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AIR QUALITY DIVISION

June 15, 2018

Mr. Mike Kovalchick
Michigan Department of Environmental Quality
Jackson District, Air Quality Division
301 East Louis Glick Highway
Jackson, MI 49203

Re: Gerdau Monroe Malfunction Abatement Plan Submission and Approval

Dear Mike:

Attached is the updated Malfunction Abatement Plan as requested in the Violation Notice dated 5/31/18. Gerdau Monroe is requesting approval of the enclosed Malfunction Abatement Plan and also closure of item 3 on the Violation Notice dated 5/31/18.

If you have any questions, please contact me at 734-384-6544.

Sincerely,

Craig Metzger
Regional Environmental Manager
Gerdau Special Steel North America

cc: Darrel Moore – Gerdau
Scott Miller (MDEQ)
File

Enc. (s)

MALFUNCTION ABATEMENT PLAN

Gerdau Macsteel Monroe Mill

Electric Arc Furnace
Vacuum Tank Degasser
Ladle Metallurgy Furnace
Continuous Caster
Rolling Mill Reheat Furnace

Revision VII
June 15, 2018

Revision Dates:

May 20, 1994
May 1, 1997
February 21, 2001
July 2, 2013
December 16, 2013
February 14, 2014
January 16, 2015
June 15, 2018

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1.0 ELECTRIC ARC FURNACE (EAF) and VACUUM TANK DEGASSER (VTD)

1.1 EAF/VTD Process and Emission Control System Description

The Electric Arc Furnace (EAF) and Vacuum Tank Degasser (VTD) employs a positive pressure type baghouse for its emission control. This baghouse has a reverse air cleaning system with dust handling by means of hopper screw conveyors to a pneumatic conveying system that loads the dust into a storage silo. The dust is loaded into haul vehicles within a full building enclosure. The building is designed to control fugitive dust emissions during the loading of the truck.

The EAF has two main emission capture points. Most of the emissions are captured directly from the EAF while melting with a Direct Evacuation Control (DEC) ductwork system, emissions not caught by the DEC are captured overhead by a canopy hood system. Emissions from the VTD are routed through a booster fan and ductwork to the canopy hood system.

The EAF exhaust system includes a CO/VOC reaction chamber that allows the exhaust to reside longer in the exhaust system to facilitate combustion of CO and VOCs. The exhaust system also includes a quench system that introduces atomized water into the DEC gas stream to cool the gases prior to entering the baghouse to avoid damaging the filter bags.

The EAF/VTD emission control system consists of a positive pressure baghouse (DVBaghouse-01) with thirteen (13) compartments, three (3) main fans, and one (1) DEC fan. The baghouse exhausts through a single stack positioned above the center of the baghouse. Each baghouse compartment contains 184 bags. Dust captured by the baghouse is screw conveyed across the baghouse and pneumatically loaded into a storage silo. The dust silo holds EAF Baghouse dust (KO61) until it is shipped offsite for disposal/recycling.

The EAF is equipped with Oxy-fuel burners to facilitate melting inside the shell.

1.2 EAF/VTD Emission Control Preventative Maintenance

Generally, one (1) maintenance employee is assigned to the baghouse on the day shift Monday through Friday. Maintenance and repairs are performed on the baghouse equipment on the other shifts as needed. Maintenance Department supervisory personnel are responsible for overseeing the inspection, maintenance, and repair of the air pollution control systems for both the Electric Arc Furnace (EAF), Vacuum Tank Degasser (VTD) and the Ladle Metallurgy Furnace (LMF) equipment. The Maintenance Department personnel are also responsible for overseeing the inspection, maintenance and repair of the EAF Oxy-fuel burners. The Oxy-fuel burners are inspected each downday for proper operation by the Maintenance personnel. There is also a daily inspection check list (typically filled out once per day when the baghouse is operating).

