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DTE

VIA PRIORITY MAIL

May 4, 2023

Mr. Brian Carley
Michigan Department of Environment, Great Lakes, and Energy
Air Quality Division
301 East Louis Glick Highway
Jackson, MI 49201

Re: **Monroe Power Plant – Units 1, 2, 3 and 4 Control Devices Malfunction Abatement Plan/Start-up Shutdown Plan, Control of Fugitive Dust, and Units 1, 2, 3 and 4 Mercury Control Devices Malfunction Abatement Plan**

Dear Mr. Carley:

Enclosed you will find revisions of the malfunction abatement plans (MAPs) for the following-

- Units 1, 2, 3 and 4 Control Devices Malfunction Abatement Plan/Start-up Shutdown Plan;
- Control of Fugitive Dust; and
- Units 1, 2, 3 and 4 Mercury Control Devices Malfunction Abatement Plan

These MAPs remain in the format of the plant orders used at Monroe Power Plant and have been approved by plant management.

Should you desire further information or if you have questions, please contact me at (734) 384-2259 or via email at elise.ciak@dteenergy.com.

Sincerely,

Elise Ciak
Environmental Engineer
Environmental Management & Safety
DTE Energy Corporate Services, LLC

Cc: B. Marietta
D. Casey
I. Fadanelli
G. Chilson
File

1.0 PURPOSE

This Malfunction Abatement Plan (MAP) has been prepared to meet the requirements of EPA Administrative Consent Order (ACO), EPA-5-2018-113(a) and the ROP. The ACO and ROP require Monroe Power Plant to ***"...operating and maintaining the process monitors in accordance with an approved malfunction abatement plan and operating the halogenated compound application system when the mercury process monitor demonstrates elevated mercury emissions, and as otherwise needed for mercury emissions control in accordance with an approved malfunction abatement plan."*** This Malfunction Abatement Plan has been prepared by DTE Electric Company in accordance with Rule 336.1201, Act 451 324.5503(b), EPA-5-2018-113(a)-MI-07 paragraph 16 and 17.

2.0 DESCRIPTION OF SYSTEM

2.1 Ohio Lumex 915J Mercury Process Monitors

Monroe Units 1, 2, 3 and 4 are equipped with Ohio Lumex 915J Mercury Process Monitors. The Ohio Lumex Mercury Process Monitor 915J is designed for the continuous emissions measurement of the mass concentration of Total and Elemental mercury in process (stack) gases. The 915J Mercury Process Monitors are located within each unit's stack.

Stack gas is withdrawn from the stack via heated dilution probe. The probe is attached to a pipe flange. The vacuum in the probe is created by a bypass eductor (attached to the heated filter block) with a motive air pressure set from 10-20 PSI. The bypass flow in the probe is from 0.5 - 5 LPM and it is discharged back into the stack after passing through a 2-micron filter which is heated from 180°C – 220°C. A small portion of filtered bypass flow is withdrawn by a sample dilution eductor and pulled through a critical orifice which is sized to give a dilution ratio between 30:1 and 200:1. The dilution motive air is filtered, dried and scrubbed of all mercury. The sample dilution eductor works at 50-70 PSI pressure and creates a vacuum from 15-23 inches of mercury downstream from the critical orifice. The diluted sample gas enters a converter where all mercury species are thermally (750°C) reduced to elemental mercury allowing the analyzer (which analyses only elemental mercury) to measure the Total Mercury concentration in the gas. Using a three-way valve (V5) the system can bypass the thermal converter and scrub all oxidized species of mercury from the gas allowing the analyzer to detect the Elemental Mercury concentration in the gas. Thus, mercury speciation is possible by alternating the speciating valve (controlled by software). The analyzer uses a multipath optical cell, which is kept at a temperature above the dew point of the measured gas. In this cell, which has an optical path length of ±10 meters, a spectrometer determines the mercury concentration by Zeeman atomic absorption spectrometry using high frequency modulated polarized light (ZAAS-HFM). This eliminates all interferences related to SO2, NOx, etc.

