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Malfunction Abatement Plan
for
EU-Incinerator

City of Warren
Wastewater Treatment Plant

August 2021

Prepared for:

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Malfunction Abatement Plan

For EU-Incinerator

At the

City of Warren, Michigan
Wastewater Treatment Plant

AUGUST 2021
209-4201861

PRESENTED TO

City of Warren Wastewater Treatment Plant
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REPORT CERTIFICATION

The material and data in this document were prepared under the supervision and direction of the undersigned.

Edward (Ted) Bishop — 9/16/2021
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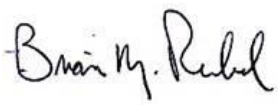

Brian Rubel, P.E. — 9/16/2021
Client Manager

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APPENDICES

ACRONYMS, ABBREVIATIONS, AND LETTER SYMBOLS

Acronyms/Abbreviations	Definition
AQD	Air Quality Division
EGLE	Michigan Department of Environment, Great Lakes, and Energy
MAERS	Michigan Air Emissions Reporting System
CFR	code of federal regulations
EPA	United States Environmental Protection Agency
HAP	hazardous air pollutant
HHV	higher heating value
LHV	lower heating value
MAP	Malfunction Abatement Plan
MW	molecular weight
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NSPS	New Source Performance Standards
PSD	Prevention of Significant Deterioration
ROP	Renewable operating permit (Title V operating permit)
SCADA	Supervisory control and data acquisition
SSI	Sewage sludge incinerator
WWTP	Wastewater treatment plant
STP	Standard temperature and pressure
°C	degrees Celsius
acfm	actual cubic feet per minute
atm	atmosphere
atm-ft^3/lb-mol-R	atmosphere cubic foot per pound mole Rankine
Btu	British thermal unit
cal/s	calorie per second
CO	carbon monoxide
dscfm	dry standard cubic foot, feet per minute
ft	foot, feet
ft/min	foot per minute
ft/s	foot per second
ft^3	cubic foot
gpm	gallon per minute
g	gram
g/dscm	grams per dry standard cubic meter
hr	hour
in	inch

ºK	Kelvin (temperature)
lb/hr	pound(s) per hour
m	meter
m/s	meter(s) per second
m^3	cubic meter(s)
mg	milligram
Mg	megagram (metric ton)
mi	mile(s)
min	minute (s)
mm	millimeter
MM	million
mol	mole
MT	metric ton (megagram)
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
Pb	lead
PM	particulate matter (TSP)
PM_{10}	particulate matter ≤ 10 microns
$PM_{2.5}$	particulate matter ≤ 2.5 microns
ppbv	parts per billion by volume
ppbw	parts per billion by weight
ppmv	parts per million by volume
ppmw	parts per million by weight
ºR	Rankine (temperature)
R	universal gas constant
scf	standard cubic foot
scfm	standard cubic feet per minute
sec	second
SO_2	sulfur dioxide
tpd, ton/day	ton(s) per day
tph, ton/hr	ton(s) per hour
tpy, TPY	ton(s) per year
TSP	total suspended particulate (PM)
µg	microgram
µg/dsl	microgram per dry standard liter
$\mu g/m^3$	microgram per cubic meter
VOC	volatile organic compound
yd^3	cubic yards

1.0 INTRODUCTION

The City of Warren, Michigan currently operates a Wastewater Treatment Plant Sewage Sludge Incinerator that combusts waste sludge generated in the water treatment process, the residual of which can then be disposed of as ash. This document contains the Incineration Process Malfunction Abatement Plan to be used at the City of Warren Wastewater Treatment Plant, 32360 Warkop Ave, Warren, Michigan 48093. The plan's purpose is to assure compliance with the EU-Incinerator emission limits in the event of a malfunction or failure of any part of the incineration process that would affect air emissions.

As required by Permit to Install (PTI) No. 23-21, issued on June 15, 2021, Process/Operational Restriction No. III.1:

> *1. The permittee shall not operate EU-Incinerator unless a malfunction abatement plan (MAP) as described in Rule 911(2)…..and… the MAP shall, at a minimum, specify the following:*
>
> *a. A complete preventative maintenance program including identification of the supervisory personnel responsible for overseeing the inspection, maintenance, and repair of air-cleaning devices, a description of the items or conditions that shall be inspected, the frequency of the inspections or repairs, and an identification of the major replacement parts that shall be maintained in inventory for quick replacement.*
>
> *b. An identification of the source and air-cleaning device operating variables that shall be monitored to detect a malfunction or failure, the normal operating range of these variables, and a description of the method of monitoring or surveillance procedures.*
>
> *c. A description of the corrective procedures or operational changes that shall be taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits.*
>
> *If at any time the MAP fails to address or inadequately addresses an event that meets the characteristics of a malfunction, the permittee shall amend the MAP within 45 days after such an event occurs. The permittee shall also amend the MAP within 45 days, if new equipment is installed or upon request from the District Supervisor. The permittee shall submit the MAP and any amendments to the MAP to the AQD District Supervisor for review and approval. If the AQD does not notify the permittee within 90 days of submittal, the MAP or amended MAP shall be considered approved. Until an amended plan is approved, the permittee shall implement corrective procedures or operational changes to achieve compliance with all applicable emission limits.*

Rule 911 of the State of Michigan Air Pollution Control Rules requires the Warren WWTP to have a Malfunction Abatement Plan (MAP) in place, "to prevent, detect, and correct malfunctions or equipment failures resulting in emissions exceeding any applicable emission limitation."

