

**Startup, Shutdown, and Malfunction
(SSM) Plan**

**Per General Provisions 40 CFR §63.6(e)
&
Coil Coating NESHAP 40 CFR Subpart SSSS**

**ABC Coil Coating
Anytown, USA**

Regenerative Thermal Oxidizer (RTO)

Date Prepared: December 2004

Affected Processes: Coil Coating Line No. 1 (Prime & Finish Coaters)

Approval Signatures:

Owner _____
Name _____ Date _____

Plant Manager _____
Name _____ Date _____

Environmental Engineer _____
Name _____ Date _____

Per 40 CFR 63.6 (e)(3)(v), ABC Coil Coating must maintain at the affected source a current SSM plan to be made available upon request for inspection and copying by the Administrator. In addition, if the plan is subsequently revised, ABC Coil Coating must maintain at the affected source each previous version of the SSM plan to be made available for inspection and copying by the Administrator for a period of 5 years after revision. If at any time after adoption of a SSM plan the affected source ceases operation or is otherwise no longer subject to the provisions of this part, the ABC Coil Coating must retain a copy of the most recent plan for 5 years from the date the source ceases operation or is no longer subject to this part and must make the plan available upon request for inspection and copying by the Administrator.

I PURPOSE OF THE SSM PLAN (40 CFR §63.6(E)(3))

This SSM plan describes procedures for operating and maintaining the regenerative thermal oxidizer (RTO) -- and sources that it controls -- during startup or shutdown events, and during periods of operation when the RTO or process sources malfunction. A list of the coating processes and emission points controlled by the RTO is included as Table 1. This SSMP plan also describes ABC Coil Coating's corrective action procedures for malfunctioning RTO components, process equipment, and monitoring equipment used to comply with the Metal Coil Surface Coating NESHAP.

The purpose of this startup, shutdown, and malfunction plan is to:

1. Ensure that, at all times, ABC Coil Coating operates and maintains the RTO, affected sources, and the RTO monitoring equipment in a manner consistent with safety and with air pollution control practices designed to minimize emissions to the levels required by the Metal Coil Surface Coating NESHAP and ABC Coil Coating's Title V permit;
2. Ensure that ABC Coil Coating is prepared to correct malfunctions as soon as practicable after their occurrence in order to minimize excess emissions of hazardous air pollutants; and
3. Reduce the reporting burden associated with periods of startup, shutdown, and malfunction events (including corrective action taken to restore malfunctioning process and air pollution control equipment to its normal or usual manner of operation).

II DEFINITIONS

- a. Definitions set forth in the NESHAP General Provisions (40 CFR §63.2):
- i. Startup: “...*the setting in operation of an affected source or portion of an affected source for any purpose.*”
 - ii. Shutdown: “...*the cessation of operation of an affected source or portion of an affected source for any purpose.*”
 - iii. Malfunction: “...*any sudden, infrequent, and not reasonably preventable failure of air pollution control and monitoring equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.*”
- b. Definitions used in this SSMP plan that are specific to Coil Coating Operations:
- i. Startup: *Commencing operation of the curing ovens and oxidizer from ambient temperatures (normally following a complete shut-down of the coil coating line). The coating applicator would not be engaged until the ovens and oxidizer reach their set point temperatures defined in the start-up procedure.*
 - ii. Idle Condition: *Coating applicator is disengaged and the oven and oxidizer are operating on a low-fire mode (temperature at a lower set-point but significantly above ambient conditions).*
 - iii. Operating Condition: *Coating applicator is engaged, with the curing oven and oxidizer operating at or above set-point temperatures.*
 - iv. Shutdown: *Termination of operations such that the curing oven and oxidizer are allowed to cool to ambient conditions. Short-term stoppages of coating operations for changeovers or brief line maintenance (where the line is temporarily placed in idle mode and then brought back up to operating condition) are not considered shutdown events.*
 - v. Malfunction: *Failure or upset condition of the oxidizer, coating line, or their monitoring instrumentation systems, which results in either excess emissions or a parametric monitoring excursion. Failures or upset conditions caused by poor maintenance or improper operation are not considered to be malfunction events covered by this SSM plan.*