The 915J Mercury Process Monitors operate in Total Mercury mode. Once per day a complete auto-calibration is run on the system and automatic corrections are made for drift.

Periodic Inspection/Task Checklist

Revised 10/04/2016

OHIO LUMEX

915-J Mercury Process Monitor Maintenance Schedule

	Probe & Umbilical Line	Head	Console	Enclosure
3-8 Weeks		For Inlet Locations Only: Replace scrubber cartridge (frequency of replacement depends on flue gas conditions) MT-057, MT-057R		
Quarterly	Replace or clean probe insert MT-047, MT-047S	Check for proper heating of all components	Check for proper heating	Check for proper heating & cooling
	Check probe and umbilical line for proper heating	Replace total scrubber (may be bi-annually depending on flue gas conditions) MT-001		Inspect and clean air conditioner filter (rinse with soapy water and vacuum excess water before reinstalling)
		Replace elemental scrubber (may be bi-annually depending on flue gas conditions) MT-002		Inspect and clean air conditioner condensate management system (pan, drain nipple, tubing)
		Clean and sonicate titanium filter MT-010		Clean air conditioner cabinet
		Clean filter housing & lid assembly MT-035, MT-009		
		Inspect Viton O-rings in filter lid assembly MT-004		
		Inspect Teflon lines and replace if discolored or damaged. If any line from speciation valve is discolored, clean valve. MT-030		
Semi-Annually	Clean probe (if not using disposable inserts) MT-009		Replace pre-analyzer scrubber MT-005	Replace air conditioner filter MT-059
				Replace air system filter elements MT-041 (x2)
Annually		Inspect Viton gaskets & replace if needed (in dilution block & bypass block) MT-024, MT-025	Inspect air/sample lines - replace if discolored	Inspect air dryers: check cycle timer, desiccant towers, solenoid valves, purge mufflers, and filters
		Inspect Teflon lines and replace if discolored or damaged. If any line from speciation valve is discolored, clean valve. MT-030	Replace zero mercury filter MT-003	Replace air system filter elements MT-014, MT-015
		Inspect Viton gasket between probe and head MT-016	Replace pre-analyzer particulate filter MT-037	
Biennially	Flush heated sample line (if needed) MT-028		Inspect and perform routine maintenace to spectrometer (must be done at Ohio Lumex facility)	Replace air dryer solenoid valves MT-013
			Inspect and re-certify Hg calibration cell (replace if needed). Replace pre-calibration cell Hg filter. (must be done at Ohio Lumex facility or by Ohio Lumex technician)	
			Replace mercury lamp (must be done at Ohio Lumex facility)	
Every 5 Years				Replace or repack air dryer desiccant towers MT-012
				Replace air dryer check ball, check spring, and o-rings MT-013

Note: This is a generic maintenance schedule. Actual required maintenance may vary based on the site-specific flue gas conditions.

5.2 If a malfunction or failure occurs with the Potassium Iodide Distribution System that cannot be corrected by an operator, then a DTE Electric Co. service request must be entered into the work management system MAXIMO. Then an operating and maintenance work order will be issued to repair the system.

5.3 Procedures for notification of regulatory agencies during a malfunction or excess emissions event are described in Power Plant Order (PPO) 223.

6.0 REVISION HISTORY

Revision No.	Reviewed by:	Changes
0		New EV- incorporated from ACO, EPA-5-2018-113(a) and PTI 27-13C.
1	E. Ciak	Removed the reference to REF. Replaced the Backup Mersorb system with the Potassium Iodide and updated personnel

1.0 Purpose

This Malfunction Abatement Plan (MAP) has been prepared to meet the requirements of the air permits issued by the State of Michigan for steam generator fuel burning and control equipment (Units 1, 2, 3 & 4) at the Monroe Power Plant. These permits require Monroe Power Plant to "***...implement and maintain a malfunction abatement/preventative maintenance program approval by the AQD.***" This Malfunction Abatement Plan and Start-up/Shutdown Plan has been prepared by DTE Electric Company in accordance with Rule 911 of the Michigan Air Pollution Act (Part 55 of Michigan Act 451).