The MAP is divided into four sections as follows:

Section 2: Provides the identification of the supervisory personnel responsible for overseeing the inspection, maintenance, and repair of the incinerator process and control equipment.

Section 3: Represented by Table 3-1, Key Monitored Process Parameters, this section relates to R336.1911 (2)(b) and Condition III.1.b and delineates, "the source and air-cleaning device operating variables that shall be monitored to detect a malfunction or failure, the normal operating range of these variables, and a description of the method of monitoring or surveillance procedures."

The Operations personnel at the Warren WWTP have determined, through training and experience, the incineration process parameters whose variance may have an effect on the incinerator emissions. These parameters are shown in column 1 of Table 3-1.

Columns 2 to 7 contain information regarding the device or method used to monitor a given process parameter in column 1, the location of such device, the frequency of monitoring, the normal range of the process parameter and the malfunction range for a given parameter.

The value of a given parameter is indicative of either normal operation or malfunction or failure of the process. Table 3-1 contains fields for both the normal operating range and the malfunction range for each monitored process parameter. If any of these parameter's values fall within the particular parameter's malfunction range, remedial action must be taken to prevent a deviation from emission limitations.

Section 4: Represented by Table 4-1, Malfunction Abatement Summary, this section relates to the action(s) to be taken, as required under R336.1911(2)(c) and Condition III.1.c., in the event that one or more of the monitored Process Parameters value(s) in Table 3-1 enters its malfunction range.

Section 5: Table 5-1, Preventative Maintenance Summary, is a summary of the preventative maintenance to be performed on devices whose failure may potentially contribute to emission deviations. The maintenance program relates to requirement (2)(a) of R 336.1911 and Condition III.1.a.

In addition, a spare parts listing is provided in **Appendix A** for use in the maintenance of devices listed in Table 5-1. The parts listing relates to requirement (2)(a) of R336.1911 and Condition III.1.a. Note that the Warren WWTP reserves the right to purchase spare parts from any company offering acceptable replacement parts. The quantity of parts on hand varies depending on the known frequency of repairs, the lead time to obtain replacement parts, the cost of parts, and whether repairs can be done in-house or need to be done by manufacturer certified technicians. The Warren WWTP reserves the right to have suppliers expedite delivery of parts from their factory or warehouse in lieu of storing onsite.

Appendix B provides some of the operational checklists that are used to track operational data on the incinerator and scrubber and other related items for maintenance and daily observations on equipment.

2.0 RESPONSIBLE PERSONNEL

The supervisory personnel responsible for overseeing the inspection, maintenance, and repair of the incinerator and control equipment are listed below:

Name	Title	Phone Number
Bryan Clor	Division Manager	586-264-2530 ext. 8103
Bob Dranberg	Chief Operator	586-264-2530 ext. 8106
Gerry Dunne	Mechanical Supervisor	586-264-2530 ext. 8130
Jason Tobolski	IT/Electrical Supervisor	586-264-2530 ext. 8108

3.0 KEY MONITORED PROCESS PARAMETERS

The key parameters that are monitored for the process and control of the incinerator at the Warren WWTP are listed below in Table 3-1.

The Warren WWTP facility SCADA system allows the information gathered by detection devices/sensors to be processed, distributed, and displayed so that operators and supervisors can monitor, record, and analyze data necessary for operational and environmental purposes.

Table 3-1. Key Monitored Process Parameters

Process Parameter	Monitoring Device	Process/Control Equipment Monitored	Device Location	Frequency of Monitoring	Normal Operating Range	Malfunction or Abnormal Range
Combustion Zone Temp	Thermocouples	Incinerator	Hearths 4, 5, 6	Continuous	1400 – 1600 ºF	< 1225 ºF
Feed Rate	Weigh Scales	Incinerator	Feed Conveyers	Continuous	4 – 6 wet tph	Below 1; Above 7 tph
Scrubber Differential Pressure	Pressure Gauges/Transmitters	Scrubber	Inlet/Outlet	Continuous	22 – 28 inches WC	< 22.0 in wc
Water Flow Rate	Electromagnetic Flow Measurement System	Scrubber	Various	Continuous	750 – 900 gpm	< 750 gpm
Effluent pH	pH Probe	Scrubber	Effluent Discharge	Continuous	6.2 to 7	< 6.0
Ash Buildup	Level Sensor	Scrubber	Ash Hopper	Continuous	Normal ash level	Buildup or no ash discharging
THC Monitoring	THC CEMS	Scrubber	Scrubber Stack	Continuous	30 – 70 ppm	> 150 ppm
Bypass Stack	Camera / alarm	Incinerator	Incinerator 4th Floor	Continuous	Closed	Open

4.0 MALFUNCTION ABATEMENT SUMMARY

This section relates to R 336.1911(2)(c) and Table 4-1 below details the action(s) to be taken in the event that one or more of the monitored Process Parameters value(s) in Table 3-1 enters its malfunction range.