- vi. Excess Emissions: *An emissions rate of hazardous organic compounds (HAPs) that exceeds the MACT standards set forth in §63.5120.*
- vii. Parametric Monitoring Excursion: *Operating outside of the monitoring parameter compliance thresholds set forth in §63.5121 and Table 1 of 40 CFR 63, subpart SSSS. For continuous temperature monitoring, a low temperature event is only considered to be an excursion if the 3-hour block average temperature of the oxidizer is less than the compliance point established from the most recent performance test.*
- viii. Set-point Temperatures: *The curing oven zone temperatures specified for each coating job and the minimum oxidizer operating temperature established as the average combustion chamber temperature measures in the most recent oxidizer performance test that demonstrated compliance with the Coil NESAHP emission limits.*
- ix. Test Strip: *A length of metal coil strip coated for quality assurance testing of the finish provided by the coating applicator and curing oven settings. For purposes of this SSM plan, coating of test strips is considered to be part of the routine production by the coil coating line.*
- x. Leader Strip: *A length of metal coil strip used to thread a new coil through the entire line when the coil strip is entirely removed from the line at cessation of operations. For purposes of this SSM plan, running a leader strip through the line is not considered to be part of the routine production by the coil coating line.*
- xi. Coating Applicator Disengaged: *The process of moving the coating application rolls away from the metal coil strip so that no coating is applied to the coil.*
- xii. Purge Fan: *An exhaust blower that evacuates the curing oven prior to start-up, to ensure that an explosive atmosphere is not present within the oven or oxidizer before they are lit during a cold start-up. This fan direct vents to atmosphere briefly (less than __ minutes) before the oxidizer and curing oven are lit, at which time the oven damper directs the oven exhaust to the oxidizer. For purposes of this SSM plan, air exhausted through the purge fan is not considered to be excess emissions or a malfunction event, since this brief bypass venting is only conducted when the coating applicator is disengaged and is only conducted as a fire or explosion prevention measure.*

III STARTUP OPERATING PROCEDURES

Startup periods will be conducted such that excess HAP emissions are minimized during the event. This means that none of the affected coating processes (listed in Table 1) will begin operation until the oxidizer has been started and is functioning within the acceptable values for critical operating parameters (e.g., combustion chamber temperature, fan inlet static pressure, damper position, etc.). Oxidizer startups will be performed per the procedures manufacturer's Operation Manual or the most current ABC Coil Coating Standard Operating Procedure. The following steps are followed during start-up of the coil coating line:

1. Evacuate oven atmosphere with purge fan for at least ___ minutes.
2. Set oxidizer fan to low-speed condition and reposition oven damper to direct exhaust to oxidizer.
3. Turn off purge fan.
4. Light oven and oxidizer burners.
5. Bring oven zones up to set-point temperatures.
6. Bring oxidizer temperature up to minimum temperature of ___ °F.
7. Engage coating applicator and run test strip or first production coil.
8. Track the increase in oxidizer temperature, and disengage the coating applicator if this temperature does not increase to minimum set point value (___°F) before completing coating of the initial coil.

The final step (tracking the oxidizer temperature during the initial coil) will determine if a successful start-up has occurred. Typically, the oxidizer will reach its set-point temperature within less than 5 minutes of the start-up of coating operations, based on a ramp up of VOC load to the unit. If the oxidizer set-point temperature is not reached by the end of the first coil (approximately 15-20 minutes), then the coating applicator will be disengaged and the start-up suspended until the problem is diagnosed. Potential problems could include burner malfunctions, fan speed controller malfunctions, fresh-air damper leakage, thermocouple problems or temperature controller failures. These problems will be addressed through the malfunction response procedures outlined in Section V and Table 2 of this SSM plan.