2.0 Scope

Unit 1 consists of a Babcock and Wilcox super-critical boiler and a General Electric turbine and is rated at approximately 817 MW (gross). Unit 2 consists of a Babcock and Wilcox super-critical boiler and a Siemens-Westinghouse turbine and is rated at approximately 823 MW (gross). Unit 3 consists of a Babcock and Wilcox super-critical boiler and a Siemens-Westinghouse turbine and is rated at approximately 823 MW (gross). Unit 4 consists of a Babcock and Wilcox super-critical boiler and a General Electric turbine and is rated at approximately 817 MW (gross). Each boiler typically burns coal at full load at a rate of about 350 tons/hour. Fuel oil is sometimes used to supplement coal during start-up, boiler upset, over fire and emission reduction situations. Each unit is equipped with emission control equipment including a selective catalytic reduction system [SCR], an electrostatic precipitator [ESP] and a wet flue gas desulfurization system [FGD].

Monroe Units 1, 2, 3, and 4 typically utilize coal treated with halogenated compounds to aid in compliance with mercury emission limits and regulations. The halogenated compound is applied to all coal burned in each unit. Each of the Monroe boilers also uses low NO_x burners to lower NO_x emissions from the boiler. The Monroe Units are pulverized coal-fired boilers which employ cell burners. Cell burners were originally designed to combine two circular burners into close-coupled, vertically stacked assembly that operates as a single unit. Cell burners achieve very high combustion efficiencies, but also produce relatively high levels of NO_x. Each boiler has 14 cell burners with 2 burners per cell on the front wall and 14 cell burners on the back wall for a total of 28 cell burners per boiler. To reduce NO_x emissions, DTE Electric Company replaced the cell burners with "first generation" low NO_x cell burners (LNCB) in the mid-1990's. In the LNCB systems, all of the coal is supplied to one burner with a portion of the secondary combustion air. The remaining combustion air is supplied to the second burner. The LNCB arrangement stages combustion and reduces NO_x emissions on these units from about 1.1 lb/mmBTU to about 0.6 lb/mmBTU.

Monroe Units 1, 2, 3 and 4 also use Selective Catalytic Reduction (SCR) as a post combustion NOx control system that can substantially reduce NOx emissions from coal-fired utility boilers. SCR systems consist of an ammonia (NH3) injection system and a catalytic reactor. Urea is decomposed in an external heat exchanger to form ammonia for use in an SCR. The ammonia injection grid is located upstream of the catalyst. Ammonia reacts with NOx and O2 in the presence of the catalyst to form molecular nitrogen (N2) and water according to the following general equations:

$$4NH_3 + 4NO + O_2 \rightarrow 4N_2 + 6H_2O$$
$$4NH_3 + 2NO_2 + O_2 \rightarrow 3N_2 + 6H_2O$$
$$2NH_3 + NO + NO_2 \rightarrow 2N_2 + 3H_2O$$

The Plant Manager along with the Performance Manager and Production Manager are responsible for overseeing the inspection, maintenance, and repair of all pollution control devices. The Shift Supervisor is responsible for the day-to-day operations of the precipitators at the plant, and is management's representative during off-hours (i.e. nights and weekends) when the plant management is not on site. The Environmental Engineer is responsible for advising the operators on response to environmental regulations.

Critical phone numbers are as follows:

Plant Director	(734) 384-2201
Plant Manager	(734) 384-2203
Shift Supervisor	(734) 384-2235
Environmental Engineer	(734) 384-2259

3.2 Continuous Monitoring

3.2.1 Monitor Stack CO and NOx as indicators of Low NOx Burner performance as well as SCR performance (limits 0.15 lb/mmBTU CO (30-day rolling avg),0.08 lb/mmBTU NOx (12-month rolling avg), and (0.09 lb/mmBTU NOx (30-day rolling avg)).

