FINAL REPORT

ZFS ITHACA, LLC.

ITHACA, MICHIGAN

SOURCE TESTING REPORT: EUSHIPRECEIVE FILTERABLE PARTICULATE MATTER TESTING

RWDI #2307109

January 2, 2024

SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI USA LLC (RWDI) was retained by ZFS Ithaca, LLC (ZFS) to complete the emission sampling program at the ZFS facility located at 1266 E Washington Road, Ithaca, Michigan. The testing program included the evaluation of filterable particulate matter (PM) from the EUSHIPRECEIVE under Flexible Group FGHANDLING. The source testing was completed to satisfy requirements of Michigan Department of Environment, Great Lakes, and Energy (EGLE) PTI 20-17F.

The test program was completed on November 9, 2023 at the Ithaca facility.

Executive Table i: Results Summary

Source		Concentration & Emission Rate				
	Unit	Run 1	Run 2	Run 3	Average	Limit
EUSHIPRECEIVE	Filterable Particulate Matter (lb/hr)	0.28	0.06	0.05	**0.13**	*N/A*
	Filterable Particulate Matter (gr./dscf) 2023 Testing Event	0.0007	0.0002	0.0001	**0.0003**	*0.01*
	Filterable Particulate Matter (lb/1000lb wet stack gas) 2023 Testing Event	0.0013	0.0003	0.0002	**0.0006**	*N/A*
	Filterable Particulate Matter (lb/1000lb wet stack gas) 2020 Testing Event	0.0013	0.0005	0.0006	**0.0008**	*N/A*
	Filterable Particulate Matter (lb/1000lb wet stack gas) 2023 & 2020 Testing Event	0.0026	0.0008	0.0008	**0.0014**	*0.10*

All measured levels for EUSHIPRECEIVE were less than their respective Limits outlined in the PTI. As per the PTI requirements and as confirmed with EGLE, the filterable particulate matter results (lb /1000 lb of wet stack gas) were combined with the EUSHIPRECEIVE results from the 2020 testing program to compare to the PTI Limit.

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1 INTRODUCTION

RWDI USA LLC (RWDI) was retained by ZFS Ithaca, LLC (ZFS) to complete the emission sampling program at the ZFS facility located at 1266 E Washington Road, Ithaca, Michigan. The testing program included the evaluation of filterable particulate matter (PM) from the EUSHIPRECEIVE source under Flexible Group FGHANDLING. The source testing was completed to satisfy requirements of Michigan Department of Environment, Great Lakes, and Energy (EGLE) PTI 20-17F.

1.1 Location and Dates of Testing

The test program was completed on November 9, 2023 at the Ithaca facility.

1.2 Description of Source

Grain receiving operations. Only the newly installed pit (#2) was in operation during the test.

1.3 Personnel Involved in Testing

Table 1.3.1: Testing Personnel

Brandon LaRosa Environmental Engineer BrandonL@zfsinc.com	**ZFS Ithaca, LLC** 1266 E. Washington Road Ithaca, MI 48847	(616) 879-1715
Kimberly James EHS Manager kimberly.james@zfsithaca.com		(989) 449-6105
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Trevor Drost Environmental Quality Analyst drostt@michigan.gov	**EGLE** Cadillac Place, Suite 2-300 3058 West Grand Blvd. Detroit, MI 48202	(517) 245-5781
Steve Smith Project Manager Steve.Smith@rwdi.com	**RWDI USA LLC** 2239 Star Court Rochester Hills, MI 48309	(734) 751-9701
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Cade Smith Field Technician Cade.Smith@rwdi.com		

2 SUMMARY OF RESULTS

2.1 Operating Data

Process data includes the following:

- Grain received in tons/hr per test run;
- Pressure drop on the baghouse every 15 minutes per test run;
- Gallons of oil application per test run; and
- Number of trucks unloaded during each test run.

All process data can be found in **Appendix A**:

2.2 Applicable Permit Number

The testing was required per Michigan EGLE Permit to Install PTI 20-17F.

3 SOURCE DESCRIPTION

3.1 Description of Process and Emission Control Equipment

EUSHIPRECEIVE covers grain shipping and receiving operations which are subject to NSPS DD for Grain Elevators. Emissions are controlled by a baghouse and a soybean oil application system. The testing was completed while only the newly installed receiving pit (Pit 2) was in operation.

3.2 Process Flow Sheet or Diagram

Stack figures with dimensions, upstream and downstream distances, and point selection can be found in the **Figures** section. A process diagram can be made available upon request.

3.3 Type and Quantity of Raw and Finished Materials

Raw materials include soybeans. The quantity of soybeans can be found in Appendix A.

3.4 Rated Capacity and Efficiency

EUSHIPRECEIVE has a maximum capacity of approximately 54,000,000 Bu/yr. During the testing, the source received an average of approximately 439 tons per hour. This is representative of normal operation at the time of testing.

3.5 Process Instrumentation Monitored During the Test

There are no monitoring processes in place for the tested sources.

3.6 Maintenance on Equipment in Last Three Months

Only routine maintenance per the Preventative Maintenance Plan has been conducted.

