135 S LaSalle Street, Suite 3500, Chicago, Illinois 60603
T 312 541 4200 W rpsgroup.com/usa

SAND SYSTEM BAGHOUSE
MALFUNCTION ABATEMENT PLAN (MAP)

BREMBO NORTH AMERICA FOUNDRY
HOMER, MICHIGAN

PREPARED BY

RPS
135 SOUTH LASALLE STREET
CHICAGO, ILLINOIS
(312) 541-4200

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Designated Person Responsible for Plans:
Vivian Rowles:
Cell: (734) 928-8664

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TABLE OF CONTENTS

1.0 INTRODUCTION

The Brembo North America, Inc. foundry, located in Homer, Michigan (Homer Foundry) will operate and maintain the facility, including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions as presented in this plan.

The Michigan Department of Environmental, Great Lakes, and Energy (EGLE) regulations and the facility's Permit to Install (PTI No. 199-14C) require the owner or operator responsible for the operation of a source of an air contaminant to prepare a malfunction abatement plan (MAP) in accordance with EGLE Rule 336.1911.

1.1 Applicability

[PTI Condition III and EGLE Rule 336.1911(1)]

The standard requires the owner / operator responsible for the operation of a source of an air contaminant to prepare this MAP to prevent, detect, and correct malfunctions or equipment failures resulting in emissions exceeding any applicable emission limit.

The following table, Table 1, presents a listing of applicable regulations and MAP sections.

Table 1: Regulatory Applicability and Plan Location

Citation	Regulations	Plan Location	
MDEQ R336.1911	Malfunction Abatement Plans	Section	Appendix
R336.1910	Control system installed, maintained, and operated in satisfactory manner and in accordance with rules	All	-
R336.1911(1)	MAP prepared to prevent, detect, correct malfunctions or equipment failures	All	-
R336.1911(2)(a)	PMP prepared and updated Inspection performed List of replacement parts maintained and inventory	3.0	B
R336.1911(2)(b)	Operating variables to be monitored to detect malfunctions; normal range; monitoring program	4.0, 6.0	A
R336.1911(2)(c)	Description of corrective action or operation changes in event of malfunction or failure to achieve compliance	5.0	-
R336.1912	Excess emissions reporting requirements; record of event	7.0	D

2.0 SOURCE DESCRIPTION

The emission source, air pollution control equipment, and affected emissions from the facility are detailed within the PTI and include:

Table 2: Emission Unit, Control Device, and Pollutants

Emission Units	Capture, Collection and Control	Permit Limits
FGSANDHNDLG: EUSHAKEOUT EUSANDHNDLG EUSILOS	During shakeout the metal is removed from the sand mold using a rotating drum system. The emissions from shakeout are controlled by the Sand System Baghouse.	PM: 14.41 pph, 36.56 tpy PM10: 16.02 pph, 40.64 tpy PM2.5: 13.31 pph, 33.76 tpy

2.1 Emission Unit, Control System, and Monitor Description

The emissions from the sand handling and shakeout operations are collected and captured by hood, enclosures and ductwork and controlled by the Sand System Baghouse. A CPM 750 emission monitor is installed on the baghouse exhaust stack to monitor the relative changes in particulate concentrations that would be indicative of a malfunction (e.g., bag break). Appendix A provides a summary of operating ranges for the system.

3.0 PREVENTATIVE MAINTENANCE PROGRAM

This preventative maintenance program identifies the personnel responsible for the program elements; proper equipment operation; and equipment inspections and maintenance schedule.

3.1 Responsible Personnel

[R336.1911(2)(a)]

The personnel responsible for this plan are listed in Table 3.

Table 3: Personnel Responsible for Plan

Position*	Responsibility
Plant Manager	Overall Operations and Maintenance
Maintenance / Engineering Manager	Training, maintaining plan
Environmental Manager	Reporting to EGLE, verifying requirements
Maintenance technician	Preventative maintenance inspections, repairs, and spare parts inventory

Notes: * Or equivalent.