The frequencies in the tables below are subject to change as the plant gains more experience with the equipment and modifies the SOPs. The frequencies in the tables are typical, but due to scheduling issues, not every inspection may be performed at the stated frequency.

EAF/VTD Exhaust System Preventive Maintenance Table 1.2-1

Equipment Name/ Description	Preventive Maintenance Task	Approx. Frequency
EAF DEC Duct	Check wheels on duct for proper tracking	Monthly
EAF DEC Duct	Inspect DEC Piping for leaking hoses	Monthly
EAF DEC Duct	Check DEC elbow for leaks, hoses for wear or cracks	Monthly
EAF Roof Frame Pressure Indicator	Inspect valves for leaks and inspect furnace pressure hose and replace if needed	Weekly
Peak Shaver	Inspect peak shaver nozzle assemblies and heads and replace if necessary	2X/month
Baghouse Main Fans	Test motors	2X/year
DEC Fan	Test motors	2X/year
Baghouse Reverse Air Fans	Test motors	2X/year
Baghouse Main Fans	Vibration analysis	4X/year
DEC Fan	Vibration analysis	4X/year
Baghouse Reverse Air Fans	Vibration analysis	4X/year
DEC Fan & Motor	Check base bolts, coupling and fan wheel for wear & lube.	Monthly
	Make any necessary repair to fan housing and build-up worn areas on fan wheel with weld as necessary	

EAF/VTD DVBaghouse-01 Preventive Maintenance Table 1.2-2

Equipment Name/ Description	Preventive Maintenance Task	Approx. Frequency
Baghouse Compartments	Inspect hoppers, fans, ducts & door seals for leaks	Monthly
	Inspect baffle plates for wear	
	Inspect & clean bag cleaning air horns	
	Inspect bag retaining ring to ensure they're properly secured	
	Inspect bag compartment magnehelic gages	
	Inspect inlet and reverse air damper actuators	
	Inspect baghouse bags	
Baghouse Hoppers	Inspect hopper slide gates	Monthly
	Inspect hoppers for dust bridging	
Baghouse Super Sucker	Check bags & pulsators	2X/year
	Check/change Rotolock unit	
Baghouse Loadout Station	Inspect truck loading slide gate	Monthly
	Inspect truck roll-out door	

EAF/VTD Dust Silo Bin Vent Filter Preventive Maintenance Table 1.2-3

Equipment Name/ Description	Preventive Maintenance Task	Approx. Frequency
Baghouse Silo Bin Vent	Check bags & pulsators. Change bags as needed.	2X/year

Each of the thirteen (13) DVBaghouse-01 compartments is equipped with a magnehelic gage. The magnehelic gages are visually inspected by Maintenance each day. If the magnehelic gage readings are too high, Maintenance makes sure that the valves are operating properly for cleaning. If the pressure is too low, Maintenance checks the opacity, fan amperage and visually inspects the bags for damage. Bags requiring replacement are noted on a log sheet and replaced during the next available maintenance down day.

The baghouse bags are inspected at least once per month, or more frequently, for compartments which have been isolated for downturn repairs due to opacity alarms being triggered. Maintenance employees inspect for dust at the base of the bags, as an indicator of damage. The bag or bags near the dust piles are then thoroughly inspected for damage. Bags that have major damage are replaced or tied off immediately. If the bags are temporarily tied off, then the bag is scheduled to be replaced as soon as practicable.

1.3 DVBaghouse-01 Spare Parts

The Maintenance Department maintains a minimum of 25 spare bags for the baghouse. In the unlikely event of a "run" on spare bags, the Maintenance Department supervisor will submit a reorder of bags within two (2) working days (Monday through Friday).

A list of major replacement parts that are maintained in inventory for the baghouse is presented in Attachment A.

1.4 Process and Air Cleaning Device Operating Variables

A programmable logic controller (PLC) continually monitors critical baghouse operations. Once a nonconformance is noted, the PLC triggers an alarm to the EAF pulpit, at which time the pulpit personnel notify maintenance. Maintenance arrives, views the PLC screen, which indicates the exact location and malfunction problem. Repair activities are initiated; when the repair is complete, the alarm is cleared.