Table 4-1. Malfunction Abatement Summary

Process Condition	Possible Cause(s)	Process or Control Equipment Monitored	Means of Detection	Corrective Action
Low Combustion Zone Temp	Feed rate increase or lower cake solids	Incinerator	PLC	Decrease water content of feed; reduce feed rate if necessary
Low Combustion Zone Temp	Low burner use profiles	Incinerator	PLC	Increase number of burners in use and/or firing rates as needed.
Low Combustion Zone Temp	Feed rate increase or lower cake solids	Incinerator	PLC	Increase number of burners in use and/or firing rates as needed; or, if necessary, reduce feed rate
High Combustion Zone Temp	Lost feed, burner use profile, or change in cake solids	Incinerator	PLC	Restore feed or reduce number of burners and/or firing rates
No Feed	Conveyer stopped feeding	Incinerator	PLC or visual inspection	Restart conveyers; check for sensor fouling; repair torn belt
Low Scrubber Differential Pressure	Various process changes	Scrubber	PLC	Increase draft and venturi differential pressure set points
Low Scrubber Water Flow Rate	Incorrect settings or loss in water supply pressure	Scrubber	PLC	Increase flow settings and/or restore water supply pressure; check water filters for fouling and clean if necessary
Low Combustion Air Supply	Air supply system	Incinerator	PLC	Check functionality of variable feed drive (VFD) on fan; bypass fan control until repair made
Low effluent pH	Need more water; possible probe issue	Scrubber	PLC	Take grab sample and analyze; increase water flow settings if possible
Ash Buildup	Ash system not removing ash properly	Scrubber	PLC or visual inspection	Check ash system. If not working, Stop Feed, Stop Shaft and Control Burn Out, and place In Standby Mode Before Corrective Maintenance Begins
THC Monitor Malfunction	Check instrument components	Scrubber	PLC / CEMS	Initiate corrective action to bring system back online; contact Trace Environmental for assistance
Bypass Stack Open	ID fan failure; air compressor failure	Incinerator	Camera / PLC	Manual operation of ID fan; initiate backup compressor

5.0 PREVENTATIVE MAINTENANCE

This section relates to R 336.1911(2)(a) and Table 5-1 below is a summary of the preventative maintenance to be performed on devices whose failure may potentially contribute to emission deviations.

Currently, the Division Head of the Warren WWTP requires a weekly operations update of all outstanding and/or recent issues that need to be addressed at the plant or have been addressed. The material in the update is reviewed early in the week in order to assess what actions are necessary and priorities for the week. In addition, the Division Head conducts an in-person meeting once every two weeks with the Supervisors of the following areas to discuss operations, including the incinerator and control devices:

- Electrical / IT Supervisor
- Maintenance Supervisor
- Operations Supervisor
- Laboratory Supervisor
- Engineering Supervisor
- IPP (Industrial Pretreatment Program) Supervisor

In addition, as a requirement under NSPS Subpart MMMM, the incinerator scrubber must undergo a complete inspection on an annual basis to ensure proper operation of all scrubber functions. This inspection report is submitted annually with the Warren WWTP Subpart MMMM Annual Compliance Report.

Table 5-1. Preventative Maintenance Summary

Maintained Equipment	Maintenance Task	Frequency	Supervisor Responsible
Cake feed scale	Mechanical inspection / adjustment	Annual	Operations/Contractor
Induced draft fan	Vibration analysis	Semi-annual	Electrical Dept
	Grease bearings	Semi-annual	Electrical Dept
Incinerator gas burner	Mechanical inspection of burners	Annual	Electrical Dept
Bypass damper	Pneumatic system check	Annual	Maintenance Dept
Incinerator center shaft drive	Center shaft drive lubrication	Quarterly	Operations
Venturi nozzle	Nozzle inspection	Annual	Operations
Pre-cooler nozzles	Nozzle inspection	Annual	Operations
Burner combustion air fan	Grease bearings & mechanical inspection	Semi-annual	Electrical Dept
	Vibration analysis	Semi-annual	Electrical Dept
Centershaft bearings	Shaft bearing lube & mechanical check	Semi-annual	Operations and Mechanical Dept
Center shaft cooling air fan	Vibration analysis	Semi-annual	Electrical Dept
	Mechanical inspection – belt drive	Semi-annual	Electrical Dept
	Mechanical inspection – sheave alignment	Semi-annual	Electrical Dept