3.2 Equipment Operations

Proper equipment operation must be verified and maintained on a regular basis in an effort to meet emission requirements. Proper operation may include:

- Fans running
- Static pressure sensor for fan within range
- Dampers online and at proper setting
- Hopper sensors working and in range
- Screw conveyors in AUTO mode unless manually set
- Zero speed sensors operational
- Slide gates operational
- Discharge chute level sensor within operating range
- Compressed air pressure within operating range
- Differential pressure module within operating range
- Pulsing sequence “ON”
- Thermocouples within operating range
- CPM 750 emission monitor(s) within operating range
- Stack flow monitor within range

The equipment presents a high health and safety hazard to personnel and precautions must be observed during maintenance and servicing operations. The following provisions must be observed prior to accessing or servicing the emission equipment:

- Lockout-Tagout/Electrical Safety - all system motors must be LOTO prior to any servicing and installation. This must be completed through the installation of specific LOTO hardware onto the electrical service disconnect. LOTO removal shall not be conducted until installation or maintenance is completed.
- Confined Space - some dust collection area are classified as Non-Permit/Permit Required Confined Spaces due to physical and chemical hazards associated with the area. Follow onsite Confined Space procedure prior to entry - entry team, air monitoring, rescue team and rescue equipment may be required.
- Working at Height - some installation/repair work may require personnel to work from height. Follow Safe Ladder Use, Aerial Work Platform and Fall Protection procedures.
- Handling and Lifting - heavy dust collector parts may present a safety hazard to anyone handling them or others in the area if they are dropped. To avoid injuries always follow instructions on proper lifting mechanics.

3.3 Equipment Inspections and Maintenance

[R336.1911(2)(a)]

Preventative maintenance is a key component to ensuring the reliability, availability, efficiency, and production at the facility. Routine maintenance and inspection of the equipment will be conducted in accordance with the manufacturer's written maintenance instructions and maintenance schedule, and applicable regulatory requirements, as presented on Table 4 below. All maintenance work performed will be documented in either hard copy or electronic format and kept for a minimum of five (5) years from the date of the maintenance activity. Maintenance includes equipment inspections, scheduled replacement of parts, and maintaining an inventory of critical spare parts.

Equipment inspections generally fall under two categories: inspections that take place while the facility is operating and less frequent inspections that take place while the facility is not operating. Inspections that take place during facility operation typically occur on a daily, weekly, monthly or quarterly basis. The frequency and scope of these inspections depend on manufacturer recommendations and operator experience and are detailed below. As is the case with most facilities, the facility will have 'major maintenance' outages that will involve more-in depth inspections of equipment internals. These major maintenance outages will be scheduled in advance and the timing of such outages will be dependent on actual facility operation and good management practices.

The following is an equipment inspection and maintenance schedule for critical equipment relating to the emission control units:

Table 4: Equipment Inspection and Maintenance Schedule

Item	Inspection/Maintenance Action	Weekly	Monthly	Semi-Annual	Annual
1	Visual check of HMI for system faults and system status	x			
2	Check for air leaks	x			
3	Listen for pulse valve diaphragm leaks	x			
4	Listen for unusual noises, smells, temps, etc.	x			
5	Visual check oil leaks	x			
6	Check compressed air regulators and filters	x			
7	Grease screw conveyor bearing and seals	x			
8	Verify compressed air pressures and drain compressed air		x		
9	Verify pneumatic transport convey air pressure		x		
10	Visual check tube sheet		x		
11	Pulse valves working when activated		x		
12	Level probes working		x		
13	Emission monitor inspected and cleaned		x		
14	Check level of oil in gearboxes		x		
15	Verify air knife pressure for emission monitor		x		
16	Inspect pneumatic transport dome valve		x		
17	Grease discharge conveyor bearings		x		
18	Visalite bag house			x	
19	Grease and oil change in SEW drive				x
20	Have fan motors and bearings analyzed				x
21	Visually inspect the integrity of ductwork/ stack/ duct supports				x
22	Excessive oil leaks by equipment should be investigated and fixed. Refill oil and grease at the time.				x
23	Flow monitor calibration				x
24	Monitor pressure drop across each baghouse cell to ensure pressure drop is within the normal operating range identified in the manual.	DCS			
25	Visual inspection of hoppers to confirm dust is being removed	x			
26	Monitor cleaning cycles to ensure proper operation	x			
27	Check bag cleaning mechanisms for proper functioning		x		
28	Visual inspection bag tension to ensure that bags are not kinked (kneed or bent) or lying on their sides.		x		
29	Visual inspection to confirm the integrity of the baghouse interior for air leaks			x	
30	Visual inspection, or use of vibration detectors, of fans for wear, material buildup, and corrosion			x	
31	Vibration analysis to check for wear on motors and gear boxes|1|			x	
	CPM 750 Monitor				
32	Monitor inspected and cleaned				x
33	Check the operation of the CPM 750. Verify that the control is displaying a monitor value	DCS			
34	Check the window value. Compare the value to previously noted window values. If the window value is approaching the Low Window Value Set Point, perform the service procedure		x		
35	Check the operation of the purge air system		x		
36	Visually inspect the transmitter head and receiver head housings to verify that no portion is loose or distorted		x		
Notes:	DCS = distributed control system (effectively a Daily task).				
	[1] Revision Dec 2018				