Operating Variable or Permit Limit	Monitoring Method	Normal Range
Baghouse Differential Pressure	Magnehelic	3 – 14" WG
Baghouse Temperature	Thermocouple to PLC	$< 400^0$F
Baghouse Opacity	Opacity Monitor	Less than 3%
Furnace static pressure	Pressure gage	Per stack test[1]
Fan Motor Amps or Flowrate	Ammeter	Per stack test[2]

Footnote 1: Furnace DEC hood static pressure set during most recent EAF Baghouse compliance stack test and will change after each test.
Footnote 2: +/- 15 % of the EAF Baghouse fan amperage set during most recent EAF Baghouse compliance stack test and will change after each test.

1.5 Variables Monitored to Detect Malfunctions

The EAF operating pulpit is equipped with a baghouse opacity alarm system. In the event of an opacity alarm, the operating personnel contact the Maintenance Department, who in turn corrects the problem or isolates the baghouse chamber that triggered the alarm. All non-conformances are noted in the quarterly Melt Shop Opacity Reports provided to the Michigan Department of Environmental Quality (MDEQ). The opacity monitoring equipment is auto-calibrated daily. The opacity monitor is audited on an annual basis.

Also, within the EAF operating pulpit, is an alarm panel which will sound instantaneously when equipment malfunctions occur. This alarm panel is triggered by the baghouse PLC, and other field signals around the EAF. When the alarm sounds, the furnace operator contacts Maintenance; it is then the responsibility of the shift's Maintenance employees to respond and initiate repairs.

The EAF Baghouse PLC monitors incoming baghouse temperatures. At 375°F, an alarm is triggered. At 400°F, the PLC shuts down the baghouse. This is to protect the baghouse bags, which have a maximum temperature rating of 500°F. The Baghouse PLC also monitors a wide variety of other baghouse field conditions.

1.6 Corrective Procedures or Operational Changes

In the event of a major malfunction of DVBaghouse-01 (i.e. more than one of the baghouse fans malfunction), the Melt Shop will cease operations until repairs have been made. If only one of the three main baghouse fans fails, daily visible emissions (VE) readings of the Melt Shop roofline will be conducted to determine if the Melt Shop can continue to run, or if it should be shut down to facilitate the necessary repairs. If opacity from the Melt Shop roofline exceeds 6%, the Melt Shop will cease operation until necessary repairs can be made. Minor malfunctions in the baghouse (i.e., a dropped bag causing 3% opacity or more to be emitted from the baghouse stack) will require immediate attention for repairs or require a baghouse chamber to be isolated, and/or baghouse and EAF shutdown until repairs can be safely made. Proper notification will be made to the MDEQ via the quarterly Melt Shop Opacity Report.

See Appendix B for the "Corrective Procedures in Event of a Malfunction – EAF" table.

2.0 LADLE METALLURGY FURNACE (LMF)

2.1 LMF Emission Control System Description

A ladle metallurgy furnace has the ability to reheat and add "trim" alloys into the liquid steel that was melted in the EAF. The LMF affords the ability to provide temperature and alloy control to the steel making process.

The LMF employs a pulse jet baghouse (DVLMFBaghouse) to control off gases from the ladle. The steel processing off gases are captured in the LMF ladle hood and travel through the LMF Baghouse ductwork to DVLMFBaghouse. DVLMFBaghouse captures emissions from the LMF and the East Melt Shop Roof Monitor. Particulate from the off gas is removed as it passes through the filter bags in the baghouse compartments. After passing through the baghouse bags, the exhaust gas is emitted through an exhaust stack. The dust collected in the baghouse is transported off site for recycling.

The LMF emissions control system consists of a ten-module pulse jet dust collector, two operating 150,000 cfm fans (North & South ID Fans), one 70,000 cfm Booster Fan, ductwork, and process controls. Draft control is accomplished with variable position dampers.