Table 5-1 (continued). Preventative Maintenance Summary

Maintained Equipment	Maintenance Task	Frequency	Supervisor Responsible
Center shaft cooling air fan	Fan lubrication	Semi-annual	Electrical Dept and Operations
	Sensory check of fan	Annual	Electrical/Contractor
Combustion air fan	Vibration analysis	Semi-annual	Electrical Dept
	Mechanical inspection – belt drive	Semi-annual	Electrical Dept
Ash Pumps	Vibration analysis	Semi-annual	Electrical Dept
	Mechanical inspection – belt drive	Semi-annual	Electrical Dept
	Mechanical inspection – sheave alignment	Semi-annual	Electrical Dept
	Pump packing inspection	Annual	Electrical Dept and Operations
Scrubber	Scrubber skid pumps – vibration analysis	Semi-annual	Operations
	Scrubber skid pumps – grease motors	Semi-annual	Operations
	Scrubber skid pumps – inspect filters	Weekly	Operations
Scrubber Lances	Inspect and clean	Annual	Operations
Scrubber Mist Eliminator	Inspect and clean	Annual	Operations

6.0 IMPLEMENTATION OF AND UPDATES TO PLAN

The overall goal of this plan is to provide assurance to EGLE-AQD that the incinerator and control equipment are being operated and maintained in a manner consistent with good engineering practice to minimize emissions and prevent malfunctions that can lead to exceedances of limitations, while allowing the Warren WWTP operational flexibility in its operations.

If the plan fails to address or inadequately addresses an event that meets the characteristics of a malfunction at the time the plan is initially developed, the permittee shall revise the plan within 45 days after such an event occurs and submit the revised plan for approval to the EGLE-AQD District Supervisor. Should EGLE-AQD determine the malfunction abatement/preventative maintenance plan to be inadequate, the EGLE-AQD District Supervisor may request modification of the plan to address those inadequacies.

APPENDIX A

Incinerator and Scrubber Replacement Parts

Appendix A
INCINERATOR PARTS

QUANTITY	DESCRIPTION	PART NUMBER	LOCATION
3	RABBLE ARMS 2 SHRINK WRAPPED ONE NOT		Outside Truckwell
12	RABBLE ARM PINS		On Shelf
Numerous	VARIOUS SIZE TEETH SPACERS		On Shelf
5		4083-2BR	Floor
10	ALTERNATE PART NUMBER FOR HEARTH 6,8,10	11400A	Floor
4	HEARTH 2 teeth	4083-4FR	Floor
10	HEARTH 4 teeth	4083-4DR	Floor
11	HEARTH 7,9 teeth	9116-ADR	Floor
1		4083-4ER	Floor
9	HEARTH 2 teeth	4083-4FR	On Shelf
8	HEARTH 5 teeth	4083-2ER	On Shelf
1	END OF ARM HEARTH 7,9	4083-1K	On Shelf
22	HEARTH 7,9 teeth	9116-ADR	On Shelf
1		9116 BE	On Shelf
20	UNIDENTIFIED TEETH		On Shelf
36	HEARTH 6,8,10	9116 BDR	On Order

QUANTITY	DESCRIPTION	PART NUMBER	LOCATION
4	Gas regulators		
1	Honeywell Modutrol IV		
12	Replacement Thermocouples		
10	T/C transmitters		
6	Laurel (thermocouple) transmitters		
1	pH probe assembly		
NOTE:	SCADA parts are on hand, but too numerous to list		

3.3.1 Supplied Spare Parts

Quench Spray Lance (Ref. Drwg. C110-1115)

Part No.	Qty	Size	Part Description	Delivery
1115.110-2	7	3/4"	SPRAY NOZZLE, HM 343, 316-SS	2 WEEKS

Tray Irrigator Spray Lance (Ref. Drwg. C113-1115)

Part No.	Qty	Size	Part Description	Delivery
1115.113-2	4	1/2"	HM 218, SPRAY NOZZLE, 316-SS	2 WEEKS

Venturi Inlet Spray Lance (Ref. Drwg. C115-1115)

Part No.	Qty	Size	Part Description	Delivery
1115.115-2	9	3/8"	HM147 SPRAY NOZZLE, 316-SS	4-5 WEEKS

Venturi Throat Manifold (Ref. Drwg. C116-1115)

Part No.	Qty.	Size	Part Description	Delivery
1115.116-2	9	1/4"	SM10 SPRAY NOZZLE, 316-SS	4-5 WEEKS

ME Irrigator Spray Lance (Ref. Drwg. C118-1115)

Part No.	Qty.	Size	Part Description	Delivery
1115.118-2	4	3/8"	HM 125 NOZZLE, 316-SS	2 WEEKS