3.4 Equipment Spare Parts

[R336.1911 (2)(a)]

The ability to quickly replace components which malfunction during operations largely depends on three factors:

- the availability of off-site sources for replacement parts,
- the willingness of the source to shut down while waiting for such parts, and
- the ability to replace parts without the necessity of a shutdown.

In an effort to minimize potential equipment downtime, an inventory of spare parts for the baghouse system are maintained onsite. A summary of the spare parts maintained onsite as recommended by the manufacturer is included in Appendix B. A comprehensive up-to-date list is maintained in electronic format in the maintenance department.

4.0 OPERATING VARIABLES TO BE MONITORED

Routine monitoring and collection of operating data is an integral part of equipment operation and necessary to maintaining the equipment operation as per the requirements of the PTI. Often it is the data collected during routine observation of equipment operation that necessitates large-scale equipment servicing or repairs. During normal operations, personnel are required to collect specific operating parameters and data from the baghouse system, as described below.

4.1 Baghouse Operating Variables

Baghouse operating variables that are monitored are summarized in Appendix A. Examples includes:

- Differential pressure module (high differential pressure alarm) – Monitors the differential pressure across the bags. Information used to determine when to clean down the collector and is available on the DCS.
- The baghouse system is monitored at the DCS and data will be available at all times to the operators. The list of information to be monitored should be considered as a minimum and is subject to expansion at a later date.

4.2 Bag Leak Detection System (BLDS)

The BLDS consists of a CPM 750 emission monitor installed on the exhaust stack of the baghouse to measure relative change in particulate concentration.

- The BLDS alarm set point is identified in the on the specification sheet in Appendix A.

A CPM 750 measures relative change in particulate concentration. The movement of particles through this sensor beam causes a rapid variation in the received light intensity. The CPM 750 sensor is supplied with logarithmic output with signal to DCS.

The BLDS is integral to the operation of the baghouse system and will be functional at all time the baghouse systems are in operation. The system is wired to be powered when the baghouse is on.

5.0 CORRECTIVE ACTION PROCEDURES

Troubleshooting procedures shall be well-documented prior to equipment activation to increase the likelihood of timely and effective repairs. Thorough completion of the troubleshooting procedures also reduces the risks of adverse operating conditions which can lead to the discharge of excess emissions. In addition, training of personnel in the typical operations and troubleshooting/repair of the equipment is essential to minimize emissions and maximize operational time.

5.1 Corrective Action Procedures

[R336.1911(2)(c)]

This section presents the actions to be taken to correct (e.g., repair) the malfunctioning process, air pollution control, and air pollution monitoring equipment as soon as practical after the malfunction happens to minimize emissions. Corrective action procedures for the listed malfunction scenarios are presented below. Refer to equipment manuals for specific step-by-step instructions as needed.

5.1.1 Initial Corrective Actions

[R336.1911(2)(c)]

In the event of a BLDS alarm, corrective action to determine the cause of the alarm will be taken within 1 hour and corrective action to correct the cause of the problem will be taken within 24 hours of the alarm. The corrective action will be completed as soon as practicable. Initial corrective actions may include:

A. Inspecting the baghouse for air leaks, torn or broken bags or filter media, or any other condition that may cause an increase in emissions.
B. Sealing off defective bags or filter media.
C. Replacing defective bags or filter media or otherwise repairing the control device.
D. Sealing off a defective baghouse compartment.
E. Cleaning the BLDS probe or otherwise repairing the BLDS.
F. Making process changes.
G. Shutting down the process producing the PM emissions.