The ten-module pulse jet dust collector is divided into two groups of five. Each group of five modules discharges dust into its own screw conveyor. Every dust collector module can be isolated from the inlet plenum via a manually operated inlet butterfly damper. Every module may be isolated from the outlet plenum via a pneumatically operated outlet butterfly valve. Each hopper has a rotary valve and vibrator. The modules are cleaned on an automatically sequenced basis, which can be triggered by time or by differential pressure. The cleaning can also be manually activated.

For proper air pollution control, the system requires that eight of the ten modules be in operation when the LMF is operating. When fewer than eight modules are noted to be in operation, the LMF will be shut down.

2.2 DVLMFBaghouse Preventative Maintenance

Generally, one (1) maintenance employee is assigned to the LMF operation on the day shift Monday through Friday. Maintenance is performed on the LMF equipment on other shifts as needed. Maintenance Department supervisory personnel are responsible for overseeing the inspection, maintenance, and repair of the air pollution control systems for both the DVBaghouse-01 and DVLMFBaghouse.

A list of major replacement parts that are maintained in inventory for the LMF operation and emission control system is also provided in Attachment A.

The facility's Maintenance personnel perform the following maintenance activities on DVLMFBaghouse in accordance with department procedures and specified frequencies. The frequencies in the tables below are subject to change as the plant gains more experience with the equipment and modifies the SOPs. The frequencies in the tables are typical, but due to scheduling issues, not every inspection may be performed at the stated frequency.

DVLMFBaghouse Preventive Maintenance Table 2.2

Equipment Name/ Description	Preventive Maintenance Task	Approx. Frequency
Baghouse Rotary Valves and Screw Conveyors	Check oil level in rotary valve and screw conveyor gearboxes and add oil if needed	Monthly
	Check rotary valve and screw conveyor gearbox chains for wear. Tighten or replace if necessary.	
Baghouse – Dust Hoppers	Check for dust build-up & clean out if blocked	Monthly
	Inspect bottom side of bags	
Booster Fan Ductwork	Inspect for dust build-up and contact Hydro Tech	Monthly
Baghouse Diaphragm Valves	Inspect diaphragm valves for leaks and replace as necessary	Monthly

There is also a daily inspection check list (typically filled out one per day when the baghouse is operating)

2.3 Source and Air Cleaning Device Operating Variables

A PLC continually monitors critical baghouse operations. Once a nonconformance is noted, the PLC triggers an alarm to the LMF pulpit, at which time the LMF operator notifies Maintenance. Maintenance arrives, views the PLC screen, which indicates the location and malfunction problem. Repair activities are initiated; when the repair is complete, the alarm is cleared.

Operating Variable	Monitoring Method	Normal Range
Baghouse Differential Pressure	Magnehelic	3 – 12" WG
Baghouse Temperature	Thermocouple to PLC	$< 300^0$F
Baghouse Particle Detection	Triboelectric to PLC	Below alarm level

2.4 Corrective Procedures or Operational Changes

In the event of a major malfunction of the LMF (i.e., the baghouse ceasing operations), the entire LMF system is not operational until the malfunction has been corrected. Other minor malfunctions are picked up either by a preventative maintenance inspection or through the LMF PLC alarm system. Once a malfunction is noted, the root cause of the malfunction is determined, and the appropriate corrective actions implemented.

See Appendix B for the "Corrective Procedures in Event of a Malfunction – LMF" table.

3.0 CONTINUOUS CASTER (Caster)

3.1 Caster Equipment and Process Description

The Caster is designed to tap the Ladle from the bottom to transfer the molten steel into a covered tundish. This design minimizes particulate emissions which would occur from tip and pour casting. The caster consists of four strands and can process steel in all four strands simultaneously. Each strand is equipped with an oxy-fuel cutting torch to cut the steel into billets for ease of storage and further handling. Oxy-fuel cutting is a process that uses fuel gases and oxygen to cut the hot cast strands into billets. Pure oxygen, rather than air (20% oxygen/80% nitrogen), is used to increase the flame temperature to allow localized melting of the metal in a room environment. The oxy-fuel cutting torches provide cleaner cuts and make quality testing easier. Neither the tapping of the Ladle nor the oxy-fuel cutting torch operations are equipped with localized hooding or emission control equipment.