3.2.2 Monitor SO2 emissions as indicators of FGD performance (Limit 0.107 lb/mmBTU (24-hr rolling avg)).

3.2.3 Monitor PM emissions via PM CEMS as indicators of FGD performance (Limit 0.011 lb/mmBTU (24-hr rolling avg)).

3.2.4 Monitor duct opacity as a leading indicator of poor ESP performance that could impact the SCR or FGD systems.

3.2.5 Monitor the alarm panel in the control room for an indication of failed or troubled conditions.

3.2.6 Review daily report on gypsum chemistry (issued every business day of operation) as a leading indicator of poor FGD system performance.

3.2.6 Monitor absorber pH as indicators of FGD performance. (An acidic value could indicate poor limestone injection rates.)

3.2.7 Monitor absorber ORP (oxidation reduction potential) as indicators of FGD performance. (High or fluctuating values could indicate poor FGD performance.)

3.2.8 Monitor slurry control valves left in manual (fixed flow rate). Alarm will sound if SO2 outlet becomes elevated (above 0.080 lb/mmBTU) while the slurry control valves are in manual. This indicates that the fixed flow rate is not effectively limiting SO2 outlet.

3.3 Inspections

Operations personnel inspect all the air pollution control systems daily and monitor their performance using the continuous emissions monitoring system (CEMS) as well as the plant digital control system (DCS). The following preventative maintenance items are inspected as scheduled:

Daily Inspection Checklist

System		Checklist Requirement		Responsible Department

- Inspect power feeds, rappers, anti-sway insulators, corona shields, precipitator duct work, perforated plates, collector plates, wire racks, supports and other internals for soundness, making repairs as necessary. (ESP – completed by Engineering)
- Inspect burners for wear and damage to the burner components. Replace burner parts and assemblies as necessary. (LNB – completed by Maintenance)
- Complete Absorber Tank inspection, making repairs as necessary. (FGD – completed by EMJs)
- Inspect mist eliminators for plugging. (FGD – completed by EMJs)
- Perform mist eliminator spray functional test for plugged/broken nozzles and headers (FGD – completed by Engineering)
- Inspect and clean mist eliminator trays for plugging (FGD – completed by Engineering)
- Inspect and clean base of stack and stack drains – (FGD – completed by Engineering)
- Inspect Absorber Recirculation system for damaged pumps, plugged headers and nozzles. Repair or replace as necessary (FGD – completed by EMJs)
- Inspect nozzles and headers, making repairs or replacements as necessary. (SCR – completed by EMJs)
- Inspect and clean LPA screens and or back-passes. Repair as necessary. (SCR – completed by Maintenance)
- Institute a catalyst management program that includes repair and replacement based on a schedule and periodic testing. Testing will be compared to specifications designed to ensure proper operation. (SCR – completed by Engineering)
- Inspect screens, inlet duct mixers, rectifier and catalyst for ash build-up. (SCR – completed by Maintenance)

Replacement Parts

DTE Electric Company stocks parts necessary for routine maintenance and common replacements for these systems. If necessary, parts for more involved repairs or replacements for the systems are available on a quick turnaround basis from the vendor.

MONITORING REQUIREMENTS:

All emission limits are programmed into the CEMS DAHS system and are monitored continuously by plant operations. Alarms must be acknowledged, and a reason code and corrective action must be determined and recorded. The best guide as to whether the emissions controls are operating properly is a review of the emissions. With few exceptions, emission controls cannot be bypassed, though in some cases, continued controlled operation of the boiler will result in lower emissions than an immediate shutdown if emissions are above limits. In addition, troubleshooting excess emissions is much easier while the unit is in operation. In a case where excess emissions are recorded, a root cause and preventive action will be identified (if possible) and this document will be updated.

PM emissions are monitored via PM CEMS. Per the plant's air permit, should the PM CEMS be out of control based on the results of quality assurance tests these alternative monitoring measures shall be taken:

- A certified or non-certified visible emissions (VE) reader shall take VE readings during routine operating conditions by taking 6-minute VE readings at a minimum of once per calendar day the boiler is operating.
- If the VE are observed, 6-minute VE readings using Method 22 shall be performed once every 30 minutes until emissions are no longer visible or until emissions have been observed for more than two hours.
- If visible emissions have been observed for more than two hours, a certified VE reader shall determine the opacity using Federal Reference Test Method 9. A certified reader may be available on site. If a certified reader is not available on site, one will be brought in from the Environmental Management & Safety stack testing group.

will be updated as necessary to address operating circumstances that will be regularly encountered at the plant or after equipment changes.

