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Compliance Assurance Monitoring Plan

Great Lakes Castings LLC

Ludington, Michigan

July 2009

Last Revision January 2020

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List of Acronyms

CAM	Compliance assurance monitoring
CD	Control Device
CFR	Code of Federal Regulations
CMS	Continuous monitoring system
CO	Carbon Monoxide
DRE	Destruction efficiency
EU	Emission Unit
FR	Federal Register
GLC	Great Lakes Castings LLC
HAP	Hazardous Air Pollutant
IA	Insignificant Activity
Inches w. g.	Inches of Water, Gauge Pressure
MPAP	Malfunction, Prevention and Abatement Plan
NSPS	New Source Performance Standards
PM	Particulate Matter
PPMVd	Parts per million, by volume, on a dry basis
PPMVw	Parts per million, by volume, on a wet basis
PS	Performance Specification
PSEU	Pollutant-specific emission unit
QA/QC	Quality Assurance/Quality Control
QIP	Quality Improvement Plan
SCFM	Standard cubic feet per minute
SV	Stack/Vent
TEA	Triethylamine
TSP	Total Suspended Particulate
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

Section 1 Introduction

This Compliance Assurance Monitoring (CAM) Plan addresses the requirements of 40 CFR Part 64 and satisfies the CAM requirements for the Great Lakes Castings LLC (GLC) facility located in Ludington, Michigan.

GLC operates a grey iron foundry in Ludington, Michigan, under Permit Number MI-ROP-A3934-2015. Equipment within the facility is grouped by process operations into emission units for permitting purposes. The emission units identified by the existing permit for GLC include:

- EUCUPOLA - Metal melting system consisting of the cupola and associated demister, afterburner, quencher, and venturi scrubber, metallic scrap storage area, coke storage area, and electric holding furnace.
- EUCOLDBOXCORE – Six cold box core machines with a packed tower scrubber.
- EUHUNTERPOURING – Hunter iron pouring process.
- EUHUNTERMOLDCOOLING – Hunter mold cooling.
- EUHUNTERSAND – Hunter sand system.
- EUHUNTERDUSTAR – The portion of emissions from the Hunter Line mold cooling, shakeout and return mold sand system and sand mulling operations controlled by the Dustar Baghouse.
- EUDISADUSTAR – Disa line pouring, mold cooling and sand mulling operations controlled by the Dustar Baghouse.
- EUOTHERDUSTAR – The sample shot blast unit controlled by the Dustar Baghouse.
- EUDISAEWETDC – The Disa Line shakeout and return mold sand system operations controlled by the East Wet Dust Collector.
- EUAPPLICATION – Rust inhibitor application.
- EUEASTCOREOVEN – East Core Oven and ancillary equipment.
- EUCLEANING – Shot blast machines and AAF baghouseused to clean castings prior to finishing.
- EUFINISH – Casting finishing process using grinding wheels and AAF baghouse.
- EUCOLDCLEANER – Immersion cold cleaners with covers and drains used to clean metal parts for maintenance purposes. The air/vapor interface of the cleaner is less than 10 square feet. Only non-halogenated solvents are used.
- EURULE290 – Core coating, patternmaking and shell core machines exempt under Rule 290.
- EUSHELLCORE – Shell core machines.

Section 2
CAM Requirement Applicability

Per 40 CFR 64.2(a), the CAM requirement applies to each pollutant-specific emission unit (PSEU) at a major source that is required to obtain a Title V, part 70 permit if the unit satisfies all of the following criteria:

1. The unit is subject to an emissions limitation or standard for the applicable regulated air pollutant.
2. The unit uses a control device to achieve compliance with any such emission limitation or standard; and
3. The unit has "potential pre-control device emissions" of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source.

GLC is a major source for certain air pollutants and is required to obtain a Title V, Part 70 permit. GLC current Permit Number MI-ROP-A3934-2015, issued by the Michigan Department of Environmental Quality, identifies emission units based on process groupings. For example, Unit/Group ID EUCUPOLA consists of several related processes and emission control units that are grouped together based on being part of the melting process. The related emission units within this grouping are the cupola melting furnace, scrap storage area, coke storage area, and electric holding furnace. As emissions are not always readily quantifiable between these emission units, the smallest grouping of combined process operations that potential emissions are quantifiable for were conservatively assumed to be the pollutant specific emission unit (*e.g.*, EUCUPOLA). This approach is consistent with the emission limits specified in Permit Number Mi-ROP-A3934-2009.