3.2 Oxy-Fuel Cutting Torch Preventative Maintenance

Maintenance Department supervisory personnel are responsible for overseeing the inspection, maintenance, and repair of the oxy-fuel cutting torches.

Continuous Caster Oxy-Fuel Cutting Torches Preventive Maintenance Table 3.2

Equipment Name/ Description	Preventive Maintenance Task	Approx. Frequency
Caster Oxy-Fuel Cutting Torches	Check condition of torches	Quarterly
	Calibrate oxygen and fuel meters and adjust oxy-fuel ratio	Annually

The frequencies in the table above are subject to change as the plant gains more experience with the equipment and modifies the SOPs. The frequencies in the tables are typical, but due to scheduling issues, not every inspection may be performed at the stated frequency.

3.3 Process Operating Variables / Parameters

Emissions from the caster operation are minimized by implementing the following operating parameters:

- Ladles are covered during delivery to and processing at the Caster.
- Steel is tapped from the bottom of the Ladle.
- The tundish will remain enclosed while processing steel.
- Fuel use by the oxy-fuel cutting torches is limited to pipeline quality natural gas.

The Maintenance Department periodically inspects the cutting torches and the oxy-fuel delivery system to determine whether the torches and/or delivery system are operating as designed. The Roll Mill monitors and records the amount of natural gas used by the oxy-fuel cutting torches on a monthly basis.

3.4 Corrective Procedures

In the event the oxy-fuel cutting torches and/or the oxy-fuel delivery system are found to be operating out of conformance with the design parameters, the applicable equipment will be repaired or replaced consistent with the manufacturer's recommendations.

4.0 CASTER COOLING TOWER

4.1 Caster Cooling Tower Equipment and Process Description

EUCASTERCOOLTWR employs Mist or Drift Eliminators to minimize water mist generated during the process water cooling process. Noncontact process water is used to condense the steam produced from the Continuous Caster. EUCASTERCOOLTWR cools process water used to condense steam from the Continuous Caster.

4.2 Caster Cooling Tower Drift Eliminator Preventative Maintenance

Caster Cooling Tower Drift Eliminator Preventive Maintenance Table 4.2

Equipment Name/ Description	Preventive Maintenance Task	Approx. Frequency
Caster Cooling Tower Drift Eliminator	Verify that drift eliminator is securely in place	1X/year

The frequency in the table above is subject to change as the plant gains more experience with the equipment and modifies the SOPs. The frequency in the tables is typical, but due to scheduling issues, the inspection may not be performed at the stated frequency.

4.3 Process Operating Variable / Parameter

Emissions from the caster cooling tower operation are minimized by implementing the following operating parameter:

- Keeping drift eliminators are in place

The Maintenance Department periodically inspects the cooling tower drift eliminators to determine whether the eliminators are in place and operating as designed.

4.4 Corrective Procedures

In the event the drift eliminators are found to be operating out of conformance with the design parameters, the it will be repaired or replaced consistent with the manufacturer's recommendations.

5.0 Rolling Mill

5.1 Rolling Mill Reheat Furnace Equipment and Process Description

The Rolling Mill Billet Reheat Furnace (BRF) is a natural gas-fired furnace designed to reheat billets from ambient temperatures to temperatures suitable for rolling. The furnace is heated by 38 burners, each powered by a combination of natural gas and combustion air. Temperatures in the furnace can reach up to 2250 °F. Burners come equipped with the capability to run on a flameless heating mode to reduce NO_x emissions.