All of the sampling measures undertaken are aimed at assessing the health and effectiveness of the catalyst in the SCR. Some issues can be dealt with at the plant such as performing tuning on the SCR or attempting to clear some of the pluggage. Should the effectiveness of the catalyst be to such a point that it is no longer producing the expected NO_x reduction, the catalyst will be replaced at the next opportunity. This testing is analyzed by subject-matter experts to assess the catalyst effectiveness against the forecast. Catalyst changes are made based on the forecast and adjusted as necessary using the effectiveness assessments and performance analysis.

5.0 REVISION HISTORY

Revision No.	Reviewed by:	Changes
0		New EV- incorporated from OI-170-05.
1		Incorporates changes from Permit 93-09A, included provision for alternate stack testing.
2	B. Marietta	Updated to better reflect current practices and PTI 93-09B
3	B. Marietta	Included additional information on catalyst management & effectiveness assessment.
4	B. Marietta	Catalyst management removed, catalyst management plan developed as a separate document.
5	K. Johnson	Added REF, added Unit 1 FGD System, added reference to PTI 27-13 (replaced 93-09B)
6	K. Johnson	Added Unit 2 FGD references, added FGD Absorber Recirculating System section and specific corrective actions
7	B. Marietta	Added information related to PM CEMS monitoring and actions to take in the event of failed QA testing.
8	E. Starbuck	Added information related to Absorber pH and ORP as methods of monitoring SO2 emissions.
9	A. Kosch	Removed references to SO3 system as SO3 tanks are being removed. SO3 is not required for emission control.
10	A. Thomas	Updated critical phone numbers, added NSR Settlement NOx 30-day rolling avg, added additional maintenance procedures to the forced outage and planned outage activities, replaced Smart Signal Sentinel with PI server data as a means to monitor FGD Absorber Recirculating System, and replaced Environmental Management and Resources with Environmental Management and Safety.
11	A. Thomas	Added information about the slurry control valve alarm.
12	E. Ciak	Removal of REF system and updated personnel

1.0 Purpose

The purpose of this order is to specify the requirements and to assign responsibility for fugitive dust control and reporting procedures at Monroe Power Plant. Per the ROP, the following emission units are required to implement a program for continuous fugitive dust control for material handling operations: coal handling activity in the Cascades room, coal handling activity in the Transfer Houses, coal handling activity in the Dumper House, coal handling activity in the Crusher House, coal unloading activities from Great Lakes ships and includes storage and pile maintenance, petroleum coke handling activity, limestone and limestone slurry handling activities, gypsum handling activity, storage and handling of hydrated lime, and fly ash storage facility.

2.0 Scope

This order applies to all potential sources of fugitive dust, including roads and lots, open areas, storage piles, construction, demolition, material handling operations, including vessel unloading, and rail and vehicle traffic at the site.

3.0 Definitions

Fugitive Dust – Particulate matter which is generated from indoor processes, activities, or operations, and which is emitted in the outer air through building openings and general exhaust ventilation, except stacks. The term also means particulate matter which is emitted into the outer air from outdoor processes, activities, or operations due to forces of the wind or humans' activities.

Uncontrolled Fugitive Dust – Emissions that would occur prior to the application of any emission control devices or measures.

4.0 Requirements

Section 5524 of MI Public Act 451, as amended, requires that fugitive dust be controlled so that any fugitive dust source regulated under this section shall not cause or allow the emission of fugitive dust from any road, lot, or storage pile, including any material handling activity at a storage pile, that has an opacity greater than 5%, or from any other fugitive dust source that has an opacity greater than 20%. Opacity is determined by Observation Method 9(d), as performed by a Qualified Observer. The rule, further, requires that each facility significantly reduce uncontrolled fugitive dust emissions by application of reasonably available control technology.