At GLC, emission units EUHUNTERPOURING, EUH-MOLDCOOLING, EURULE290, EUCOLDBOXCORE, EUCOLDCLEANER, EUCOREWASH, EUPATTERNMAKING, EUSHELLCORE, EUSHOTBLAST and EUEASTCOREOVEN either do not use a control device to meet an emission limitation or standard, or do not have a potential emission greater than the major source threshold; and therefore are not subject to CAM requirements under the requirements listed above.

The remaining emission units identified in the operating permit were all determined to have maximum potential pre-control device emissions of at least one pollutant greater than the major source threshold. In general, there emissions were conservatively estimated by dividing the post control emissions at the process line production capacity by one minus the emission control efficiency of the pollutant controlled by the device. Table 1 contains the results of this evaluation.

As a result of the CAM applicability review, GLC pollutant specific emission units (PSEUs) and type of control devices used to control the pollutants have been defined as EUCUPOLA (afterburner, wet scrubber); EUHUNTERSAND (baghouse); EUHUNTERDUSTAR and EUDISADUSTAR (baghouse); EUCLEANING and EUFINISH (baghouse); and EUDISAEWETDC (wet scrubber).

Section 3
CAM Plans by Type of Emission Control Device

3.1 Afterburner for CO Control

- EUCUPOLA utilizes an afterburner to achieve the control of carbon monoxide (CO) emissions required under R 336.1201(3). Afterburner (cupola upper stack) temperature will be used as the compliance indicator. The details of the CAM Plan for this PSEU is shown in Table 2.

3.2 Wet Scrubber for PM Control

- EUCUPOLA utilizes a wet scrubber system to achieve the control of particulate matter under R 336.1201(3) and R 336.1331(1)(c). The wet scrubber system contains three connected units (quencher, venturi scrubber, demister). The differential pressures and/or liquid flow rates of the components will be used as the compliance indicator. The details of the CAM Plan for this PSEUs is shown in Table 3.

3.3 Baghouse for PM Control

- EUHUNTERSAND; EUHUNTER, EUDISADUSTAR ; EUCLEANING and EUFINSH processes utilize baghouses to achieve the control of particulate matter under R 336.1201(3). Baghouse differential pressure observations for each baghouse will be used as the compliance indicator. The details of the CAM Plan for these PSEUs are shown in Table 4

▪ 3.4 Wet Scrubber for PM Control

- EUDISAESORM utilizes a wet scrubber to achieve the control of particulate matter under R 336.1201(3) and R 336.1331(1)(c). Wet scrubber liquid flow rate will be used as the compliance indicator. The details of the CAM Plan for these PSEUs are shown in Table 5.

Table 1
Maximum Potential Uncontrolled Emissions Summary

Emission Point	Primary Emission Source Description	Control Device	Maximum Potential Emission - Uncontrolled (TPY)	Emission Calculation Basis
EUCUPOLA	Cupola Melting	Wet Scrubber (TSP, PM_{10}) Afterburner (CO)	4,356 232	1.2 lb/ton metal (MAERS), 72,600 ton/year metal limit, and 99% PM control efficiency 0.32 lb/ton metal (MAERS), 72,600 ton/year metal limit and 95% CO control efficiency
EUHUNTERSAND	Hunter Return Sand System and Shakeout	Baghouse (PM)	1,176	0.324 lb/ton metal (MAERS factor adjusted for 7:1 sand/metal ratio) 72,600 ton/year metal limit and 99% PM control efficiency
EUHUNTERDUSTAR EUDISADUSTAR	Hunter Mold Cooling, Sand system; Disa Pouring, Cooling, and Sand Handling	Baghouse (PM_{10})	4,356	2.2 lb/ton metal (MAERS), 39,600 ton/year metal limit, and 99% PM control efficiency
EUCLEANING EU FINISH	Casting Cleaning and Finishing	Baghouse (PM)	617	17 lb/ton metal (MAERS) and 72,600 ton/year metal limit
EUDISAESORM	Disamatic Molding Line Shakeout	Wet Scrubber (PM_{10})	3,240	64.8 ton/year PM emission limit (ROP) and 98% PM control efficiency

NOTES:
(1) Control efficiencies are low-end design expectations and have been used only to demonstrate inclusion for CAM requirements. No emission control devices have been excluded based on calculations using control efficiency values.