5.1.2 Broken Bags or Filter Bleed Through

Filter bag failure may result due to defects, thermal failure, mechanical failure, high differential pressure, or gradual wear. The following corrective action procedures are used when there is a malfunction resulting in excess emissions from broken filter bags or filter breed through.

A. Inspect for broken bags and repair or replace filter bags, as necessary.
B. If required, seal off defective bag or baghouse compartment if immediate replacement or repair cannot be made.

5.1.3 Fan or Amp Measuring System Failure

The corrective action for malfunction or excess emissions due to fan failure includes repair, replacement, or other adjustments. The following are corrective actions that may be required.

A. Mechanism malfunction- make adjustments to the alignment or tension of fan components.
B. Dirty equipment – clean air flow surfaces coating with excessive particulate.
C. Fan settings – adjust fan settings, correct damper settings, or modify control settings.

5.1.4 CPM 750 Failure and/or Alarm

A. Verify DCS - check for other monitoring parameter readings.
B. Clean probe if correction is indicated.
C. Check power input.

5.1.5 Cleaning Mechanism Failure

A. Check cleaning mechanism for proper operation.
B. Listen for unusual noises.
C. Repair or replace components as necessary.
D. Check for proper settings. If filter cake buildup is insufficient then reduce cleaning frequency; if cake buildup is excessive increase cleaning frequency.

5.2 Corrective Action Responsibilities

[EGLE Rule 336.1911(2)(c)]

In the event a BLDS alarm is triggered, the following procedures will be followed.

A. Maintenance Technician

1. Contact Maintenance / Engineering Manager upon discovery of any malfunction, alarm, or abnormal startup or shutdown.
2. Determine the cause of any alarm or malfunction within 1 hour.
3. Determine if there has been an exceedance of any emission or operating limit.
4. Initiate corrective action to correct the cause of any problem within 24 hours of the alarm or malfunction.

5. Complete the corrective action as soon as practicable.

B. Maintenance / Engineering Manager

1. Contact Environmental Manager upon discovery of any malfunction, alarm, or abnormal startup or shutdown.
2. Verify the cause of any alarm or malfunction within 1 hour.
3. Determine if there has been an exceedance of any emission or operating limit.
4. Verify that corrective action to correct the cause of any problem within 24 hours of the alarm or malfunction.
5. Complete the corrective action as soon as practicable.
6. Complete malfunction records per form in Appendix D.

C. Environmental Manager

1. Determine if there has been an exceedance of any emission or operating limit.
2. Determine if there has been a malfunction that is not included in the corrective action procedures, **Section 5.1**, above.
3. Verify that corrective actions are taken within 1 hour of alarm or malfunction and within 24 hours to correct any problem.
4. Complete the corrective action as soon as practicable.
5. Verify all recordkeeping procedures are followed.
6. Follow Malfunction Reporting procedures, as required.

6.0 MALFUNCTIONS

The malfunction requirements are presented under regulations including: PTI General Conditions (GC) 7 and EGLE Rule 336.1911.

6.1 Definitions

For the purposes of this plan, a malfunction is recognized as:

- 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 which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

6.2 Malfunctions

This list can periodically be revised as necessary to reflect operations. However, each change must be reported in the semi-annual report. If the MAP fails to address or inadequately addresses a malfunction event, the plan will be revised in 45 days of the event to correct the deficiency. A written notice must be provided to the agency if the revision 'alters the scope or the activities at the source which are deemed to be startup, shutdown, or malfunctions'.

The corrective active procedures for the malfunctions identified in Table 6 are presented in Section 5.

