Operation and Maintenance Plan

Cadillac Castings, Inc.
Cadillac, Michigan

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Executive Summary

Cadillac Castings, Inc. (CCI) is subject to the National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries (40 CFR 63 Subpart EEEEE) commonly known as the Foundry Maximum Achievable Control Technology (MACT). As provided in 63.7710(b), this Operation and Maintenance Plan (O&M Plan) is required for each capture and collection system and control device for an emissions source that is subject to an emissions limit. Emission sources subject to a Foundry MACT emissions limit at the CCI facility include the cupola melting furnace and the A-Line pouring station.

The O&M Plan is a culmination of smaller plans that provide for monthly inspections of capture and control equipment, establishing operating limits for certain operations, conducting air pollution control device preventive maintenance, igniting of mold vents, and the detection of bag leaks and associated monitoring and corrective action. In general, the plans in this document refer to other preventative maintenance or operating procedure programs that were already in place prior to the promulgation of the Foundry MACT Standard.

Section 1
Introduction

The Cadillac Castings, Inc. (CCI) foundry operates a cupola melt furnace and A-Line pouring station that are subject to the Foundry Maximum Achievable Control Technology (MACT) Standard. The other casting manufacturing operations are not subject to the Foundry MACT Standard.

The cupola melt furnace utilizes an afterburner for carbon monoxide and volatile organic compound (VOC) control and a venturi scrubber for particulate control. The A-Line pouring station utilizes a regenerative thermal oxidizer for VOC and particulate control.

The facility is subject to the National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries (40 CFR 63 Subpart EEEEE) commonly known as the Foundry MACT. This Operation and Maintenance Plan (O&M Plan) is required by 63.7710(b) of the Foundry MACT. For each affected unit, the O&M Plan includes:

- Monthly Inspections
- Operating Limits
- Preventive Maintenance Plans
- Site Specific Monitoring Plans
- Corrective Action Plans
- Mold Vent Ignition Plan

A Startup, Shutdown, and Malfunction Plan is also required by the Foundry MACT. That plan has been developed and is maintained separately from the O&M Plan.

Table 1 identifies equipment and control devices that are subject to the O&M Plan requirement. All equipment at this facility is considered "existing" because construction commenced prior to December 23, 2002.

Table 1
Affected Sources

O&M PLAN REQUIREMENT	EMISSION UNIT	AFFECTED EQUIPMENT
Monthly Inspections	Cupola Melt Furnace	Ductwork and capture system Afterburner Venturi Scrubber and Scrubber Fan
	A-Line Pouring Station	Regenerative Thermal Oxidizer (RTO) and RTO fan
Operating Limits	Cupola Melt Furnace	Venturi Scrubber Exhaust Capture System and Ductwork
Preventive Maintenance (PM) Plan	Cupola Melt Furnace	Afterburner Venturi Scrubber Scrubber Fan
	A-Line Pouring Station	RTO and RTO fan
Site Specific Monitoring Plan	Not Applicable	
Corrective Action Plan	Not Applicable	
Mold Vent Ignition Plan	A-Line Pouring Station SPO Pouring Station	Pouring Stations

Section 2
Inspection and Preventive Maintenance Plan

Affected source air pollution control devices, capture hooding and ductwork, and other equipment important to the performance of the capture system are subject to monthly inspections.

In addition, the emission control devices are also required to have a preventive maintenance plan.

2.1 Inspections

The Foundry MACT requires that inspections be conducted monthly. In order to maintain their control devices and ventilation system in good working order, CCI conducts some inspections more frequently. Additional inspections not required by the Foundry MACT regulation are conducted at longer intervals. The specific inspection requirements are detailed in facility preventative maintenance plan and operational procedures. A summary list of the inspections and their frequency are shown in Tables 2 through 5. This schedule is subject to change, following obtaining any necessary approval, if the foundry determines that less or more frequent maintenance is warranted.

2.2 Maintenance Manuals

Maintenance manuals for the air pollution control (APC) equipment at the foundry are maintained in the Engineering and/or Maintenance department(s). The maintenance and operations managers are responsible for keeping these manuals current and will evaluate the technical information for the APC equipment and update the information as necessary.

Maintenance manuals for the APC equipment will contain descriptions of the APC equipment, operation, safety equipment, and manufacturer maintenance information.

2.3 Work Order System

Work order requests concerning repairs to APC equipment or process equipment that can affect APC equipment can be generated by anyone familiar with the operation of the APC equipment. Irregularities in operations, as evident from routine monitoring as presented in Tables 2 through 5, will result in a work order request being generated. The automatic work order system includes frequent equipment inspections, which are set to daily, weekly, monthly, and semi-annual schedules. Required repair work is scheduled and performed with any findings and follow-up recorded on the work order. The Maintenance Superintendent or Shift

Maintenance Supervisor assigns a level of priority to the work order request. The Maintenance Superintendent or Shift Maintenance Supervisor then decides on a course of action and assigns resources to resolve the work order in a manner consistent with the requirements of the Title V Permit and the Foundry MACT. This information is later transferred to the computerized preventive maintenance program. Records are archived for 7 years in storage at the facility.

