exhaust and is positioned so that opacity is monitored after the exhaust has been processed by the WESP and RTO, or has been bypassed.

The Teledyne LightHawk 560 Opacity/Dust Monitor system consists of the Optical Head Assembly, Retroreflector Assembly, Protective Purge Air System, Enhanced Remote Panel (ERP), and a Calibration Kit Assembly. The first three are mounted on the stack. The ERP is located in the temperature controlled CERMS shack. The Calibration Kit and Filter Pouch are stored in a protective foam-lined hard case in the Instrumentation Shop when not in use to prevent damage to the components.

The Optical Head and Retroreflector assemblies are mounted on the stack directly opposite each other on the same level as the sampling ports noted in the diagram below. Stack height is 150 feet at an elevation of approximately 1250 feet above sea level. The CERMS building containing the opacity monitor controller/ERP/interface is located on top of the dryer building approximately 70 feet northwest of the stack.



The instrument operation is based on the principle of transmissometry. A light beam with specific spectral characteristics is projected through the effluent stream of a stack or duct exhausting combustion or process gases. The amount of light reflected back to the instrument from a reflector, after passage through the stream, is compared with the maximum possible return when no effluent is present. The return signal is an indication of the transmittance of the effluent. Particulate matter in the effluent stream attenuates the projected light beam. The opacity of the gas stream is determined by measuring the attenuated signal from the instrument. The signal is then digitized and transmitted to the ERP. The ERP displays instantaneous and average opacity, sends commands to the Optical Head, and provides an operator interface for the system.

### ORGANIZATION AND RESPONSIBILITIES

The Weyerhaeuser Grayling facility is staffed (24) hours per day (7) days per week. Four operations teams (E, S, P, and N) and one support team (A) working on rotating shifts manage facility operation and monitoring. Each operating team is staffed with trained operators and maintenance members to assure proper equipment operation and quick response to any malfunctions. Specific responsibilities assignments for this plan are listed below:

|  |  |
| --- | --- |
| **Position** | **Responsibility** |
| Mill Manager | Overall |
| On-shift Team Members | Proper equipment operationsMalfunction responseDocumentationReport malfunction to Environmental Manager |
| Function Area Coach | Ensure COMS operating procedures are up-to-dateCompliance with COMS operating procedures |
| Instrumentation Maintenance | COMS operation and calibrationsPreventative maintenance Adequate COMS spare parts inventoryTrain on-shift maintenance  |
| Environmental Manager and EH&S Coordinator | Content of this planTeam member trainingMaintaining documentationAssist in corrective action and malfunction responseReporting to EGLE |

### FACILITIES, EQUIPMENT, AND SPARE PARTS INVENTORY

Weyerhaeuser’s Grayling facility has a repair and maintenance shop which is able to handle repair and maintenance problems that could happen to the COMS or related systems. It is well equipped to handle the large scale structural and electrical needs of the COMS. The facility is also equipped with a instrument maintenance and repair shop, fully stocked with various spare parts for the COMS (i.e. fittings, tubing, filters, maintenance manuals, fuses, electrical parts, pumps, heaters, blowers, lamps, regulators, specialty tools, cleaning solutions, diagnostic test equipment, regulators, etc.). This shop has various specialty tools and diagnostic monitors that are used for repair and maintenance of the COMS. The spare parts inventory is monitored to keep the proper amount of parts in stock. See Appendix B for the list of spare parts on hand. All of the manufacturers’ recommended spares are listed in the operations manual and are available through overnight shipping.

### METHODS AND PROCEDURES, ANALYSIS AND DATA ACQUISITION

The Teledyne *LightHawk* Opacity/Dust Monitor system (i.e., COMS) is set up to meet the requirements for analysis of opacity set forth in PS 1 “Specifications and Test Procedures For Opacity Continuous Emission Monitoring Systems in Stationary Sources” and audit procedures specified in 40 CFR § 60 Appendix F, Procedure 3.