Table 5: Possible Malfunctions

Possible Malfunctions	Typical Corrective Actions[1] See Corrective Action Procedures
Broken Bags or Filter Bleed Through	Inspecting the baghouse for leaks, torn or broken bags or filter media, or any other condition that may cause an increase in emissions
Fan or Amp Measuring System Failure	
High Differential Pressure Drop and/or Alarm	Sealing off defective bags or otherwise remaining the control device
High Temperature and/or Alarm	
CMP 750 Failure and/or Alarm	Sealing off a defective baghouse compartment
Cleaning Mechanism Failure or Pre-coat Faults	Cleaning the bag leak detection system probe or otherwise remaining the bag lead detection system
Bag Damper Malfunction	Making process changes
Pulse Jet Sequencing Error	Shutting down the process producing the PM emissions
Power Failure	Check power source
Motor Failure and related components such as belts, pulleys, etc. [2]	Replace Motor with new then rebuild old [2]
Gear Box Failure [2]	Replace gear box with new then rebuild old [2]
Component and Sensor Contamination	Cleaning or Replacement
[1] Referenced from 40 CFR 63.7710(b)(5)	
[2] Revision Dec 2018	

7.0 PLAN MAINTENANCE, RECORDKEEPING AND REPORTING

7.1 Initial Plan Requirements

[PTI Condition III, R336.1911]

- The plan has been submitted to the Air Quality District (AQD) for review and approval in accordance with the PTI and applicable regulations.

7.2 Plan Revisions

[PTI Condition III, R336.1911(3) and (4)]

- If at any time the MAP fails to address or inadequately addresses an event that meets the characteristics of the malfunction, the MAP shall be amended within 45 days after such an event occurs.
- The plan must be revised within 45 days, if new equipment is installed.
- The plan must be revised upon request from the AQD.
- The permittee shall submit the plan and any amendments to the plan to the AQD District Supervisor for review and approval. If the AQD does not notify the permittee within 90 days of the submittal, the MAP or amended MAP shall be considered approved. Until amended plan is approved, the permittee shall implement corrective procedures or operational changes to achieve compliance with all applicable emission limits.
- Revisions must be logged on form in Appendix C.

7.3 Record Keeping

[PTI Condition VI]

Records must be maintained in a form suitable and readily available for expeditious review.

- All current plans and superseded plans will be maintained for the life of the affected source [Management practice].
- All other information necessary to demonstrate compliance with each plan requirement must be kept on-site for a period of at least 5 years.
- All current plans and superseded plans for the CPM 750 will be maintained for the life of the affected source.

7.4 Malfunction Reporting Requirements

[PTI GC 7, R336.1912]

Malfunction reporting requirements include any emission exceedance or deviation from Renewable Operating Permit requirements on semi-annual monitoring and deviation report and annual report. [EGLE Rule 336.1213(3)]

Excess emissions reporting requirements according the EGLE are summarized in Table 6 below.

Table 6: Excess Emissions Reporting Requirements [EGLE Rule 336.1912(3)]

Citation	Excess Emission Duration	Verbal Report	Written Report
	Hours	Days	Days
MDEQ R336.1912	2	2	10[1]

[1]Written report, if required, filed within 10 days after startup or shutdown occurred, within 10 days after abnormal conditions or malfunction corrected, or within 30 days of discovery of the abnormal condition or malfunction, whichever is first.

Excess Emissions Reporting [EGLE Rule 336.1912(3), (4), and (5)]:

Excess emissions reporting is required for the Baghouse for any abnormal condition, start-up, shutdown, or a malfunction that results in emissions of **PM, PM_{10}, $PM_{2.5}$** continuing for more than **2 hours** in excess of a standard or limitation established by the permit.

Reporting requirements are presented on Table 7.