6.2.2 All unpaved roads shall be sprayed with suppressants as needed. Unpaved roads are typically treated with *Dustabate* dust suppressant solution.

6.2.3 Unpaved lots shall be sprayed with suppressants at a rate and intensity equivalent to unpaved roads.

6.2.4 Additional control measures shall be taken as necessary to control fugitive dust emissions. Water sprays are to be used on unpaved surfaces as needed between dust suppressant applications.

6.3 Exposed Areas and Storage Piles

This will apply to all storage piles and other material piles as they are developed, as well as unpaved and paved surfaces surrounding these areas.

6.3.1 The following shall be utilized:

1. All storage piles (inactive piles) shall be configured and sealed with dust suppressant as necessary to minimize fugitive dust emissions.

2. To maintain a surface-moisture content on coal piles, they shall be watered daily by use of the plant's water spray system and/or the plant's water wagon when freezing conditions are not present, AND expected rainfall for the day is less than 0.01 inch. The spray system includes 16 water cannons. This system is designed to deliver 600 gpm at 200 psi. Each cannon will be operated for no less than two minutes per day. This will result in an average daily equivalent of rainfall on the coal piles which level agrees with EPA's consultants' recommended level of rainfall necessary to preclude fugitive emissions.

3. If operator observation indicates a potential for generation of dust, water trucks will be utilized outside the winter months on the storage piles as practical to control fugitive dust.

4. All mobile equipment exhaust shall be directed upward, to preclude creation of fugitive dust by blowing exhaust gas into or across dust-containing materials (e.g., coal, PetCoke, limestone, fly ash, etc.)

5. All excessive spillage around the perimeter of transfer houses will be removed within 48 hours.

6. The On-site fly ash basin filled areas and other open areas will be controlled by vegetation. On-site driving surfaces will be sprayed with dust suppressant as described in 6.2.3, above.

7. The dry fly ash handling facility shall also be treated with water and a dust suppressant solution as described in 6.2.3, above. If any fugitive dust is identified from dry fly ash handling processes, then either a Method 9 will be performed, or the equipment will be shut down.

8. The CCR Transfer pad will utilize dust bosses when freezing conditions do not exist.

Emission observations are conducted once a week during operation as outlined in permit to install 114-20.

6.5 Construction Activities

6.5.1 Roads and vehicle staging, turning and loading areas that are formed of compacted granular material (e.g., ash, sand, limestone, etc.) shall be observed daily by Project Managers, or their delegate, in light of expected traffic load, weather conditions and road surface.

6.5.2 Project Managers, or their delegate, shall request dust suppressant measures from Fuel Systems, as appropriate, consistent with 6.2 and 6.3 above.

6.5.4 Concrete generated from demolition work may be kept on site for reuse. Concrete may be crushed to different sizes for various applications. This process may be performed by a vendor with a portable concrete crushing operation. Should an outside party be brought on site to perform such a task, the party must have a valid air permit for the operation performed. The vendor and all associated subcontractors, if applicable, must follow all provisions of that air permit as well as all air permits for Monroe Power Plant and this plan. Dust must be controlled using methods including, but not limited to water sprays & enclosures.

6.6 Reporting Procedures

6.6.1 Documentation logs of all activities specified under Sec. 6, Control Procedures of this Order shall be readily accessible at the Plant for a period of five (5) years.

6.6.2 The documentation shall be entered onto a Daily Shift Log in an online database by Fuel Systems or Plant Operations.

6.6.3 An entry will be made in the Daily Shift Log in an online database for each control activity specified in Sec. 6, Control Procedures. Any additional control measures taken on a given day will also be documented.

8.0 Revision History

	Revision No.	Reviewed by:	Changes
			Original Document
	0		Revised to update controls
	1		Updated to include electronic log
	2		Updated to include new permit requirements
	3		Updated to include stack demo requirements (6.5.3)
	4		Updated 6.4.7 & 6.4.9 to include requirements of new air permits (Permit-to-Install 93-09A). Updated 6.5.3 to include activities related to upcoming demolition of the old 3-4 stack.