ME Backwash Spray Lance (Ref. Drwg. C119-1115)

Part No.	Qty.	Size	Part Description	Delivery
1115.119-2	4	1"	RD 20 SPRAY NOZZLE, 316-SS	2 WEEKS

Booster Pump Skid (Ref. Drwg. C315-1115)

Part No.	Qty.	Size	Part Description	Delivery
1115.315-11A	1	CRN15-8	CRN15-8 PUMP END ONLY	8 WEEKS
1115.315-12A	1	CRN15-6	CRN15-6 PUMP END ONLY	8 WEEKS

Venturi Tube Assembly (Ref. Drwg. C545-1115)

Part No.	Qty.	Size	Part Description	Delivery
1115.545-0B	1	4"	VENTURI TUBE ASSEMBLY W/THROAT NOZZLE INSTALLED.	4-5 WEEKS

3.3.2 Recommended Spare Parts

Quench Spray Lance (Ref. Drwg. C110-1115)

Part No.	Qty	Size	Part Description	Delivery
1115.110-2	7	3/4"	SPRAY NOZZLE, HM 343, 316-SS	2 WEEKS
1115.110-3	1	1/4"	PRESSURE GAUGE, 0-100 PSIG	3 WEEKS
1115.110-7	1	2"X48"	FLEX HOSE, SS WITH NPT ENDS	2 WEEKS
1115.110-10	3	2"	REPLACEMENT Y-STRAINER SCREEN & GASKET, 0.250" PERF., 316-SS	2 WEEKS

Tray Irrigator Spray Lance (Ref. Drwg. C113-1115)

Part No.	Qty	Size	Part Description	Delivery
1115.113-2	4	1/2"	HM 218, SPRAY NOZZLE, 316-SS	2 WEEKS
1115.113-3	1	1/4"	PRESSURE GAUGE, 0-100 PSIG	3 WEEKS
1115.113-5	1	1"	CAMLOCK PART D, SS	1 WEEK
1115.113-6	1	1"	CAMLOCK PART F, SS	1 WEEK
1115.113-7	1	1"X48"	FLEX HOSE, SS WITH MPT ENDS	2 WEEKS
1115.113-10	2	1"	REPLACEMENT Y-STRAINER SCREEN, .125" PERF., 316-SS	2 WEEKS

Venturi Inlet Spray Lance (Ref. Drwg. C115-1115)

Part No.	Qty	Size	Part Description	Delivery
1115.115-2	9	3/8"	HM147 SPRAY NOZZLE, 316-SS	4-5 WEEKS
1115.115-3	1	1/4"	PRESSURE GAUGE, 0-400 PSIG	3 WEEKS
1115.115-7	1	1 1/2"X48"	FLEX HOSE, SS WITH MPT END/ FIXED X LAP JOINT 300# FLANGED ENDS	2 WEEKS
1115.145-41	3	1 1/2"	REPLACEMENT Y-STRAINER SCREEN, 0.125" PERF., 316-SS	2 WEEKS

Venturi Throat Manifold (Ref. Drwg. C116-1115)

Part No.	Qty.	Size	Part Description	Delivery
1115.116-3	1	1/4"	PRESSURE GAUGE, 0-400 PSIG	3 WEEKS
1115.116-7	1	1-1/2" X48"	FLEX HOSE, SS WITH MPT END/ FIXED X LAP JOINT 150# FLANGED ENDS	2 WEEKS
1115.116-20A	2	48"L	FLEX HOSE, SS, SMOOTH BORE WITH 3/8" MPT END X ½" MPT END	2 WEEK
1115.146-65	2	1-1/2"	REPLACEMENT Y-STRAINER SCREEN, 3/32" PERF., 316-SS	2 WEEKS

ME Irrigator Spray Lance (Ref. Drwg. C118-1115)

Part No.	Qty.	Size	Part Description	Delivery
1115.118-2	4	3/8"	HM 125 NOZZLE, 316-SS	2 WEEKS
1115.118-3	1	1/4"	PRESSURE GAUGE, 0-100 PSIG	3 WEEKS
1115.118-5	1	1"	CAMLOCK PART D, SS	1 WEEK
1115.118-6	1	1"	CAMLOCK PART F, SS	1 WEEK
1115.118-7	1	1"X48"	FLEX HOSE, SS WITH 1" MPT ENDS	2 WEEKS
1115.118-10	2	1"	REPLACEMENT Y-STRAINER SCREEN, 0.125" PERF., 316-SS	2 WEEKS

ME Backwash Spray Lance (Ref. Drwg. C119-1115)