The transmissometer component consists of the optical head mounted on one side of a stack and a Retroreflector unit mounted on the opposite side.  The Teledyne monitor employs an electronically modulated, intensity controlled LED located in the Optical Head assembly. Light from the LED is projected from the Optical Head across the stack/duct sample area to the Retroreflector. The reflected light re-enters the Optical Head, where it is evaluated by a signal detector, If the stack is clear, the light transmission is 100% (zero opacity). When the stack passes no light, the transmission is zero (100% opacity). Opacity can be correlated against reference methods to calculate dust loading. The LightHawk measures zero, upscale, and dust compensation (typically on a daily basis) using only one moving part.

The relationship between transmittance and opacity is as follows:

OPACITY = 1 – TRANSMITTANCE

Where opacity and transmittance are expressed as a decimal.

For a *CLEAR PATH* condition:

TRANSMITTANCE = 100% OPACITY = 0%

For a *BLOCKED STACK* condition:

TRANSMITTANCE = 0% OPACITY = 100%

Outputs in terms of Optical Density are also available from the Enhanced Remote Panel. The mathematical relationship between opacity, transmittance, and optical density is:

O.D. = log 1 / transmittance O.D. = log 1 / 1 – opacity

Where: O.D. = Optical Density

 transmittance and opacity are expressed as a decimal

### AIR PURGING SYSTEM

The air purging system serves a threefold purpose:  1) it provides an air curtain to keep the protective windows clean 2) it keeps condensed stack gas moisture from accumulating on the protective windows; and 3) it minimizes thermal conduction from the stack to the instrument. There is a separate air-purging system for the Optical Head and retro reflector units with purge fail switches associated with each blower.  Each blower floods the cavity within the instrument mounting flange with filtered ambient air.

### CONTROL UNIT

The control unit (ERP) of the Teledyne *LightHawk* 560 has a liquid crystal with LED backlit display to display both instantaneous and 6 minute average opacity readings.  The ERP provides 4 configurable analog output channels, 8 channels of digital inputs, and 8 relay outputs.  The 20-key keypad is password and key protected to allow for system set up and diagnostics.  The components of the COMS can be found in **Appendix A.**

### DATA ACQUISITION SYSTEM

The data for the COMS is collected in a dedicated PLC located in the Dryer Control Room. This PLC collects the information from the various data sources such as the COMS, other CEMS monitors and from the process. Data comes into the PLC using analog input modules which are accurate to +/- 0.1 % of full scale. Data is then displayed in both the Energy Control Room and the Press Control Room on a dedicated display using a Wonderware application. As they are being collected data points are stored on an IP 21 database storage system. This system deposits its data into a database server where the information can be retrieved for reports and analysis. The system is powered by one or more Uninterruptible Power Supplies for reliability. The computer system alarms notify the operator of exceedance and fault conditions. The computer will record the date, time, and the maximum reading of the event on an electronic database where the operator can describe the event along with any action taken to correct the upset or malfunction.

The data collection software samples the COMS once every second. The samples are averaged into “six second data points” for six-minute, one hour, eight-hour, twenty-four hour, and thirty-day averages as follows:

Six-minute rolling average: six one second data readings are averaged for a “six second” data point. The sixty data points are averaged for the six-minute average.

One hour rolling average: 360 one second data readings are averaged for a “six-minute” data point. The ten data points are averaged for the one hour rolling average.

Eight hour rolling average: 360 one second data readings are averaged for a “six-minute” data point. The eighty data points are averaged for the eight-hour rolling average.

Twenty-four hour rolling average: 240 “six second” data readings are averaged for a twenty-four-minute data point. The sixty data points are averaged for the twenty-four-hour rolling average. This system will occur every twenty-four minutes.

The data from the monitors are sent to the air quality compliance computer system which collects and electronically stores the average opacity emitted from the dryer system.