5.2 Billet Reheat Furnace Ultra-Low NOx Burners Preventative Maintenance

Rolling Mill Walking Beam Billet Reheat Furnace Preventive Maintenance Table 5.2

Equipment Name/ Description	Preventive Maintenance Task	Approx. Frequency
BRF Burners Zones	Verify that each burner is firing correctly	4X/year
	Verify that each burner's gas & air valves open & close freely.	
	Inspect each burner for possible leaks	
	Listen to each burner & note any unusual sounds	

The frequencies in the table above are subject to change as the plant gains more experience with the equipment and modifies the SOPs. The frequencies in the tables are typical, but due to scheduling issues, not every inspection may be performed at the stated frequency.

5.3 Process Operating Variables / Parameters

Emissions from the reheat furnace operation are minimized by implementing the following operating parameters:

- Level I and II automation continually monitor critical systems operations in the reheat furnace.
- Operating non-conformances trigger alarms in the operating pulpit.
- All alarms and alerts are logged and stored in an electronic archive.

The Rolling Mill continually monitors natural gas consumption. Any unexplained fluctuation in gas usage may signify a malfunction and will be investigated. The performance of the natural gas burners will also be monitored. Visible emissions readings will be performed upon lighting of the furnace.

5.4 Corrective Procedures

Preventative maintenance will be performed on applicable equipment. In the event the natural gas delivery system and/or the burners are found to be operating out of conformance with the design parameters, the applicable equipment will be repaired or replaced consistent with the manufacturer's recommendations.

6.0 REPORTING OF MALFUNCTIONS

If the Gerdau Monroe exceeds any applicable emissions limit as a direct result of a breakdown of control equipment continuing for more than two (2) hours (One (1) hour for EAF roof or stack emissions), the Gerdau Monroe shall do both of the following:

1. Notify the Air Quality Division of the MDEQ (Jackson office) at telephone number (517) 780-7844 or by e-mail or text as soon as is reasonably possible, but not later than 9:00 a.m. of the next working day.
2. Submit to the MDEQ (MDEQ, Jackson District Office, 301 E. Louis Glick Highway, Jackson, Michigan, 49201) in writing, within 10 days, a detailed report, including identification of the emission source that experienced the malfunction, the time and date, probable causes, duration of violation or abnormal condition, remedial action taken, and what steps are being undertaken to prevent a recurrence. These preventative steps shall become part of the Malfunction Abatement Plan.

Attachment A

Spare Parts

Spare Parts Listing – Malfunction Abatement Plan

EAF Emission Control System

- Valve Controller for the EAF Sonic Spray System
- D1 Retractable Duct
- EAF Elbow
- Baghouse Bags
- DEC Fan
- DEC Impeller
- Main Exhaust Fan
- Main Exhaust Impeller
- Rotary Blower Solenoid
- Vibration Sensor

Billet Reheat Furnace

- Fan Motor
- Combustion Air Fan
- Gas Valves

LMF Emission Control System

- Baghouse Bags
- Broken Bag Detector - TRIBO U3400-H-11-I-15-42"Q
- Main Fan Impeller
- Main Fan Motor
- Booster Fan Motor
- Booster Fan Soft Starter
- Main Fan Soft Starter
- Screw Conveyor & Rotary Valve zero speed switches
- Vibration Transmitter - Metrix ST5484E-121-101-00
- Bearings
- Pillow Blocks
- Gearbox – Rotolock
- AMETEK NCC Pulse cleaning board