Part No.	Qty.	Size	Part Description	Delivery
1115.119-2	4	1"	RD 20 NOZZLE, 316-SS	2 WEEKS
1115.119-3	1	1/4"	PRESSURE GAUGE, 0-15 PSIG	3 WEEKS
1115.119-5	1	1"	CAMLOCK PART D, SS	1 WEEK
1115.119-6	1	1"	CAMLOCK PART F, SS	1 WEEK
1115.119-7	1	1"X48"	FLEX HOSE, SS WITH 1" MPT ENDS	2 WEEKS
1115.119-10	2	1"	REPLACEMENT Y-STRAINER SCREEN, 0.125" PERF., 316-SS	2 WEEKS

Booster Pump Skid (Ref. Drwg. C315-1115)

Part No.	Qty.	Size	Part Description	Delivery
1115.315-1	2	4"	REPLACEMENT STRAINER BASKET, 1/8" PERF., 316-SS	4 WEEKS
1115.315-1	2	4"	REPLACEMENT STRAINER COVER O-RING	2 WEEKS
1115.315-5B	2	2"	REPAIR KIT, 3-PIECE FULL PORT BALL VALVE	1 WEEK
1115.315-2	1	CRN15-	CRN15-10 PUMP COMPLETE WITH 20HP	8 WEEKS

		10	MOTOR	
1115.315-2ASS	1	CRN15	SHAFT SEAL, KUBE	1 WEEK
1115.315-3	1	CRN15-8	CRN15-8 PUMP COMPLETE WITH 15HP MOTOR	8 WEEKS
1115.315-3ASS	1	CRN15	SHAFT SEAL, KUBE	1 WEEK
1115.315-4	1	2"	CHECK VALVE	4 WEEKS
1115.315-9	1	1/4"	PRESSURE GAUGE, 0-400 PSIG	3 WEEKS
1115.315-8	1	1/4"	PRESSURE GAUGE, 0-100 PSIG	3 WEEKS

Venturi Tube Assembly (Ref. Drwg. C545-1115)

Part No.	Qty	Size	Part Description	
1115.545-0	1	4"	VENTURI TUBE ASSEMBLY COMPLETE, WITHOUT THROAT NOZZLE	4-5 WEEKS
1115.545-1	9	1/4"	SPRAY NOZZLE, SM10-170FHC, 316-SS	5 WEEKS
1115.545-6A	2	4"	REPLACEMENT GASKET, MORRIS CLAMP, SS	2 WEEKS

Mist Eliminator

Part No.	Qty.	Size	Part Description	Delivery
1115.565-1	1	96" Ø	REPLACEMENT MESH PAD MIST ELIMINATOR COMPLETE, CONSISTS OF QTY. 12 SECTIONS	4-5 WEEKS

APPENDIX B

Operational and Maintenance Checklists

HEARTH TEMPERATURES

CHECK SCUBBER CHART AND TRENDING

SHUT DOWN OPERATIONS IF NOT RECORDING DATA

ALTERNATE ASH PUMPS WEEKLY

Date		1	2	3	4	5	6	7	8	9	10	TEMPERATURE		SCRUBBER		I.D.	SCRUBBER						BURNERS											TORQUE	THC ppm	Initial		
<6.75t/24hr												CS	Combustion	DRAFT	PRES	FAN %	619	648	642	Total Flow	P.H	B.H.															
	scale	tons											>1311/12hrs		>24.6"			<200	<95	<95	>755 /12hr	>6.5/3hrs	5,6,7	2	2	2	4	4	4	6	6	6	8	8	8	<100/month		Percent	Solids
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12	.													.	.	%					.																
13	.													.	.	%					.																
14	.													.	.	%					.																
	TOTAL TONS-				% SOLIDS-			POLY-				DRY/TON-				GAS READING 0600 -							GAS READING 1400-										TOTAL-			Percent	Solids
15	.													.	.	%					.																
16	.													.	.	%					.																
17	.													.	.	%					.																
18	.													.	.	%					.																
19	.													.	.	%					.																
20	.													.	.	%					.																
21	.													.	.	%					.																
22	.													.	.	%					.																
	TOTAL TONS-				% SOLIDS-			POLY-				DRY/TON-				GAS READING 1400-							GAS READING 2200-										TOTAL-				