### COMS SECURITY

Security of the recorded data is accomplished by limiting assigned individuals access to the PLC program, HMI display, and the database storage program.

### DATA BACKUP PROCEDURES

All data collection required under the permit is performed by a PLC and personal computer control system located in various parts of the mill. This system utilizes a remote I/O network called Modicon Momentum I/Owhich interfaces with field sensors and process sensors and the control system. The control software operating on the PLC is called Concept and the operator display software is Wonderware. The database collection software is Aspen Tech IP21. The entire system is designed to minimize downtime. The data which is stored on the database collection system is backed up continuously to prevent loss of data.

### START-UP OPERATION

The COMS goes through the startup and operation procedures as described in the Owner’s Manual. The COMS is only shut down for maintenance. If production at the facility has slowed down or stopped the COMS continues to operate.

### CALIBRATION AND QUALITY CONTROL CHECKS

Calibration and quality control requirements of the COMS are performed in accordance with manufactures set guidelines and 40 CFR Parts 60.7, 60.13, Appendix B “Performance Specifications” (PS 1) and Appendix F, Procedure 3.

**DAILY CHECKS**

QC procedures are completed according to Procedure 3 which requires daily instrument zero, upscale drift check and status indicator check as follows:

1. Check zero drift with simulated zero device
	* Corrective action required for drift > 2 times the applicable drift in PS 1 (2% opacity x 2 = 4% opacity)
2. Check upscale drift with upscale calibration device
	* Corrective action required for drift > 2 times the applicable drift in PS 1 (2% opacity x 2 = 4% opacity)
3. Check status indicators, data acquisition system error messages, and other system self diagnostic indicators
	* Corrective action based on manufacturer recommendations

Both the simulated zero and upscale calibration devices are intrinsic to the COMS. Neither of them requires any frequent calibration. Rather they both must comply with ASTM D 6216-03 “Standard Practice for Continuous Opacity Monitor Manufacturers to Certify Design Conformance and Monitor Calibration”. The LightHawk also meets the ASTM D6216-12 Annex 1 tolerances for low-level opacity monitors (below 10% opacity). Note that the COMS complies with the facility’s renewable operating permit (ROP) FGDRYERS Flexible Group Condition IV.3 that requires the span value for opacity to be 2.0 times the lowest emission standard or as specified by federal regulation.

So as to assure that these devices are operating properly, the COMS comes with a Calibration Kit that is used to verify the accuracy and precision of both the simulated zero device and the upscale calibration device. The Calibration Kit also contains three neutral density filters (aka, attenuators). These attenuators must be recertified annually as required by 40 CFR Appendix F to Part 60, Procedure 3, 10.2(2). If two annual calibrations agree within 0.5 percent opacity, the attenuators may then be calibrated once every 5 years. The recertification is performed by way of Teledyne Monitoring Lab. Because Teledyne Monitoring Labs uses a laboratory based transmissometer, the attenuators are considered secondary as opposed to primary attenuators.

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### PERFORMANCE AUDITS

**QUARTERLY**

To challenge the COMS, quarterly performance audits are completed as required by 40 CFR Appendix F to Part 60, Procedure 3 (2.0). Quarterly checks are performed with the unit online and include:

1. Zero Compensation is the same as the LightHawks’ “Dust Compensation.” The LightHawk automatically applies the dust compensation to the final readings, as required by Procedure 3. Zero compensation is calculated as equivalent opacity at stack exit conditions and must be ≤ 4% opacity.
2. The three-point audit of the COMS is performed with the external audit/zero device installed. Before beginning, the cal kit must read ≤ 1% opacity. A minimum of three *nonconsecutive* readings are taken for each attenuator.
	1. Ensure that the entire light beam passes through the attenuator
	2. Minimize interference from reflected light
	3. Leave the attenuator in place for at least two times the shortest recording interval on the COMS data recorder.