Table 7: Excess Emissions Reporting Requirements

Excess Emissions Reporting - Any Air Contaminant [MDEQ Rule 226.1912]	
Excess Emissions Episode of any air contaminant continuing for more than 2 hours in excess of a standard or limitation. [MDEQ Rule 226.1912(3)]	
Initial Notification	**Excess Emissions Any Contaminant [MDEQ Rule 226.1912(4)]**
Timing	As soon as reasonable but not more than two (2) business days after discovery
Method	Any reasonable means, including electronic, telephone, or oral communication
Requirements	**Verbal Report to Include:** Recommend following information [Per 40 CFR §63.10(5)(ii))]
	● Provide name and title (may require Responsible Official)
	● Explain circumstances of the event
	● Describe all excess emissions and/or parameter monitoring exceedances which are believed to have occurred description and circumstances including date, duration, pollutants, and limits exceeded
	● Description of the malfunctioning equipment or condition
	● Corrective action taken
	● Other actions taken to minimize emissions
Written Reports	**Excess Emissions Any Contaminant [MDEQ Rule 226.1912(5)]**
Timing	Whichever is first: ● Within 10 days after start-up or shutdown occurred; ● Within 10 days after abnormal conditions or malfunction has been corrected; or ● Within 30 days of discovery of the abnormal conditions or malfunction, whichever
Method	**Written Report - Requires Certification by Responsible Official (using ROP Cert Form):**
Requirements	● The time and date, the probable causes or reasons for, and the duration of the abnormal conditions, start-up, shutdown, or malfunction.
	● An identification of the source, process, or process equipment that experienced abnormal conditions, was started up or shut down, or which malfunctioned and all other affected process or process equipment that have emissions in excess of an applicable requirement, including a description of the type and, where known or where it is reasonably possible to estimate, the quantity or magnitude of emissions in excess of applicable requirements.
	● Information describing the measures taken and air pollution control practices followed to minimize emissions.
	● For abnormal conditions and malfunctions, the report shall also include a summary of the actions taken to correct and to prevent a reoccurrence of the abnormal conditions or malfunction and the time taken to correct the malfunction.

Appendix A
Summary of Operating Ranges

Sand System Baghouse
Summary of Operating Ranges

Operating Parameter	Unit of Measure	Normal	Max	Low / High Alarms	Sensors
Flow Rate	acfm	150,000	200,000 ^	No Alarms	In-stack pitot tubes
Fan Amperage	Amps	360	360	No Alarms	Current transformer
Pressure Drop	in H2O	5.0 - 5.5	3.0 Above Set Point	None / 3.0	dP module …
CPM 750 (Bag Leak Detection System)*					
Particulate Concentration	Relative to Reference Concentration	5% - 165%	165%	<5% / >165% for 30 seconds	Optical / light scattering …

Notes:
The baghouse is a "pulse" system with a centrifugal fan, and two "cells" housing bag arrays operating in parallel.

* Monitoring results collected in the SDADA system.

^ 187,400 scfm (estimated)

Appendix B
Equipment Spare Parts

Homer Foundry
Appendix B - Summary of Typical Sprare Parts - Comprehensive and Up-to-Date List In Maintenance Department
Baghouse System and BLDS