Attachment B

Corrective Procedures in Event of a Malfunction

Gerdau Monroe
Corrective Procedures in Event of a Malfunction - EAF

Condition	Possible Cause	Means of Detection	Remedial Action
Elevated Baghouse Opacity	Improperly installed bags	Opacity Monitor Alarm and/or Visible stack emissions	Check bag snap bands to ensure proper tension and full expansion into tubesheet.
	Torn or punctured bags		Inspect filter bags for tears or punctures caused by mechanical damage or sparks. Check for wear at top or bottom of bags, which may be a sign of improper tensioning. Isolate the chamber until damaged bags are replaced. Note: One small hole in one bag may cause abrasion to adjacent bags, potentially leading to damage throughout an entire chamber. Immediate action is required!
	Dirt in clean air plenum		After bag failure or during routine bag change-outs, dust will accumulate in dead air zones. Clean tubesheet when dust accumulation is present.
High Differential Pressure (Over 14" WG)	Baghouse dampers not closing properly during cleaning cycle	High differential pressure reading on the manometer and/or the control panel	Check damper cylinders and solenoids. Repair damper cylinder or solenoid as needed.
	Air horns used during cleaning not functioning properly		Check air horns for proper operation. Repair as necessary.
	Bags not properly tensioned		If bags are hung too loosely, the reverse air system cannot be effective in removing the dust, the dust can be restricted from dropping out of the bottom of the filter bags and could fill up the bag with dust. If the bags are hung too tightly, the bags could pop off. Check bag tension and readjust.
	Malfunctioning cleaning system control		Check to see if baghouse is going through cleaning cycle. If not, contact Maintenance.
	Dust build-up in hopper and/or dust re-entrainment		Dust disposal system plugged or jammed - clean and check disposal system including vibrators, rotary valve and pneumatic conveyor.
	Bag Blinding		Check system for condensation or free moisture present on bags. Check for water seepage into unit, or source of moisture and correct.
Opacity Outside the Shop	Fan problem	Vibration alarm, high temperature alarm, and/or fan amp alarm	Check fan drive, fan motor, fan wheel and blades. Repair as required. If problem is expected to last more than 8 hours, see malfunction response for fan failure at bottom of table.
	DEC or canopy hood problem	Operator observation	If minor problem, fix immediately. If problem is expected to last more than 8 hours, see malfunction response for capture hood failure at bottom of table.
	Bag blinding	High Differential Pressure Reading on the Magnahelic	Inspect bags for possible blinding. Blinded bags usually result in high pressure drop. Check reverse air cleaning cycle operation and bag tensioning. Clean bags with fan at low speeds until differential pressure drops into acceptable range.
	System air inleakage	Audible noise of air leaking into ductwork or hopper	Check all ducting and flanges to and from collector for leaks. Repair as required. Check hopper dust disposal equipment for leaking seals. Adjust or replace as required.

Gerdau Monroe
Corrective Procedures in Event of a Malfunction - EAF

Condition	Possible Cause	Means of Detection	Remedial Action
Low differential Pressure at Baghouse (Less than 2" WG)	Fan dampers closed	Low Differential Pressure Reading on the manometer during operation and poor capture at hood	Check for stuck louvers.
	Fan RPM too low		Check fan speed and adjust as necessary.
	System resistance static too high		Check ductwork for material build-up or blockages. Clear if necessary.
Dust Build-up in Hoppers	No dust in the dust silo.	Check dust silo when emptying.	Check for bridging in the baghouse hoppers, check pneumatic system. Repair as necessary.
	Dust bridging over in the hoppers.	Hopper full - no dust discharged	Check rotary valves, vibrators/air horns. Repair as required. Vibrate the side of the hopper, or remove build-up manually.
Fan Failure	Fan motor or drive failure	Visual, Audible Alarm	Service the motor or fan drive. In the event of a major malfunction of the Gerdau Monroe baghouse, i.e. in which more than one of the baghouse fans malfunction, the melt shop will cease operations until repairs are made. If only one of the three main baghouse fans fail, the melt shop may continue operations until repairs are made, and daily visible emissions (VE) readings of the melt shop roofline will be conducted to determine if the melt shop can continue to operate or if it should be shut down prior to the next maintenance outage in order to make necessary repairs. **For this type of emergency, immediately contact the General Manager and and Environmental Manager.**
	Baghouse electrical power outage		Work to restore power. **For this type of emergency, immediately contact the General Manager and and Environmental Manager.**
	Fan bearing failure		Replace and repack bearings.
	Fan wheel/blade failure	Operator would note emissions not captured.	Replace or repair fan.
Emission Capture System Failure	Damage to DEC elbow	Operator would notice.	Repair DEC as soon as practical. Possibly increase canopy hood draft during melting.
	Damage to canopy hoods		Repair canopy hoods during next outage.
COMS Malfunction	Electrical malfunction	Operator would notice.	Contact Maintenance to assess and repair. Also, report the issue to the Environmental Manager.
	Calibration Error		
	Dirty Window	Dirty Window Alarm	
Catastrophic Baghouse Failure	Fire caused by sparks and/or high temperature	Visible stack emissions and alarm	Isolate chambers with damaged bags. Replace filters bags and repair damage to baghouse. If two or fewer chambers need to be shut down, the baghouse and furnace may still operate. **For this type of emergency, immediately contact the General Manager and and Environmental Manager, who will decide if the plant should be shut down.**
	PLC failure		Dampers will be closed to seal off air flow to the baghouse. Repair or replace PLC, **For this type of emergency, immediately contact the General Manager and and Environmental Manager, who will decide if the plant should be shut down.**