Mid Lrg Gas

Mid Sm Gas

Mid Lrg

Sm

HEARTH TEMPERATURES | CHECK SCUBBER CHART AND TRENDING | ALTERNATE ASH PUMPS WEEKLY

SHUT DOWN OPERATIONS IF NOT RECORDING DATA

Date 6/15/22

			1	2	3	4	5	6	7	8	9	10	TEMPERATURE		SCRUBBER		I.D.	SCRUBBER						BURNERS										TORQUE	THC ppm	Initial	
			<6.75/24hr										CS	Combustion	DRAFT	PRES	FAN %	619	648	642	Total Flow	P.H	B.H.														
91.2	scale	tons												>1311/12hrs		>24.6"		<200	<95	<95	>755/12hr	>6.5/3hrs	5,6,7	2	2	2	4	4	4	6	6	6	8	8	8		<100/month		Percent Solids
23	96.2	5.0	843	1034	1040	1161	1525	1509	1360	911	293	133	243	1467	-.30	24.9	76.5%	143	76	73	900	6.3	5/6	Ø		Ø			43			100			7.1	52.1		
mid	101.3	10.1															%																					16.7%	
1	4.8	4.8	850	1029	1023	1396	1421	1465	1412	910	288	118	237	1430	-.30	25.0	76.5%	146	77	74	899	6.2	5/6	Ø		Ø			42			26			6.8	94.6		
2																	%																					17.1%	
3	15.1	5.2	865	1046	1029	1373	1402	1416	1399	913	272	122	238	1444	-.30	25.0	76.5%	146	77	74	901	6.3	5/6	Ø		2			100			79			7.1	44.7		
4																	%																					19.2%	17.8%
5	25.3	5.1	896	1110	1049	1488	1530	1513	1419	893	275	125	241	1443	-.30	24.9	76.5%	145	77	74	901	6.2	5/6	Ø		Ø			Ø			18			7.2	47.1		
6	30.1																%																					18.7%	

TOTAL TONS- 40.2 | % SOLIDS- 17.8% | POLY- 1428/1.4 | DRY/TON- 7.2 | GAS READING 2200- 388155 | GAS READING 0600- 388185 | TOTAL 30

																																							Percent Solids
7	34.8	4.6	378	1070	1036	1412	1403	1407	1397	909	287	121	234	1433	:30	24.9	76.5%	143	76	73	897	6.3	5/6	0		0			89			13			9.1	70	6.3	
(8)																	%																					12.74	17.7
(9)	44.0	5.5	860	1027	1041	1441	1477	1504	1429	924	296	116	241	1462	.30	24.6	76 %	143	73	72	944	6.3	5/6	6		0			0			100			7.5	58		10.99	17.0
(10)																	%																					13.02	18.0
11	55.1	5.5	876	1048	1034	1428	1466	1501	1468	983	307	121	241	1462	.30	24.9	76.5%	147	74	72	943	.	5/6	0		0			53			100			7.6	41			17.5
(12)			877	1059													%						0															14.83	16.8
13	66.3	5.5	877	1059	1037	1406	1400	1470	1440	817	244	121	244	1456	.30	25.0	76.5%	148	75	73	939	.	5/6	0		0			71			100			7.4	48			
14	71.7																%																							

TOTAL TONS- 41.8 | % SOLIDS- 17.5 | POLY- 17.7/1.7 | DRY/TON- 7.3 | GAS READING 0600 - 388185 | GAS READING 1400- 387221 | TOTAL 36

																																							Percent Solids
15	77.2	5.0	876	1065	1037	1553	1403	1420	1387	577	252	134	242	1457	-.29	25.1	76.5%	147	80	75	886	6.3	5/6	0		0			46			17			8	39		15.9	
16																	%																								
17	87.0	4.7	901	1109	1053	1416	1461	1447	1403	874	282	131	244	1437	-.3	24.9	76.5%	146	80	76	897	6.3	5/6	0		0			100			41			7	38			
18																	%																								
19	96.2	4.9	915	1113	1071	1431	1513	1485	1323	876	286	128	249	1444	-.3	24.8	76.5%	143	78	75	887	6.4	5/6	0		0			96			35			7	23			15.9
20																	%																					15.9		
21	106.0	4.8	944	1128	1071	1374	1403	1257	1307	874	281	137	245	1438	-.29	25.0	76.5%	145	80	75	880	6.3	5/6	0		1W			1W			1W			7	33			
22	110.8																%																								

TOTAL TONS- 38.9 | % SOLIDS- 15.9 | POLY- 1648/1.6 | DRY/TON- 6.2 | GAS READING 1400- 388221 | GAS READING 2200- 388260 TOTAL 39

Mid Lrg Gas 538807

Mid Sm Gas 324443

Mid Lrg 539036

Mid Sm 324470

17.1%

DATE		23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Blnd tank
	SLUDGE FLOW																									1 2 3
	GBT BELT SPEED																									1 2 3
	POLY PUMP #	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3
	GBT. TOP																									1 2 3
S	BELLOWS HEIGHT																									1 2 3
G	PLI																									1 2 3
B	BP BELT SPEED																									1 2 3
T	BELT PRES. TOP																									1 2 3
1	BELLOWS HEIGHT																									Days
2	PLI																									1 2 3
3	BP Bottom Pres.																									1 2 3
	BELLOWS HEIGHT																									1 2 3
	PLI																									1 2 3
	CAKE THICKNESS	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	1 2 3
																										1 2 3
	SLUDGE FLOW																									1 2 3
	GBT BELT SPEED																									1 2 3
	POLY PUMP #	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	Afternoon
S	GBT PRES. TOP																									1 2 3
G	BELLOWS HEIGHT																									1 2 3
B	PLI																									1 2 3
T	BELT SPEED																									1 2 3
1	BELT PRES. TOP																									1 2 3
2	BELLOWS HEIGHT																									1 2 3
3	PLI																									1 2 3
	BP Bottom Pres.																									1 2 3
	BELLOWS HEIGHT																									
	PLI																									
	CAKE THICKNESS	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	