Brembo part number	Description	Part number	Vendor
294CHP000344	1/4" Muffler/Breather	UP1944	Allied
294CHP000345	1/4" Quick Exhaust	UP1898	Allied
294CHP000346	1/4" Muffler	UP1039	Allied
294CHP000347	2" Regulator	UP1859	Allied
286ELE000676	Stack Particulate Monitor	08510750-000B	B&W
285BEA000270	Precoat Expansion Joint 1/4 x 4" WD x 9" ID	938815	BRR
285BEA000271	Fan Expansion Joint (Inlet) 9"WD x 62-3/4"ID	938815	BRR
285BEA000272	Fan Expansion Joint (Inlet) 9"WD x 68-3/4"ID	938815	BRR
285BEA000273	Fan Expansion Joint (Inlet) 9"WD x 52-3/4"ID	938815	BRR
285BEA000287	Fan Expansion Joint (Outlet) 9" WD x 41-3/8" x 53-1/8"	938815	BRR
285BEA000289	Fan Expansion Joint (Outlet) 9" WD x 53-8/8" ID x 69 1/2" ID 3/16" Thick	938815	BRR
285BEA000294	Fan Expansion Joint (Outlet) 9" WD x 53 5/8" ID x 69 1/2"ID 3/16" Thick	938815	BRR
286ELE000655	Thermal Circuit Breaker	5SJ41xx-7HG42	C&E
286ELE000659	Programming Port	GRAC-P-R2-K3RF3	C&E
286ELE000670	Alarm Horn	450E-024	C&E
286ELE000692	Pulse Pipe - 17 Hole	NA	ETA
286ELE000859	DRIVE 6SL3224-0XE42-0UA0 POWER MOD 240 ETA SAND	6SL3224-0XE42-0UA0	SIEMENS
285BEA000269	Mold Fan Wheel	33963	IAP
285BEA000283	Finishing Fan Wheel	33816	IAP
285BEA000286	Fan Shaft	33816	IAP
285BEA000288	Sand Fan Wheels	33814 & 33815	IAP
285BEA000291	Fan Shaft	33814 & 33815	IAP
298MEC000367	Melt Fan Wheels (one CW, one CCW)	33812 & 33813	IAP
286ELE000675	Stack Flow Monitor	DPT	JMI
286ELE000693	Flow Monitor 76" Pitot Tubes	VOLUPROBE/1SS-76	JMI
286ELE000695	Stack Flow Monitor 48" Pitot Tubes	VOLUPROBE/1SS-48	JMI
286ELE000707	Flow Monitor 96" Pitot Tubes	VOLUPROBE/1SS-96	JMI
284REB000185	1" WIDE X 1/8" THICK, SPONGE RUBBER, STRIP COVER GASKET	SP100	Martin
285BEA000255	Motor Sheave	68V1400F	Martin
285BEA000256	Motor Bushing	F3 3/8	Martin
285BEA000257	Fan Sheave	68V1900J	Martin
285BEA000258	Fan Bushing	J4 7/16	Martin
285BEA000261	2 7/16" Dia. X 15 3/8" Long End Shaft, 2-Bolt Drilled And A Machined Keyway	CE5BB-W	Martin
285BEA000265	2 7/16" Ø Coupling Shaft	CC5-H	Martin
285BEA000266	1/4" THK. X 9" Mounting Plate Welded Into The Troughs With 3/8" Studs	PLATE	Martin
285BEA000278	Motor Sheave	65V1090E	Martin
285BEA000279	Motor Bushing	E3 3/8	Martin
285BEA000280	Fan Sheave	65V1320F	Martin
285BEA000281	Fan Bushing	F3 15/16	Martin
285BEA000292	Motor Sheave	88V1400J	Martin
285BEA000293	Fan Sheave	88V2000M	Martin
289BEL0000115	Sand Fan Belts 8V2240 (2 sets of 8 per each fan)	8V2240	Martin

Homer Foundry
Appendix B - Summary of Typical Sprare Parts - Comprehensive and Up-to-Date List In Maintenance Department
Baghouse System and BLDS - Continued