All monitor responses are then independently recorded to the IP21 data logger. The low-, mid-, and high-range calibration error results are computed as the mean difference and 95 percent confidence interval for the difference between the expected and actual responses of the monitor as corrected to stack exit conditions. Calibration error must be ≤ 3% opacity.

1. Optical Alignment checks are performed as routine maintenance during the quarterly audit. Optical alignment must be within the optical alignment indicator. Adjustments are made as necessary.

**ANNUAL ZERO ALIGNMENT**

Procedure 3 requires annual zero alignment checks. These are performed off stack by comparing the COMS simulated zero to the actual clear path zero. When the requirements are met for the Alternative Annual (on stack) Check, off stack zero alignment must be performed at least every 3 years.

The Teledyne LightHawk 560 meets the requirements of the Alternative Annual Check which allows annual zero alignment checks to be conducted on stack. The calibration kit provided with each monitor includes an external zero device (EZD) that can be used for two out of every three required annual checks. The EZD setting was permanently established for the monitor path length and recorded during the initial installation in June of 2013. With the new installation by certified technicians, Teledyne provided the Grayling facility with a manufacturers certificate of conformance (MCOC) which demonstrated the EZD was capable of producing a consistent zero response.

If the external zero device setting is found to have changed during checks before initiation of the zero alignment, an off-stack zero alignment must be performed. Zero alignment error must be ≤ 2% opacity.

**ON STACK ZERO ALIGNMENT**

1. Clean external optics and align instrument.
2. Run cal cycle and record the Dust Compensation.
3. Install the external zero device fixture from Cal Kit on the face of the Optical Head; record the instantaneous opacity reading with the external zero device in place as variable EZD.
4. Press the “Zero” button on the optical head and record the instantaneous reading as the “Simulated Zero Condition,” or SZD.
5. Calculate the primary zero alignment (PZA) error as PZA = EZD – SZC. If PZA exceeds ± 2% opacity, then the test failed. Take corrective action.
6. After passing, perform normal PM.

**OFF STACK ZERO ALIGNMENT**

1. Remove the unit from the stack and set up to the correct hinge to hinge distance.
2. Clean external optics and run cal cycle. Record Dust Compensation.
3. Record the instantaneous reading under clear path conditions as CPC.
4. Press the “Zero” button on the optical head and record the instantaneous reading as “Simulated Zero Condition,” or SZC.
5. Calculate the primary zero alignment (PZA) error as PZA = CPC – SZC. If PZA exceeds ± 2% opacity, then the test failed. Take corrective action and redo test.
6. Install Cal Kit and record the instantaneous reading as “External Zero Device,” or EZD. This value must be ≤ ± 1% opacity. This check is required by Section 6.8 of ASTM D-6216-12 any time the monitor is set up in clear path conditions.
7. After passing, perform normal PM, set functions, etc.

### COM SYSTEM INSPECTION AND PREVENTIVE MAINTENANCE

A preventative maintenance program is in place to assure that high maintenance areas of the system are checked on a scheduled basis to prevent extended downtime. Step by step preventive and corrective maintenance procedures are outlined below.

Preventive maintenance actions are recorded on a calibration sheet, dated, signed, and maintained with the instrument records.

**Routine Maintenance and Schedule**Preventive maintenance is performed by the Instrumentation Team.

1. Daily Check.
* Check the analyzer visually after the 24-hour calibration check. The following items are indicated on the reporting computer.
* Opacity monitor fault – This may be dirty windows, purge air fail or an electronics problem. The alarm will show up on Wonderware as a fault alarm.
* Purge/heater fail – The units will not function properly with any condensation or dirt. This will alarm on the unit processor.
* Check control unit, monitor malfunctions lights “Lamp”, “Window”, and “Air Purge” will be on if there is a malfunction.
* Ensure that 24-hour Zero and Span test reads correctly.
1. Down day (every other week) Maintenance
* Check instrument mounting and flanges.
* Replace blower filter
* Monitor alignment error – measurement of the light beam which is not returned to the measurement detector.
* Optical surface dust accumulation
1. Yearly Maintenance Check and Test.