Midnight

	POLY #1 Totalizer	POLY #2 Totalizer	POLY #3 Totalizer	
22:00				
Mid				
6:00				
total				

X

Days

	POLY #1 Totalizer	POLY #2 Totalizer	POLY #3 Totalizer	
6:00				
14:00				
total				

X

Afternoon

	POLY #1 Totalizer	POLY #2 Totalizer	POLY #3 Totalizer	
14:00				
22:00				
total				

X

Ferric Feed System

Pump Runnning: Mid - 1 2 3 ____% Day- 1 2 3 ____% Aft- 1 2 3 ____%

Ferric Flow Rate: Mid - ____ gpd Day ____gpd Aft - _____gpd

Check For Leaks

Month/ Week/Year:

CEMS Log
Incinerator / Scrubber Systems

Section:			A	B.1.	B.2.	B.3.	B.4.	B.5.	B.6.	B.7.	C	D	E	F
Operating			Dessicant	OIT 101	Atmo Seal	CAI 600	Ameteck 02 Wet	Gas Display	Ametek O2 dry	SCS 101	Alarms	THC	Gas Cylinders	Dryer
Condition		Name	purple?	~ 325F ?	10-13 psi?	THC	% O2, Cell Temp.	O2: 10-20PSI	% O2, Cell Temp.	Cool, Dry	Report!	10 to 100 ppm	>300psi?	purge
	Date / Time	Init.	System ok?	Power?	190-195F?	faults?	~650F, mV?	C-free 10-20psi	~650F, mV?	pos. read?		No Solids:<10 ppm	(in day light)	1x/week
Monday														
Tuesday														
Wednesday														
Thursday														
Friday														
Saturday														
Sunday														

Notes:

The system must be monitored and the readings recorded by Solids Process Operators on every shift when the Solids Process is running and before startup. The CEMS logs compliance data.

Notify Lead Operator and Engineer or Electricians immediately if readings fall outside the normal operating range. Verify any abnormal condition and take appropriate action.

Weekly (Weekend) - Maintenance Checklist

	DATE	DATE	DATE	DATE	DATE	DATE
First day Clean - Up						
Long Incline	**M**	**A**	**D**	**M**	**A**	**D**
Short Incline	**M**	**A**	**D**	**M**	**A**	**D**
Clean under Belt #3	**M**	**A**	**D**	**M**	**A**	**D**
Flush Trench behind Belt Presses	**M**	**A**	**D**	**M**	**A**	**D**
Steam Clean BP #	**D**	**M**	**A**	**D**	**M**	**A**
Clean push water screens polymer and ferric	**D**	**M**	**A**	**D**	**M**	**A**
Empty Trash in Solids Bldg	**D**	**M**	**A**	**D**	**M**	**A**
Clean Top of MHF + Penthouse	**A**	**D**	**M**	**A**	**D**	**M**
Check oil level Conveyor drives #3,#4,#6 30 WT Oil.	**A**	**D**	**M**	**A**	**D**	**M**
Steam Clean BP #	**A**	**D**	**M**	**A**	**D**	**M**
Second day Clean - Up						
Clean and Switch Screens for Venturi pumps, circle what side is in service on	**L R**	**L R**	**L R**	**L R**	**L R**	**L R**
Pump Skid (Main Floor of MHF)	**A**	**D**	**M**	**A**	**D**	**M**
Clean Scrubber Water Screens(MHF basemt.) or steam clean GBTs	**M**	**A: steam one GBT#**	**D**	**M: steam one GBT#**	**A**	**D: steam one GBT#**
Empty penthouse wheelbarrow - hose area	**D**	**M**	**A**	**D**	**M**	**A**
Ash hopper	**D**	**M**	**A**	**D**	**M**	**A**
Clean U.V system cone screen	D	**A**	**D**	**A**	**D**	**A**
Warm up MHF, do NOT fill BTs yet (for MIDs)	**A**	**A**	**A**	**A**	**A**	**A**
Fill and mix Polymer Tanks	**A**	**A**	**A**	**A**	**A**	**A**
Ensure BFP/ Scrubber/ OCS fan is ready	**A**	**A**	**A**	**A**	**A**	**A**
Check water softener, add salt (# of bags)	**A ( )**	**M ( )**	**D ( )**	**A ( )**	**M ( )**	**D ( )**
All Shifts Dewater Storage Tanks						
Tighten chicanes on GBT's	**D**	**A**	**M**	**D**	**A**	**M**
Grease ID fan bearings (2) - 2 x w. black grease gun (shows ID fan bearings) **every 2 weeks**	**D**	**A**	**M**	**D**	**A**	**M**