Brembo part number	Description	Part number	Vendor
298MEC000363	10" X 2 7/16" X 10" PITCH X 12' 7-11/16" LG. RIGHT HAND SECTIONAL SCREW MOUNTED ON 3" SCH. 40 PIPE WITH 2-BOLT COUPLINGS. FLIGHTS TO BE MADE 3/8" THK. MILD STEEL W/ CWCS WELDING	10S524-R	Martin
298MEC000364	10" X 2 7/16" STYLE 226 HANGER ASSEMBLY WITH GREASE PIPE	10CH2265-O	Martin
299HOS000056	10" X 2 7/16" FLUSH TROUGH END	10TEDF5-BB-P	Martin
299HOS000057	10" x 14GA. X 4'-7 1/4" LG. FLANGED COVER	10TCF14	Martin
299HOS000058	10" x 14GA. X 7'-5" LG. FLANGED COVER	10TCF14	Martin
299HOS000059	10" x 14GA. X 8'-0" LG. FLANGED COVER	10TCF14	Martin
299HOS000060	10" x 14GA. X 4'-0 5/8" LG. FLANGED COVER	10TCF14	Martin
299HOS000061	10" X 4" WIDE, BUTTSTRAP	10BLF10	Martin
299HOS000062	9" OD X 10 GA. MTO INLET	INLET	Martin
299HOS000123	9" X 2 7/16" X Full (9") Pitch X 16'-5" Lg. Right Hand Sectional Screw Mounted On 3" Sch. 40 Pipe With 2-Bolt Couplings. Flights To Be 3/8" Thk. With C.W.C.S. Welding. Discharge End To Have 8 1/2" Of Bare Pipe	9S524-R	Martin
299HOS000145	9" X 3/16" THK. X 10'-0" Lg. Form Flange U-Trough	9CTF7-10	Martin
299HOS000147	9" X 3/16" THK. 4'-0" LG. FORM FLANGE U-TROUGH	9CTF7	Martin
299HOS000148	4" PIPE COUPLINGS W/ PLUGS ON SIDES OF ACCESS DOORS AT HANGERS, FITTED	4" PIPE COUPLING	Martin
299HOS000149	9" X 10 GA. THK FLUSH END DISCHARGE CHUTE W/ 3/16" THK FLANGE, DRILLED FOR A SMOOT ROTARY VALVE, FITTED	9TSDF10	Martin
299HOS000150	9" X 10 GA. THK DISCHARGE W/ BOLTED COVERS	9TSDS10	Martin
299HOS000151	9" X 2 7/16" X 1/2" THK. Trough End Fitted With Screw Conveyor Drive	9TEF5-BB-P	Martin
299HOS000153	9" X 2 7/16" X 9" PITCH X 11'-1" LG. RIGHT HAND SECTIONAL SCREW MOUNTED ON 3" SCH. 40 PIPE WITH W-BOLT COUPLINGS. FLIGHTS TO BE 3/8" THK. WITH C.W.C.S WELDING. DISCHARGE END TO HAVE 5 1/4" BARE PIPE	9S524-R	Martin
299HOS000154	9" X 2 7/16" X 6" PITCH X 11'-1" LG. RIGHT HAND SECTIONAL SCREW MOUNTED ON 3" SCH. 40 PIPE WITH W-BOLT COUPLINGS. FLIGHTS TO BE 3/8" THK. WITH C.W.C.S WELDING	9S524-R-6	Martin
299HOS000155	9" X 2 7/16" Style 226 Hanger Assembly With Grease Pipe Plumbed to Outside The Trough	9CH2265-O	Martin
299HOS000156	5/8" DIA. COUPLING BOLTS W/ LOCKNUTS	CCB5	Martin
299HOS000157	9" X 14 Ga. X 12" Lg. Flanged Cover Bolted As Per Detail With Special 1" Long Flanges.	9TCF14	Martin
299HOS000162	10" X 10 GA. THK. DISCHARGE	10TSD7	Martin
299HOS000163	10" Trough Saddle Welded To Trough	10TS	Martin
299HOS000163	10" Trough Saddle Welded To Trough	10TS	Martin
299HOS000164	10" X 2 7/16" X 1/2" THK. TROUGH END	10TEF5-BB-P	Martin
299HOS000165	10" X 2 7/16" Flush Trough End	10TEDF5-BB-P	Martin
299HOS000167	10" X 14 Ga. X 4'-7 1/4" Lg. Flanged Cover Bolted On 12" Centers	10TCF14	Martin
299HOS000170	10" X 4" Wide, Buttstrap	10BLF10	Martin
299HOS000172	10" X 3/16" THK. X 10'-0" LG. FORM FLANGE U-TROUGH	10CTF7-10	Martin
299HOS000173	10" X 3/16" THK. X 4'-0" LG. FORM FLANGE U-TROUGH	10CTF7-4	Martin
299HOS000174	10" X 10 GA THK. DISCHARGE WITH BOLTED COVER	10TSDS10	Martin
285BEA000284	Bearing, Pilot 2B 17MM FLGR FDA PTI	204-0438	Martin
286ELE000678	Pre-coat Fan	2006A3HP	NYB
298MEC000365	Slide Roller 7/8"	S00-07	
298MEC000366	Slide Blade	S10-08V1	

Appendix C
MAP Revisions

Sand System Baghouse

Revision Date	Revision No.	Reviewer	Summary of Changes
Dec-18	1	J. Conard	Remove Section 1.2 as duplicate of Section 3.1. Renumber tables. Table 4: addition to PM Table 5: addition to Malfunctions / Correction Actions
Oct-20	2	J. Conard	General revisions to reflects new PTI

Appendix D
Malfunction Record

Homer Foundry
Appendix D
Malfunction Records

Information	Description
Date	
Type of Malfunction	
Provide detailed explanation of the circumstances of event	
Provide description of corrective actions taken	
Describe the reasons the MAP was not followed.	
Describe any proposed revisions to the MAP and list revisions in table in Appendix C.	
Name	
Title	