All coil coating line startups, normal or otherwise, will be recorded on the "Startup-Shutdown-Malfunction Log" (Attachment A). These records will include the date, time, and duration of the start-up, as well as an indication of whether the event was completed in accordance with the SSM Plan procedures.

IV SHUTDOWN OPERATING PROCEDURES

Scheduled shutdown periods will be conducted in a manner that should not generate any excess HAP emissions. Shutdown events are limited to times when the curing oven and oxidizer are removed from service and allowed to cool down to ambient temperatures. Temporary production stoppages related to changing coatings or brief maintenance events on the line where the oven and oxidizer are placed in idle condition are not considered to be shutdown event in this SSM plan.

During a shutdown event, the oxidizer will be kept on-line and operated within the acceptable parameter values until both the prime and finish coating applicators are disengaged, the painted coil strip is completely cured, and the ovens have been exhausted for a sufficient length of time to remove all of the solvent-laden air generated by thermal curing of the coatings. After this condition is satisfied, the oxidizer will be shut down per the manufacturer's Operation Manual or the most current ABC Coil Coating Standard Operating Procedure. A scheduled shutdown event will include the following steps:

1. The prime and finish coating applicator will be disengaged at the end of the final coil (when the start of the leader strip passes through the coater), but the curing oven will continue to be vented to the oxidizer for a brief period of time after the coating rolls are disengaged.
2. Oven burners will be shutdown after the final coil exits the curing oven, then oven LEL readings will be tracked to determine when the oven damper can be reset to direct vent the oven through the bypass vent for cooling purpose. Bypass venting will not be started until all oven LEL readings have dropped to below 1%.
3. When the ovens are bypassed to direct venting, the oxidizer inlet damper will be set to pull from the fresh air intake and the oxidizer burners will be shut down.
4. Once the combustion chamber temperature falls below 200 °F, the draft fan and combustion blower will shut down and the unit is considered to be fully shut down after this step is complete.

All process equipment or oxidizer shutdowns, normal or otherwise, will be recorded on the "Startup-Shutdown-Malfunction Log" (Attachment A). These records will include the date, time, and duration of the shutdown, as well as a description of the event that confirms it was completed in accordance with the SSM Plan procedures.

V MALFUNCTIONS

Malfunctions covered by this plan primarily consist of any sudden, infrequent, and not reasonably preventable failure of the oxidizer and/or associated emissions monitoring equipment. Other potential process equipment malfunctions that could create uncontrolled venting of HAPs to the atmosphere (such as a oven bypass vent damper failure) are also covered by the plan. All oxidizer and monitoring equipment malfunction events will be identified and corrected as soon as practicable in order to minimize excess HAP emissions. During a malfunction event, the coaters will be disengaged as soon as the coil in process is completed. The coaters will not be re-engaged until the oxidizer is operating within appropriate thresholds for critical operating parameters (e.g., combustion chamber temperature, fan inlet static pressure, damper position, etc.), and any process malfunction has been corrected (such as proper bypass damper positioning).

In any malfunction situation, the same general response steps will be followed:

- 1) Malfunction Identification - Most foreseeable malfunction events are incorporated into the alarm notification system, which provides audible and visual identification of a malfunction occurrence. Other malfunctions will be identified through parameter monitoring equipment or by operator observations.
- 2) Responsible official notification - Once a malfunction has been identified, the most appropriate responsible official at the facility at the time of the event (Environmental Engineer, Shift Supervisor, Plant Manager, Maintenance Supervisor, etc.) will be notified. The responsible official will provide assistance and guidance, if necessary, to successfully complete the remaining response actions.
- 3) Suspension of Coating Operations – Once the coil that is in process is completed, the coating applicators will be disengaged and the line stopped until the malfunction is diagnosed and corrected. Coating operations will not be re-started until the both the oxidizer and process is returned to normal operating conditions.
- 3) Diagnosis and malfunction cause determination - The cause of the malfunction must be identified to identify the appropriate corrective action steps. Table 2 provides a list of the potential conditions or factors that could cause each malfunction event covered by this SSM Plan.
- 4) Corrective action procedures - Once the cause of the malfunction has been determined, appropriate corrective action measures will be implemented to resolve the malfunction and restore the oxidizer or affected process equipment back to normal operation. Potential corrective action measures are listed in Table 2, and additional detail is provided in the Oxidizer Operating Manual or the most current ABC Coil Coating Standard Operating Procedure. If a