The preventive maintenance check is recommended at least yearly and consists of inspecting, testing and adjusting. The Inspection frequency for the COMS will depend on its environment. A corrosive and high particulate loading atmosphere could have detrimental effects on various components. Cold weather can cause repeated fogging on the optical head when the enclosure is removed and makes calibration difficult if not impossible. If specified results are not obtained, refer to the troubleshooting procedures explained in the instrument manuals in the appendix A of this QA/QC Plan.

Inspect the COMS as follows:

* Open the cabinet doors.
* Remove panels from the COMS.
* Check for evidence of corrosion, water or other obvious damage to wiring, tubing, optical filters, sample cell, lamps and mounting, and amplifier unit.
* Check for loose connections on terminal board wiring and plugs.
* Check security of ground connection on amplifiers.
* Check blower for proper operation.
* Check for buildup of particulate on light source.
* Check lamp source for proper operation.
* Check COMS sampling system for cleanliness.
* Check heated chambers, and for evidence of overheating.
* Check flow meter, tubing, vacuum regulator, valves, gauges, for condition and security.
* Check, repair, or tighten any damaged or faulty parts.
* Inspect the power supply, wiring and components for evidence of overheating and corrosion, security and faulty part.
* Panel meter checks – the digital displayed response on the panel of the monitors when a known signal is induced.
* Calibration error checks – the response of the COMS to the known opacity values of three calibrated neutral density filters.
* Zero compensation limit – means of automatically adjusting the monitor calibration to compensate for drift in the monitor’s response to the simulated zero opacity condition.
* If everything is satisfactory, replace the analyzer access panels.
* Stack exit correlation error – the measured opacity at the monitor location corrected to stack exit conditions.

### MALFUNCTION RESPONSE AND REPORTING

The steps for resolving and reporting malfunctions of air monitoring equipment are:

1. When a Team Member identifies a malfunction, they take immediate steps to correct the situation. If the Team Member is unable to correct the malfunction and additional resources are required the appropriate Maintenance Team member(s) is notified. Contact Teledyne Monitoring Labs for assistance concerning the COMS if need be.
2. The Maintenance or team member will notify the Environmental Manager if the COMS malfunction lasts for over 2-hours.
3. The Environmental Manager verbally notifies the EGLE – Air Quality Division Inspector within 24-hours or as soon as possible. The Environmental Manager follows up with a written report in 10 days that indicates:

a) The probable cause of the malfunction

b) The actions taken to correct the malfunction

c) Steps taken to prevent a re-occurrence

**Out-of-control periods:**Out-of-control periods mean that one or more COMS parameters falls outside of the acceptable limits established by Procedure 3.
During the period the COMS is out-of-control, COMS data may not be used to calculate emission compliance or to meet minimum data capture requirements in this procedure or the applicable regulation.
A Data Assessment Report (DAR) must be completed for out of control periods and must include the information required by sections 10.0, 10.1, 10.2, and 10.3 of 40 CFR § 60. Appendix F, Procedure 3 for the COMS at the interval specified in the applicable regulation.
The report must include the information listed in paragraphs (1) through (5) of this section in the DAR.

(1) Name of person completing the report and facility address,

(2) Identification and location of the COMS(s),

(3) Manufacturer, model, and serial number of the COMS(s),

(4) Assessment of COMS data accuracy/acceptability and date of assessment as determined by a performance audit described in section 10.0. If the accuracy audit results show the COMS to be out-of-control, we must report both the audit results showing the COMS to be out-of-control and the results of the audit following corrective action showing the COMS to be operating within specifications, and

(5) Summary of all corrective actions taken when the COMS was determined to be out-of-control.