Gerdau Monroe

Corrective Procedures in the Event of a Malfunction - LMF

Condition	Possible Cause	Means of Detection	Remedial Action
Elevated Baghouse Opacity	Improperly installed bags	Bag Leak Detector Alarm and/or Visible stack emissions	Check bag snap bands to ensure full expansion into tubesheet.
	Torn or punctured bags		Isolate chamber with the elevated bag leak detector reading and perform a confined space entry. Check for dust on tubesheet. May need to use fluorescent powder and a black light to note where leaks are occurring. Isolate the chamber until damaged bags are replaced or capped off.
	Dirt in clean air plenum		After bag failure or during routine bag change-outs, dust will accumulate in dead air zones. Clean tubesheet when dust accumulation is present.
High Differential Pressure (Over 12" WG)	Malfunctioning cleaning system control	High differential pressure reading on the manometers and PLC/HMI screen	Check to see if baghouse is going through cleaning cycle on either differential pressure or timer. If not, contact Maintenance.
	Insufficient compressed air pressure.		Check compressed air system for leaks and/or compressor problems and correct.
	Dust build-up in hopper and/or dust re- entrainment		Dust disposal system plugged or jammed - clean and check disposal system including rotary valves and screw conveyors.
	Bag Blinding		Check system for condensation or moisture present on bags. Check for water seepage into unit and correct.
Low differential Pressure at Baghouse (Less than 2" WG)	Fan dampers closed	Low Differential Pressure Reading on the manometer / PLC during operation and poor capture at hoods	Check for stuck louvers.
	Canopy hood and/or LMF capture hood damper closed		Open dampers
Dust Build-up in Hoppers	Dust bridging over in the hoppers.	Hopper full - no dust discharged	Check rotary valvesand screw conveyors. Repair as required. Vibrate the side of the hopper, or remove build-up manually.
Fan Failure	Fan motor or bearing failure	System will alarm in pulpit	Service the motor or bearing.
	Baghouse electrical power outage		Work to restore power.
Capture Emission System Failure	Damage to LMF or canopy hoods	Operator would note emissions capture issue.	Repair LMF or canopy hoods during next outage.
Catastrophic Baghouse Failure	Fire caused by sparks and/or high temperature	Visible stack emissions	Isolate chambers with damaged bags. Replace filters bags and repair damage to baghouse. If two or fewer chambers need to be shut down, the baghouse and LMF may still operate. **Immediately contact the General Manager & Environmental Manager, who will decide if the plant should be shut down.**
	PLC failure		Dampers will be closed to seal off air flow to the baghouse. Repair or replace PLC, **For this type of emergency, immediately contact the General Manager & Environmental Manager, who will decide if the plant should be shut down.**