malfunction not specifically covered within the plan occurs, the operator and/or maintenance department will attempt to correct the problem using the best resources available. Any previously excluded malfunction events will be added to the SSM Plan within 45 days of its occurrence. A description of the probable cause of the malfunction, operation/maintenance procedure during the event and recommended response actions will be added to Table 2 of this plan.

5) Malfunction Event documentation - The malfunction event will be appropriately documented using the “Startup-Shutdown-Malfunction Log” (Attachment A) and “Malfunction Incident Report”(Attachment B).

6) Reporting and record keeping – Malfunction events will be reported to the permitting authority and records maintained as required by the rule as described in Section VI of this report. Those events that are addressed in accordance with this SSM Plan will be summarized in the semi-annual SSM reports. Any events that are not addressed consistent with the plan will be immediately reported as described in Section VI.

Table 2 presents potential malfunction events that may cause low temperature problems, the oven exhaust stream to bypass the oxidizer, or create a situation where oxidizer components shutdown and/or go offline. Additionally, the table lists probable malfunction causes, as well as, operating & maintenance procedures during the malfunction event and suggested corrective action procedures to restore the unit to normal operation.

VI RECORD KEEPING AND REPORTING

As required by §63.10(b), ABC Coil Coating will maintain and make available for inspection applicable records, logs, reports, and/or notifications pertaining to startup, shutdown, and malfunction events for at least 5 years following each occurrence. At a minimum, the most recent 2 years of data will be retained on site, while the remaining 3 years of data may be kept at an off site location. The SSM records may be maintained on microfilm, electronic storage media, or on microfiche.

In the event of a startup, shutdown or malfunction event, periodic and immediate SSM reports will be submitted per the general provision requirements of §63.6(e)(3) and §63.10(d)(5) unless alternative reporting arrangements are made with the permitting authority. The following guidelines summarize these reporting requirements.

Periodic Reports

Periodic reports will be submitted and cover any SSM events occurring during the applicable reporting period where the response actions were consistent with the procedures specified in this plan. Periodic reports will be submitted to the Administrator semiannually¹ and will be postmarked by the 30th day following the end of each calendar half (or other calendar reporting period, as appropriate). At a minimum, the report will consist of; a letter stating that the actions taken during any startup, shutdown, and malfunction events were consistent with the plan, the number, duration, and a brief description of each event (the completed SSM log included as Attachment A), and will include the name, title, and signature of the owner or operator or other responsible official who is certifying its accuracy.

Immediate Reports

Immediate reports will be submitted when actions taken during a SSM event are inconsistent with the procedures specified in this plan, or if a malfunction event not covered by the plan occurs. Initially, notification will be sent to the Administrator by telephone or facsimile (fax) within 2 working days following commencement of the actions inconsistent with the plan. This will be followed by a letter to the Administrator postmarked within 7 days after the end of the event. The letter will contain the name, title, and signature of the owner or operator or other responsible official who is certifying its accuracy. The letter will also explain the circumstances of the event, the reasons for not following the startup, shutdown, and malfunction plan, and whether any excess emissions and/or parameter monitoring exceedances are believed to have occurred. A completed "Malfunction Report Form" (included as Attachment B of this plan) will be attached to the immediate report letter to satisfy these requirements.