The DAR reports must be kept on file and available for inspection by the EPA, State, or local enforcement agency for period of 5 years, as specified in the Renewable Operating Permit.

### CORRECTIVE MAINTENANCE PROCEDURES

The following are the three main types of malfunctions and the corresponding corrective action that often occurs. For more specific information and fail codes, refer to Troubleshooting Section 10 of the Manual. All monitor malfunctions are addressed immediately. For those problems that take longer than 2 hours to correct, malfunction reporting procedures outlined in the Title V permit are followed. Run time fails are referred to On Shift Team Maintenance if operators are unable to resolve the problem. Instrumentation technicians are called when rudimentary response methods are insufficient to correct the problem.

|  |  |
| --- | --- |
| **Malfunction** | **Corrective Action** |
| Loss of power to the opacity monitor | Check the circuit breaker located in the panel on ground level east of #4 dryer. For other problems, contact the on-shift maintenance for necessary assistance. |
| Opacity monitor fault*This may be dirty windows, purge air fail or an electronics problem. The alarm will show up on Wonderware as a fault alarm.* | Contact the on-shift maintenance for further assistance. |
| Purge/heater fail*The units will not function properly with any condensation or dirt. The alarm will show up on Wonderware as a fault alarm.* | Check the circuit breaker (same panel). Contact the on-shift maintenance for further assistance. |

### TRAINING PROCEDURES

Training procedures are in place to train operators and on-shift maintenance members about the opacity monitor. Operators and on-shift maintenance members are trained in the actual operation of the COMS and supporting sampling equipment. The manual for the monitor is available to all operators and on-shift maintenance members in order to assure proper operation of the COMS.

**Record of revisions:**

|  |  |  |
| --- | --- | --- |
| **Date**  | **Description** | **By Whom** |
| 9/9/19 | Review/updated MDEQ to EGLE, punctuation | Kathi Moss |
| 5/31/18 | Review | Kathi Moss |
| 6/7/17 | Review/updated titles  | Kathi Moss |
| 6/20/13 | Issue new plan for Teledyne LightHawk 560  | Faith Dandois |
| 6/25/14 | Annual review- minor syntax and punctuation corr. | Faith Dandois |
| 7/31/15 | Updated for new COMS rules and Procedure 3. Added spare parts on hand to Appendix B | Faith Dandois |

Appendix A

Appendix B

|  |
| --- |
| TELEDYNE MONITOR LABS (TML) LIGHTHAWK® 560SPARE PARTS ON HAND |
| **Part Name** | **TML Part #** | **System Location** | **Stocking Quantity** | **Cal Kit Recal Required After Replacement** | **Off-Stack Recal Required After Replacement** |
| Fuse (1.25 A) | 527441 | Optical Head Power Supply Board | 6 | No | No |
| Fuse (5.0 A) | 527418 | Optical Head | 6 | No | No |
| Fuse (2.0 A) | 527438 | Enhanced Remote and Multi I/O | 6 | No | No |
| Purge Filters | 528873 | Purge System | 12 | No | No |
| Wipes | 550026 | General | 1 Box | No | No |
| Lens Cleaning Fluid | 530023 | General | 1 Bottle | No | No |
| Optical Amplifier PCB | 1860-0400-01 | Optical Head | 1 | Yes | No |
| 560 Mother Board PCB (includes one Control Module 515441) | 1860-0500-01SP | Optical Head | 1 | Yes | No |
| Control Module PCB | 515441 | Optical Head | 1 | No | No |
| Power Supply PCB | 1860-1100-02 | Optical Head | 1 | No | No |
| Cal Mechanism Drive Assembly | 1860-0125-01 | Optical Head | 1 | Yes | No |
| Blower Motor | 980142 | Purge System | 1 | No | No |
| Power Supply PCB | 1803-0300-02SP | Enhanced Remote Panel | 1 | No | No |
|  |  |  |  |  |  |