Table 2
CAM Plan for PSEU's Utilizing an Afterburner as the Control Device for Carbon Monoxide

I	**Background**		
	A.	Emissions Unit	
		Description	Metal melting system
		Identification	EUCUPOLA
	B.	Applicable Regulation, Emission Limit, and Monitoring Requirements	
		Regulation No.s	R 336.1201(3), R 336.1213(3), 40CFR 64.6(c)(2)
		Emissions Limits	
		Carbon Monoxide	225.0 lbs/hr, 11.25 lbs/ ton metal charged, 408.0 tons/year
		Standard	The cupola upper stack temperature while metal is being charged to the cupola shall not be less than 1150 degrees F. or an AQD approved upperstack temperature as determined by stack temperature.
		Monitoring Requirements	The cupola upper stack temperature shall be continuously monitored and recorded once per day in a manner and with instrumentation acceptable to the AQD. A visual and audible alarm will activate when the instrumentation monitors a condition below the appropriate standard.
	C.	Control Technology	
		Afterburner	

Table 2
CAM Plan for PSEU's Utilizing an Afterburner as the Control Device for Carbon Monoxide

II	**Monitoring Approach**		
	The key elements of the monitoring approach are presented below:		
	A.	Indicator	The temperature as measured in the exhaust gases in the cupola upper stack will be used as the indicator of afterburner operation.
	B.	Measurement Approach	Temperature will be monitored continuously and recorded once per day using a temperature measurement device. A visual and audible alarm will activate when the instrumentation monitors a condition below the appropriate standard.
	C.	Indicator Range	Temperature will be maintained greater than or equal to 1,150°F while charging metal to the cupola.
	D.	QIP Threshold	The QIP threshold for the afterburner is in excess of six temperature excursions in a six month reporting period.
	E.	Performance Criteria	
		Data Representativeness	Measurements are being made directly in the stack or combustion chamber.
		Verification of Operational Status	Automatic alarming for low temperature and periodic review of the upper stack temperature reading by an operator.

		QA/QC Practices and Criteria	The temperature measurement device and alarm will be maintained based on the plant's standard procedures which have been developed in part from the manufacturer's recommendations.
		Monitoring Frequency and Data Collection Procedure	Upper stack temperature will be monitored continuously and recorded daily using a temperature measurement device. A visual and audible alarm will activate when the instrumentation monitors a condition below the appropriate standard.

Table 2
CAM Plan for PSEU's Utilizing an Afterburner as the Control Device for Carbon Monoxide

III	**Justification**	
	A.	Background
		GLC operates a grey iron foundry in Ludington, Michigan. Part of the foundry process is the metal melting system consisting of the cupola and the cupola charging system. GLC utilizes an afterburner to control the emission of carbon monoxide from this system.
	B.	Rationale for Selection of Performance Indicator
		Upper stack temperature is a direct measure at the control device of the variable most closely associated with effectiveness of control of carbon monoxide emissions. Therefore, upper stack temperature is an indicator of performance of the afterburner.
	C.	Rationale for Selection of Performance Indicator Level
		The performance indicator level of a minimum temperature of 1,150°F is taken directly from the applicable regulation and represents the temperature limit measured at the control device that is deemed to effectively control carbon monoxide emissions. If temperature falls below this limit, metal charging to the cupola will cease and corrective action will be initiated to return the temperature to an acceptable condition.

Table 3
CAM Plan for PSEU's Utilizing a Wet Scrubber as the Control Device for Particulate Matter

I	**Background**		
	A.	Emissions Unit	
		Description	Metal melting system
		Identification	EUCUPOLA
	B.	Applicable Regulation, Emission Limit, and Monitoring Requirements	
		Regulation Nos.	R 336.1201(3), R 336.1213(3), R 336.1331(1)(c), R 336.1910, 40CFR 64.6 (c)
		Emissions Limits	
		Particulate Matter	TSP : 0.25 lbs per 1,000 lbs of exhaust gases, calculated on a dry gas basis; 28.0 lbs/hr; 1.4 lbs/ton metal charged; 50.8 tons/year PM_{10} : 21.6 lbs/hr; 1.08 lbs/ton metal charged; 39.2 tons/year
		Standard	The differential pressure across the venturi and demister while the cupola is in the production mode shall be a minimum of 33 inches w.g. and not greater than 1.0 inches w.g., respectively or an Air Quality Air Division approved pressure drop determined by stack tests. The liquid flow rates to the quencher, venturi and demister while the cupola is in the production mode shall not be less than 200 gallons per minute for the quencher, 200 gallons per minute for the venturi and 40 gallons per minute for the demister or an Air Quality Division approved liquid flow rate determined by stack tests.
		Monitoring Requirements	The differential pressure across the Venturi and Demister shall be continuously monitored and recorded once per day in a manner and with instrumentation acceptable to the AQD. The liquid flow rate to the Quencher, Venturi, and Demister shall be continuously monitored and recorded once per day in a manner and with instrumentation acceptable to the AQD.
	C.	Control Technology	
		Wet Scrubber (Quencher, venturi scrubber and demister)	