¹ May be on a more frequent basis if specified otherwise in a relevant standard or as established otherwise by the permitting authority in the source's title V permit

Plan Modifications or Revisions

Modifications may be made to this SSM plan as necessary to satisfy the requirements of the rule or to reflect changes in equipment or procedures at the affected source. These Modifications may be made without prior approval from the Administrator or the permitting authority unless specifically provided otherwise by the permitting authority. Each such revision to this plan must be reported in the semiannual report required by §63.10(d)(5).

If this plan fails to address or inadequately addresses an event that meets the characteristics of a malfunction, the plan will be revised within 45 days after the event. Such revisions will include detailed procedures for operating and maintaining the source during similar malfunction events and a program of corrective action for similar malfunctions of process or air pollution control and monitoring equipment.

Any revisions to the plan that alter the scope of the activities at the source which are deemed to be a startup, shutdown, malfunction, or otherwise modifies the applicability of any emission limit, work practice requirement, or other requirement in a standard established under this part, the revised plan shall not take effect until after the owner or operator has provided a written notice describing the revision to the permitting authority.

Table 1

Process Emissions Controlled by the RTO

Table 1
Affected Process Equipment Controlled by
Regenerative Thermal Oxidizer (RTO)
ABC Coil Coating, Inc.
 Anytown, USA

| Process Source | Process Step | Emission Point | Venting Arrangement: |
|-------------------------|-----------------------|--------------------|---|
| Coil Coating Line No. 1 | Prime Coating System | Prime Coater Room | Intakes/hoods adjacent to coater vented to oven zones through combustion air blower intakes; additional floor sweep intakes vented to atmosphere. |
| | | Prime Oven | Vented directly to the oxidizer inlet header; isolation damper located in the duct run to accommodate purge fan venting on start-up and emergency bypass triggered by parameters outside of safe operating range. |
| | | Prime Quench | Direct vented to atmosphere; not regulated by coil coating MACT |
| | Finish Coating System | Finish Coater Room | Intakes/hoods adjacent to coater vented to oven zones through combustion air blower intakes; additional floor sweep intakes vented to atmosphere. |
| | | Finish Oven | Vented directly to the oxidizer inlet header; isolation damper located in the duct run to accommodate purge fan venting on start-up and emergency bypass triggered by parameters outside of safe operating range. |
| | | Finish Quench | Direct vented to atmosphere; not regulated by coil coating MACT |

Table 2

Malfunction List and Response Procedures

Table 2
SSM Plan Malfunction List and Response Procedures
Rotary-Valve Regenerative Thermal Oxidizer

| Event | Alarm/Event Notification | Operating Procedures During Malfunction Event | Corrective Action Program | | |
|-----------------------------------|---------------------------------|---|---------------------------|--|--|
| | | | SOP Reference | Potential Malfunction Causes | Recommended Actions |
| Control Power Supply Lost | Audible and Visual Alarm | Process equipment would already be non-operational if caused by complete loss of electric power supply. If malfunction is caused by problems with PLC I/O card power surges, the coating applicators would be disengaged after coating of the coil in process is completed. ABC Coil Coating would determine what caused the loss of control power supply and then attempt repairs as soon as possible. Coating will only be resumed after the RTO is | 4.12.1 | Loss of power | Check power supply. Verify no circuit breakers tripped. Verify all selector switches are in correct position. Implement adjustments, repairs or component replacement as necessary. |
| | | | | Loss of input signal to PLC | |
| Inlet Static Pressure Signal Lost | Audible and Visual Alarm | RTO interlock system will automatically take the unit off-line (fresh air purge mode with bypass of process emissions to atmosphere), at which time ABC Coil Coating would attempt repair of the instrument system. The coating applicators would be disengaged after coating of the coil in process is completed. Alarm must be acknowledged and problem corrected before the interlock will allow continued RTO operation. A static pressure signal must be achieved to allow the RTO to return to service. Coating operations would not be | 4.12.2 | Faulty wiring | Check wiring and transmitter. Repair or replace the sensor, transmitter, or wiring as necessary. |
| | | | | Transmitter failure | |
| Inlet Static Pressure Faults | Audible and Visual Alarm | RTO interlock system will automatically switch the unit to bypass mode if the static pressure at the inlet to the draft fan is above or below its specified range. The coating applicators would be disengaged after coating of the coil in process is completed. If this type of bypass occurs, ABC Coil Coating would attempt repair of the instrument system or determine if the abnormal pressure is due to a blockage in the ductwork or plugged heat transfer media. The fan inlet pressure must be restored to an acceptable level before the interlock will allow continued RTO operation. Coating operations would not resume until all RTO operating parameters are restored to within acceptable ranges. | 4.12.3, 4.12.45 | Inlet ductwork blockage | Verify proper wiring and inlet pressure transmitter operation. Repair or replace sensor, transmitter or wiring if found to be defective. Verify proper damper positioning. Check inlet header and trunk lines for blockage. Clear blockage if found or re-set dampers if needed. Check pressure drop across RTO heat transfer media. Commence full RTO shutdown to clean |
| | | | | Plugging of heat transfer media | |
| | | | | Improper setting or position of system airflow dampers | |
| | | | | Faulty wiring or transmitter failure | |