2.4 Preventive Maintenance

To assist in ensuring necessary repairs are addressed as soon as practicable, the foundry utilizes a computerized maintenance monitoring system to administer and schedule preventive and reactive maintenance for APC equipment. The computerized work order system provides:

- Systematic screening and authorization of requested work
- Necessary information for planning and coordinating future work
- Cost information for future planning
- Instructions for management and maintenance personnel in the performance of repairs
- Identification of the equipment that needs to be maintained
- Records of maintenance work performed

The computerized system organizes and manages the frequency based on past operating experience and performance history. The foundry updates the information in the system based on new operating experience and equipment history. For example, the frequency and scope of specific maintenance task may be modified, in accordance with applicable regulation, if the foundry determines that these changes will maintain proper equipment operation in the future.

Tables 2 through 5 present a summary of the general inspection and preventive maintenance schedule for the APC devices and monitoring equipment that is consistent with applicable manufacturer's instructions. This schedule is subject to change, following obtaining any necessary approval, if the foundry determines that less or more frequent maintenance is warranted.

Table 2
Inspection and Preventative Maintenance Program for Cupola Capture System

FREQUENCY	MAINTENANCE TASK
Daily	For venturi scrubber pressure measurement device, check the pressure tap for pluggage.
Weekly	Check the condition of the fan blades, sheaves, and V-belts for excessive material build-up, wear/cracks, and replace as needed. Check fan for erosion, noise and vibration. Check the structural integrity of the scrubber fan.
Monthly	Visually evaluate for the presence of holes in the ductwork or hoods, flow constrictions caused by dents or accumulated dust in the ductwork that would impair the ability of the capture system to operate effectively. Repair any identified impairments as soon as practicable. Visually inspect pressure measurement system components, mechanical and electrical, for proper functioning.
Quarterly	Check condition of fan bearings for high operating temperature or vibration. Lubricate parts (fans, bearings, motors) as necessary. Calibrate venturi scrubber pressure measurement device. Conduct a calibration check on the pressure measurement device, or install a new device, whenever the sensor exceeds the manufacturer's specified operating pressure range.

Table 3
Summary of Inspection and Preventative Maintenance Program for Cupola Afterburner

FREQUENCY	MAINTENANCE TASK
Daily	Inspect afterburner for general cleanliness and proper operation. Record temperature of afterburner as required by the Renewable Operating Permit (ROP).
Weekly	Check the condition of the fan blades, sheaves, and V-belts for excessive material build-up, wear/cracks, and replace as needed. Check fan and water pump for noise and vibration. Check the structural integrity of the scrubber.
Monthly	Visually inspect the afterburner temperature sensor components, mechanical and electrical, for proper functioning.
Quarterly	Check condition of bearings for high operating temperature or vibration. Lubricate parts (fans, bearings, motors) as necessary.
Semiannually	Perform an electronic calibration of the afterburner temperature probe according the procedures in the manufacturer's manual. Following electronic calibration, conduct a temperature sensor validation check.
Annually	Check fans and motors for vibration and noise. Check shaft and sheave alignment, and repair as necessary.

Table 4
Summary of Inspection and Preventative Maintenance Program for Venturi Scrubber System

FREQUENCY	MAINTENANCE TASK
Daily	Inspect scrubber for general cleanliness and proper operation. Record magnehelic differential pressure data and water flow rate as required by the permit. Check the venturi water pump for proper operation.
Weekly	Check the condition of the fan blades, sheaves, and V-belts for excessive material build-up, wear/cracks, and replace as needed. Check fan and water pump for noise and vibration. Check the structural integrity of the scrubber.
Monthly	Visually inspect pressure and water flow rate measurement system components, mechanical and electrical, for proper functioning. Repair any identified impairments as soon as practicable.
Quarterly	Check condition of bearings for high operating temperature or vibration. Lubricate parts (fans, bearings, motors) as necessary. Check venturi scrubber pressure measurement gauge and transducer calibration. Conduct a calibration check on the pressure measurement device, or install a new device, whenever the sensor exceeds the manufacturer's specified operating pressure range.
Semiannually	Conduct a scrubber water flow rate sensor calibration check according to manufacturer's instructions.
Annually	Check fans and motors for vibration and noise. Check shaft and sheave alignment, and repair as necessary.