Table 3
CAM Plan for PSEU's Utilizing a Wet Scrubber as the Control Device for Particulate Matter

II	**Monitoring Approach**		
	The key elements of the monitoring approach are presented below:		
	A.	Indicator	Pressure drop across the scrubber, liquid flow rate through the scrubber will be used as the indicators.
	B.	Measurement Approach	Pressure drop across the scrubber and liquid flow rate through the scrubber will be monitored using instrumentation typical for these parameters.
	C.	Indicator Range	A minimum pressure drop of 33 inches w.g. across the venturi and no greater 1.0 inches w.g. across the demister will be maintained. A minimum liquid flow rate of 200 gpm through the venturi, 200 gpm through the quencher and 40 gpm through the demister will be maintained.
	D.	QIP Threshold	The QIP threshold for the scrubber is in excess of six pressure drop or six liquid flow rate excursions in a one month reporting period.
	E.	Performance Criteria	
		Data Representativeness	Pressure drop and liquid flow rate are measured directly at the control device.
		Verification of Operational Status	Pressure drop and liquid flow rate will be monitored continuously and recorded once per day to verify operational status. In addition, periodic review of the pressure drop and liquid flow rate readings by an operator with automatic alarming will be performed.
		QA/QC Practices and Criteria	The pressure and flow rate instrumentation will be maintained based on the plant's standard procedures, which have been established in part from the manufacturer's recommendations.
		Monitoring Frequency and Data Collection Procedure	Pressure drop and liquid flow rate will be monitored continuously and recorded once per day, with the results noted on the daily log sheet.

Table 3
CAM Plan for PSEU's Utilizing a Wet Scrubber as the Control Device for Particulate Matter

III	**Justification**	
	A.	Background
		GLC operates a grey iron foundry in Ludington, Michigan. Part of the foundry process is the metal melting system consisting of the cupola and the cupola charging system. GLC utilizes a wet scrubber to control the emission of particulate matter from this system.
	B.	Rationale for Selection of Performance Indicator
		Pressure drop and liquid flow rate were selected as performance indicators because they are the two parameters that best determine effectiveness of the control device.
	C.	Rationale for Selection of Performance Indicator Level
		The pressure drop and liquid flow rate indicator levels have been selected based on the level established in the applicable standards, which are deemed to achieve effective control of particulate matter emissions.

Table 4
CAM Plan for PSEU's Utilizing a Baghouse as the Control Device for PM

I	**Background**		
	A.	Emissions Units	
		Descriptions	Hunter return sand system, shakeout and CSI Baghouse ; Disamatic line pouring, mold cooling, sand muller and Hunter mold cooling, shakeout, mold return and the Dustar Baghouse. Shot blast machines and grinding wheels used to clean and finish castings.
		Identifications	EUHUNTERSAND: EUDISADUSTAR and EUHUNTER; EUCLEAN and EUFINISH
	B.	Applicable Regulation, Emission Limit, and Monitoring Requirements	
		Regulation Nos.	R 336.1331(1)(c), R 336.1910, R 336.1213(3), R 336.1201(3)
		Emissions Limits	
		PM	PM (EUHUNTERSAND)– 0.10 pounds per 1,000 pounds of exhaust gases, calculated on a dry gas basis PM (EUCLEAN)–0.10 pounds per 1,000 pounds of exhaust gases, calculated on a dry gas basis PM (EUFINISH)–0.10 pounds per 1,000 pounds of exhaust gases, calculated on a dry gas basis
		PM_{10}	PM_{10} (EUHUNTERDUSTAR)– 0.0205 pounds per 1,000 pounds of exhaust gases, calculated on a dry gas basis; 6.5 tpy PM_{10} (EUDISADUSTAR)– 0.0205 pounds per 1,000 pounds of exhaust gases, calculated on a dry gas basis ; 7.5 tpy

		Monitoring Requirements	Continuously monitor and record once per day the differential pressure across the baghouse during operation.
	C.	Control Technology	
		Baghouses (fabric filters): CSI Baghouse (EUHUNTERSAND), Dustar Baghouse (EUHUNTERDUSTAR and EUDISADUSTAR), AAF Baghouse (EUCLEAN and EUFINISH)	