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Rotary-Valve Regenerative Thermal Oxidizer

| Event | Alarm/Event Notification | Operating Procedures During Malfunction Event | Corrective Action Program | | |
|---------------------------------------|---------------------------------|--|---|---|---|
| | | | SOP Reference | Potential Malfunction Causes | Recommended Actions |
| Combustion Chamber Temperature Faults | Audible and Visual Alarm | Out-of spec combustion chamber temperature (improperly sensed or real) or loss of the burner flame will automatically take the RTO to emergency bypass mode or cause the PLC to shut down the burner, which could take the unit off-line if the temperature drops too low. The coating applicators would be disengaged after coating of the coil in process is completed. The burner settings and operation, as well as the devices sensing the proper burner operation would be checked. Possible process upsets causing a slug load of emissions would also be investigated. ABC Coil Coating will adjust, repair or replace any malfunctioning components identified by the assessment. Coating | 4.12.31, 4.12.32, 4.12.34, 4.12.35, 4.12.36, 4.12.62 | High inlet or combustion chamber temperature | Evaluate process conditions to determine if abnormal loading caused temperature variance. Check thermocouples in combustion chamber. Verify proper operation of the gas supply train. Visually verify flame in the combustion chamber. Check flame sensor operation. Adjust, repair or replace any malfunctioning |
| | | | | Low inlet or combustion chamber temperature | |
| | | | | Flame failure | |
| | | | | Process upset | |
| | | | | Combustion chamber thermocouple failure | |
| Oxidizer or Draft Fan Air Flow Faults | Audible and Visual Alarm | RTO interlock system will automatically shut down the RTO burner if an air flow fault occurs, at which time ABC Coil Coating would attempt repair of the instrument system or determine if the fault is due to a blockage in the ductwork or plugged heat transfer media. The coating applicators would be disengaged after coating of the coil in process is completed. The sensors must register air flow at the fan and within the RTO before the interlock will allow the burners to re-ignite. The system would be taken off-line (fresh air purge mode) to allow diagnosis and repair. Coating operations would not | 4.12.4, 4.12.5 | Inlet blockage | Verify air flow sensor and transmitter operation. Repair or replace sensor, transmitter or wiring if required. Verify proper damper positioning. Check inlet header and trunk lines for blockage. Clear blockage or re-set dampers if needed. Check pressure drop across RTO heat |
| | | | | Plugging of heat transfer media | |
| | | | | Improper setting or position of system airflow dampers | |
| | | | | Faulty wiring or transmitter failure | |
| Oxidizer Rotary Valve Faults | Audible and Visual Alarm | If the rotary diverter valve is not advancing to its next position, the PLC will stop the draft fan, shut down the burner and the RTO will be taken off-line. The coating applicators would be disengaged after coating of the coil in process is completed. ABC Coil Coating will attempt repairs to the control system or pneumatic actuators while the system is operating in the fresh air purge and emergency bypass mode. Coating operations would not resume until all RTO operating parameters are restored to within acceptable ranges. | 4.12.6, 4.12.7 | Index plate tooth proximity switch failure | Check diverter valve and index plate tooth proximity switch. Check index pin cylinder pneumatic actuation system. Adjust, repair or replace the proximity switch and pneumatic system components as needed. Repair or adjust the rotary |
| | | | | Improper operation or failure in pneumatic system that actuates the | |
| | | | | Index pin has not disengaged from its current position. | |