Table 5
Summary of Inspection and Preventative Maintenance Program for A-Line RTO

FREQUENCY	MAINTENANCE TASK
Daily	Inspect RTO and fan for general cleanliness and proper operation. Record temperature as required by the permit.
Weekly	Check the condition of the fan blades, sheaves, and V-belts for excessive material build-up, wear/cracks, and replace as needed. Check fan for noise and vibration. Check the structural integrity of the afterburner.
Monthly	Visually evaluate for the presence of holes in the ductwork or hoods, flow constrictions caused by dents or accumulated dust in the ductwork that would impair the ability of the capture system to operate effectively. Repair any identified impairments as soon as practicable.
Quarterly	Check condition of bearings for high operating temperature or vibration. Lubricate parts (fans, bearings, motors) as necessary.
Annually	Check fans and motors for vibration and noise. Check shaft and sheave alignment, and repair as necessary.

Section 3
Operating Limits

3.1 Process Description

CCI operates a cupola equipped with an afterburner and a venturi scrubber. The afterburner is subject to the emission limit for volatile organic hazardous air pollutants (VOHAP) listed in 40 CFR 63.7690(a)(8). Therefore, an operating plan for the capture system must be developed per 63.7710(b)(2).

The cupola is a cylindrical steel shell with cooling water cascading down the exterior wall. A charge, includes metallics, flux and fuel, is conveyed into the cupola through the charge door. Metallic raw materials may include pig iron, iron and steel scrap, and foundry returns. Flux is generally limestone. The fuel is coke.

The afterburners are located in the upper stack of the cupola. An exhaust fan pulls the air through the afterburner and the venturi scrubber. Combustion air is blown into the bottom of the cupola through tuyeres that are sized to the cupola.

The combustion air is automatically balanced with the exhaust fan to ensure that no air escapes the cupola without going through the afterburner. A static pressure differential meter monitors the airflow through the venturi scrubber and exhaust capture system to ensure that the cupola internal pressure is negative to the outside. Because the systems of dampers and fans are automated, there is insufficient need to be concerned with damper settings.

The operating limit parameter, venturi scrubber differential static pressure, was selected because it is a good indicator of the system capture efficiency by ensuring adequate airflow. The pressure transducer monitors the differential pressure and pressure readings are recorded electronically at least 15-minute intervals.

The following operating limit has been determined for the cupola capture system.

Table 6
Cupola Capture System Operating Limits

DEVICE	CONTROL	ACCEPTABLE APC DEVICE OPERATING RANGE
Cupola Capture System Monitoring	Pressure transducers measuring differential pressure across the venturi scrubber.	> 42 inches water gage.

Section 4
Site Specific Monitoring Plans

No bag leak detection system is required at the facility as no baghouses are use to control emissions from process operations subject to MACT emission limits.

Therefore, a Site Specific Monitoring Plan is not required for the facility.

Section 5
Corrective Action Plans

No bag leak detection system is required at the facility as no baghouses are use to control emissions from process operations subject to MACT emission limits.

Therefore, a Corrective Action Plan is not required for the facility.

Section 6
Mold Vent Ignition Plan

6.1 Plan Background

63.7710(b)(6) contains the requirements to develop a Mold Vent Ignition Plan. The plan must contain procedures for providing an ignition source to mold vents of sand mold systems in each pouring area and pouring station unless a determination is made that the mold vent gases either are "not ignitable," "ignite automatically," or "cannot be ignited due to accessibility or safety issues." A facility must document and maintain records of any determination made that mold vent gases are "not ignitable," "ignite automatically," or "cannot be ignited due to accessibility or safety issues."

The determination of ignitability, accessibility, and safety may encompass multiple casting patterns provided the castings utilize similar sand-to-metal ratios, binder formulations, and coating materials. The determination of ignitability must be based on observations of the mold vents within five minutes of pouring and the flame must be present for at least 15 seconds for the mold vent to be considered ignited.

Mold vents that ignite more than 75 percent of the time without the presence of an auxiliary ignition source are considered to ignite automatically and mold vents that do not ignite automatically and cannot be ignited in the presence of an auxiliary ignition source more than 25 percent of the time are considered to be not ignitable. A "mold vent" means an intentional opening in a mold through which gases containing pyrolysis products of organic mold and core constituents produced by contact with or proximity to molten metal normally escape the mold during and after metal pouring.

6.1.1 Mold Vent Ignition Plans

A mold vent ignition plan must be developed for each "pouring area" and "pouring station." A pouring station is defined as "a fixed location to which molds are brought in a continuous or semi-continuous manner to receive molten metal, after which the molds are moved to a cooling area."

The CCI foundry operates the SPO casting line pouring station and the A-Line pouring station. Each of these lines incorporates a mold vent ignition source based on the assumption that the molds produced on each line are ignitable.

For the SPO Line, a natural gas-fired flame is directed at each of the molds after the molds leave the pouring station. This flame is provided to ignite each mold if the mold is ignitable. This ignition source is operated whenever molds are being poured on the SPO line.

For the A-Line, after the molds leave the pouring station, they enter an enclosed room which is exhausted to the RTO. The RTO provides a continuous flame combustion source to ignite the gases from any molds that are ignitable. The RTO operates at approximately 1,400°F or higher, ensuring complete ignition and combustion of the mold gases.