Table 4
CAM Plan for PSEU's Utilizing a Baghouse as the Control Device for PM

II	**Monitoring Approach**		
	The key elements of the monitoring approach are presented below:		
	A.	Indicator	Differential pressure will be used as the indicator.
	B.	Measurement Approach	Differential pressure across the baghouses will be continuously monitored.
	C.	Indicator Range	The differential pressure must be maintained between 1.0 and 6.0 inches of water.
	D.	QIP Threshold	For each stack/vent that a baghouse is serving a PSEU exhausts to, the QIP threshold is in excess of six excursions in a one month reporting period.
	E.	Performance Criteria	
		Data Representativeness	Measurements are being made directly at the emission point.
		Verification of Operational Status	Pressure drop will be monitored continuously and recorded once per day during operation to verify operational status.
		QA/QC Practices and Criteria	The pressure instrumentation will be maintained based on the plant's standard procedures, which have been established in part from the manufacturer's recommendations.
		Monitoring Frequency and Data Collection Procedure	Pressure drop will be monitored continuously and recorded once per day, with the results noted on the daily log sheet.

Table 4
CAM Plan for PSEU's Utilizing a Baghouse as the Control Device for PM

III	**Justification**	
	A.	Background
		GLC operates a grey iron foundry in Ludington, Michigan. Sand separation, breaking and sorting, and metal finishing operations are parts of the foundry process. GLC utilizes baghouses to control the emission of particulate matter from these operations.
	B.	Rationale for Selection of Performance Indicator
		Differential pressure was selected as the performance indicator because it is indicative of operation of the baghouse in a manner necessary to comply with the particular emission standards. When the baghouse is operating properly, there will be very low particulate emissions from the exhaust. If the differential pressure is not in the allowable operating range, it constitutes an abnormal condition indicates a reduced performance of the particulate control device, therefore, the potential for the presence of increased particulate emissions.
	C.	Rationale for Selection of Performance Indicator Level
		Particulate emissions from the baghouse exhaust vary within a normal range dependant on process variables. So long as the differential pressure remains within this normal range, the baghouse is performing as expected. If the differential pressure is out of the allowable operating, then baghouse performance is abnormal and corrective action will be initiated to return the baghouse performance to normal.

Table 5
CAM Plan for PSEU's Utilizing a Wet Scrubber as the Control Device for PM

I	**Background**		
	A.	Emissions Units	
		Descriptions	Disamatic molding line shakeout and return mold sand system operations.
		Identifications	EUDISAEWETDC
	B.	Applicable Regulation, Emission Limit, and Monitoring Requirements	
		Regulation No.	R 336.1213(3), R 336.1910, R 336.1205(3), R 336.1201(3), R 336.1331(c), 40 CFR 64.6 (c)
		Emissions Limits	
		PM_{10}	The PM_{10} emissions shall not exceed 0.10 pounds per 1,000 pounds of exhaust gases, calculated on a dry gas basis. The PM emissions shall not exceed 64.8 tons per year.
		Monitoring Requirements	Continuously monitor the liquid flow rates for the scrubber and record the flow rate readings once per day during operation.
	C.	Control Technology	
		Wet Scrubber: Wet Dust Collector	

Table 5
CAM Plan for PSEU's Utilizing a Wet Scrubber as the Control Device for PM

II	**Monitoring Approach**		
	The key elements of the monitoring approach are presented below:		
	A.	Indicator	Water flow rate through the scrubber will be used as the indicator.
	B.	Measurement Approach	Water flow rate through the scrubber will be monitored using instrumentation typical for the parameter.
	C.	Indicator Range	The water flow rate through the scrubber must be maintained at 150 to 275 gpm on a daily average basis.
	D.	QIP Threshold	The QIP threshold for the indicator is in excess of six excursions in a one month reporting period.
	E.	Performance Criteria	
		Data Representativeness	Water flow is measured directly at the control device.
		Verification of Operational Status	Water flow rate will be monitored and recorded once per day to verify operational status.
		QA/QC Practices and Criteria	The flow instrumentation will be maintained based on the plant's standard procedures, which have been established in part from the manufacturer's recommendations.
		Monitoring Frequency and Data Collection Procedure	Water flow rate will be monitored and recorded on a daily basis and results noted on the daily log sheet.

Table 5
CAM Plan for PSEU's Utilizing a Wet Scrubber as the Control Device for PM

III	**Justification**	
	A.	Background
		GLC operates a grey iron foundry in Ludington, Michigan. Sand separation, breaking and sorting, and metal finishing operations are parts of the foundry process. GLC utilizes the wet scrubber to control the emission of particulate matter from these operations.
	B.	Rationale for Selection of Performance Indicator
		Water flow rate is selected as the performance indicator because it is the parameter that best determines effectiveness of the control device.
	C.	Rationale for Selection of Performance Indicator Level
		Water flow rate indicator levels have been selected based on the level established in the applicable standards, which are deemed to achieve effective control of particulate matter emissions.