Table 2
SSM Plan Malfunction List and Response Procedures
Rotary-Valve Regenerative Thermal Oxidizer

| Event | Alarm/Event Notification | Operating Procedures During Malfunction Event | Corrective Action Program | | |
|--|---------------------------------|---|---------------------------|--|--|
| | | | SOP Reference | Potential Malfunction Causes | Recommended Actions |
| Isolation Damper, Oxidizer High Temperature Bypass (VER) or Emergency Bypass Damper Faults | Audible and Visual Alarm | If monitoring systems or proximity switches indicates that any of these dampers are not in the correct position, the PLC will stop the draft fan, shut down the burner and the RTO will be taken off-line. The coating applicators would be disengaged after coating of the coil in process is completed. ABC Coil Coating would then check the actual damper position, adjust or repair position switches if needed, and reposition the dampers if required. If the problem persists, the PLC and control system components would be checked, adjusted or repaired as needed. Coating operations would not resume until all RTO operating parameters are restored. | 4.12.8 through 4.12.15 | Inlet isolation damper failed to open or close or switch failure | Verify proper damper operation. Reposition damper if needed. Check function of damper proximity switches; adjust, repair or replace switches if necessary. Check PLC programming logic and control system components that actuate the damper position; adjust or repair as needed. |
| | | | | Fresh air damper failed to open or close or switch failure | |
| | | | | Oxidizer VER damper failed to open or close or switch failure | |
| | | | | Emergency bypass fails to open or close | |
| Draft Fan Variable Frequency Drive Fault | Audible and Visual Alarm | Loss of the draft fan VFD (whether real or incorrectly sensed) will cause the PLC to shut down the burner and the RTO will be taken off-line. The coating applicators would be disengaged after coating of the coil in process is completed. ABC Coil Coating would determine draft fan is running and repair or replace the VFD if needed. If the a VFD fault is incorrectly indicated, the PLC and control system components would be checked, adjusted or repaired as needed. Coating operations would not resume until all RTO operating parameters | 4.12.16, 4.12.17 | VFD failure | Check draft fan operation. Repair, adjust or replace VFD if needed. Check PLC and instrument loop sensing fan operation. Repair, adjust or replace control system components as required. |
| | | | | PLC or control system failure | |
| Combustion Blower Faults | Audible and Visual Alarm | Faults in the combustion blower motor starter operation or air flow sensor will cause the PLC to shut down the burner and RTO will be taken off-line. The coating applicators would be disengaged after coating of the coil in process is completed. The VFD motor and starter switches would be checked, and then adjusted, repaired or replaced as required. Coating operations would not resume until all RTO operating parameters | 4.12.22, 4.12.23, 4.12.24 | Faulty motor starter run sensor | Check blower motor run sensor; repair or replace as needed. Check airflow pressure switch; repair, adjust or replace as required. Check blower motor and motor starter; repair or replace as |
| | | | | Faulty airflow pressure switch | |
| | | | | Malfunctioning motor or motor starter | |

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|---------------|---------------------------------|---|---|--|---|
| | | | SOP Reference | Potential Malfunction Causes | Recommended Actions |
| Burner Faults | Audible and Visual Alarm | Abnormal gas pressure, or failures (improperly sensed or real) in the burner blocking or air/gas valves or the flame relay will cause the PLC to shut down the burner and RTO will go off-line if the combustion chamber temperature drops below the minimum operating point. The coating applicators would be disengaged after coating of the coil in process is completed. These valves, flame relay, gas supply line/regulators, as well as the devices sensing their proper operation would be checked. ABC Coil Coating will adjust, repair or replace faulty components as required. Coating operations would not resume until all RTO operating parameters | 4.12.26, 4.12.27, 4.12.28, 4.12.29, 4.12.30, 4.12.33 | High or low gas pressure detected Burner blocking valve failure. Burner air/gas valve failure. Burner flame relay detection fault | Check gas supply line and pressure regulators. Verify burner valve operation and flame relay. Check pressure and limit switches. Adjust, repair or replace malfunctioning components as required. |
| | | <p>THIS TEMPLATE FOR TABLE 2 PROVIDES A CROSS-SECTION OF POTENTIAL MALFUNCTION EVENTS THAT COULD OCCUR IN A ROTARY-VALVE RTO. MODIFY THESE EVENTS TO SUIT YOUR TYPE OF OXIDIZER AND ADD ALL RELEVANT MALFUNCTION EVENTS THAT CAN BE REASONABLY EXPECTED TO OCCUR OR THOSE THAT ARE COVERED BY THE RTO VENDOR OPERATIONS MANUAL</p> | | | |

Attachment A

Startup, Shutdown, and Malfunction Log

Attachment B

Malfunction Report Form

MALFUNCTION REPORT FORM

Regenerative Thermal Oxidizer (RTO)

ABC Coil Coating, Inc.

This form is to be completed during or immediately following any RTO or parameter monitoring device malfunction event. Information provided will be relied upon for meeting reporting and record keeping requirements.

Date:

Time malfunction identified:

Name and title of initial responder:

Name and title of Shift Supervisor, Maintenance Supervisor or responsible official notified of event:

Malfunction description:

Suspected cause of malfunction:

List corrective action(s) taken:

Time malfunction was corrected:

Total duration of malfunction:

Was Malfunction listed in SSM plan? (Check one) Yes No

If yes, was response consistent with SSM Plan? (Check one) Yes No*

Provide explanation if response was inconsistent with SSM Plan*:

Did SSM Plan appropriately address the malfunction? (Check one) Yes No**

Provide any recommendations for revisions or modifications to current SSM to better accommodate future malfunctions?

Whether any excess emissions and/or parameter monitoring exceedances are believed to have occurred during the malfunction:

List any additional measures taken to reduce excess emissions:

Your Name:

Your Signature:

Name of Supervisor on duty during malfunction:

Comments of Supervisor:

Signature of Supervisor:

**An immediate report is to be submitted to the permitting authority following any response action taken that is inconsistent with the SSM plan.*

***Plan is to be appropriately revised within 45 days.*

Attachment C

Periodic Report Template

MONTH DAY, YEAR

Any State Environmental Protection Agency
P.O. Box 999
Anywhere, USA

RE: Periodic (Semi-annual) SSM Report
ABC Coil Coating, Inc.
Anytown, USA

To Whom it May Concern:

Per the startup, shutdown and malfunction (SSM) reporting requirements contained in §63.6(e)(3) and §63.10(d)(5), ABC Coil Coating is submitting this periodic report pertaining to the RTO startup, shutdown, and malfunction events for the time period of **MONTH/DAY/YEAR** through **MONTH/DAY/YEAR**. Within this time period, all actions taken in response to the applicable startup, shutdown, and malfunction events were consistent with the procedures and actions specified in the current SSM plan (**REVISION DATE**) for this control device. Additional information for individual events are included within the attached SSM log sheets and malfunction report forms for the applicable reporting period.

Please feel free to contact me at (555) 555-8000 if there are any questions.

Sincerely,

NAME OF RESPONSIBLE OFFICIAL
TITLE OF RESPONSIBLE OFFICIAL
ABC Coil Coating, Inc.

Enc.