4 SAMPLING AND ANALYTICAL PROCEDURES

The emission test program utilized the following test methods codified at Title 40, Part 60, Appendix A of the Code of Federal Regulations (40 CFR 60, Appendix A)

- Method 1 – Sample and Velocity Traverses for Stationary Sources
- Method 2 – Determination of Stack Gas Velocity and Volumetric Flowrate
- Method 3 – Determination of Molecular Weight of Dry Stack Gases
- Method 4 – Determination of Moisture Content in Stack Gases
- Method 5 – Determination of Particulate Matter from Stationary Sources

4.1 Stack Velocity, Temperature, and Volumetric Flow Rate

The exhaust velocities and flow rates were determined following U.S. EPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)". Velocity measurements were taken with a pre-calibrated S-Type pitot tube and incline manometer or digital manometer. Volumetric flow rates were determined following the equal area method as outlined in U.S. EPA Method 2. Temperature measurements were made simultaneously with the velocity measurements and were conducted using a chromel-alumel type "k" thermocouple in conjunction with a calibrated digital temperature indicator. A cyclonic flow check was performed.

The dry molecular weight of the stack gas was determined following calculations outlined in U.S. EPA Method 3, "Gas Analysis for the Determination of Dry Molecular Weight" using a Fyrite.

Stack moisture content was determined through direct condensation and according to U.S. EPA Method 4, "Determination of Moisture Content of Stack Gases" and was done along with the particulate matter testing.

4.2 Particulate Matter

For USEPA Method 5, the particulate matter was withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature of 120 ±14 °C (248 ±25 °F). The PM mass, which includes any material that condenses at or above the filtration temperature, was determined gravimetrically after the removal of uncombined water. The sampling train consisted of the following: nozzle (stainless steel or glass), probe liner (borosilicate or quartz) with heating system, glass fiber filter, modified GS impinger with 100 ml of water, standard GS impinger with 100 ml of water, empty modified GS impinger, silica gel impinger, and the metering system. At the end of each test a leak check was performed. The filter and probe/nozzle acetone rinses were analyzed gravimetrically at RWDI's laboratory in Rochester Hills, Michigan.

4.3 Description of Recovery and Analytical Procedures

All sample procedures followed the prescribed methods of USEPA Method 1, 2, 3, 4, & 5.

4.4 Sampling Port Description

All sampling ports meet USEPA Method 1 locations and can be found in the **Figures** Section.

5 TEST RESULTS AND DISCUSSION

5.1 Detailed Results

Detailed results for filterable particulate matter are provided in **Appendix B**.

Table 5.1.1: Results Summary

Source		Concentration & Emission Rate				
	Unit	Run 1	Run 2	Run 3	Average	Limit
EUSHIPRECEIVE	Filterable Particulate Matter (lb/hr)	0.28	0.06	0.05	**0.13**	*N/A*
	Filterable Particulate Matter (gr./dscf) 2023 Testing Event	0.0007	0.0002	0.0001	**0.0003**	*0.01*
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	Filterable Particulate Matter (lb/1000lb wet stack gas) 2023 & 2020 Testing Event	0.0026	0.0008	0.0008	**0.0014**	*0.10*

All measured levels for EUSHIPRECEIVE were less than their respective limits outlined in the PTI. As per the PTI requirements and as confirmed with EGLE, the filterable particulate matter results (lb/1000 lb of wet stack gas) were combined with the EUSHIPRECEIVE results from the 2020 testing program to compare to the PTI Limit with all three pits in operation.

The detailed results can be found in the following Appendix:

- **Appendix B –** Particulate Matter
- **Appendix C –** Field Notes

5.2 Variations in Testing Procedures

There were no variations in planned testing procedures.

5.3 Process Upset Conditions During Testing

ZFS representatives were monitoring the process during testing to ensure that the process was operating under normal conditions.

5.4 Audit Samples

This test did not require any audit samples.

5.5 Process Data

Process data can be found in **Appendix A.**

5.6 Particulate, Flows and Moisture

Results can be found in **Appendix B**.

5.7 Field Data Sheets

Results can be found in **Appendix C**.

5.8 Calibration Data

Calibration can be found in **Appendix D**.

5.9 Laboratory Data

Laboratory data can be found in **Appendix E**. Filterable particulate matter was analyzed gravimetrically in RWDI's laboratory.

5.10 Example Calculations

Example calculations can be found in **Appendix F**

5.11 Source Testing Plan and Approval Letter

Copies of the Source Testing Plan, Approval Letter from EGLE and communication on PTI limit comparison can be found in **Appendix G**.

TABLES

Table 1: Summary of Sampling Parameters and Methodology

Source Location	No. of Tests per Stack	Sampling Parameter	Sampling Method
EUSHIPRECEIVE	3	Velocity, Temperature, and Flow Rate	U.S. EPA [1] Methods 1, 2, and 4
	3	PM / PM_{10} / $PM_{2.5}$	U.S. EPA [1] Method 5
	3	Oxygen / Carbon Dioxide	U.S. EPA [1] Method 3

Notes:

[1] U.S. EPA - United States Environmental Protection Agency

Table 2: Sampling Summary and Sample Log

Source and Test #	Sampling Date	Start Time	End Time	Filter ID / Tank ID
EUSHIPRECEIVE				
Blank	9-Nov-23	--	--	A-376
Test #1	9-Nov-23	7:24 AM	8:27 AM	A-379
Test #2	9-Nov-23	8:53 AM	9:55 AM	A-384
Test #3	9-Nov-23	10:22 AM	11:25 AM	A-378

Table 3: Sampling Summary - Flow Characteristics - EUSHIPRECEIVE

Stack Gas Parameter	Unit	Test No. 1	Test No. 2	Test No. 3	Average
Testing Date		9-Nov-23	9-Nov-23	9-Nov-23	
Stack Temperature	°F	51	51	54	52
Moisture	%	1.1%	1.2%	1.2%	1.2%
Velocity	ft/s	51.0	52.4	52.0	51.8
Referenced Flow Rate	CFM	47,784	48,989	48,341	48,372
Sampling Isokinetic Rate	%	100.3	101.4	100.9	100.9

Notes:

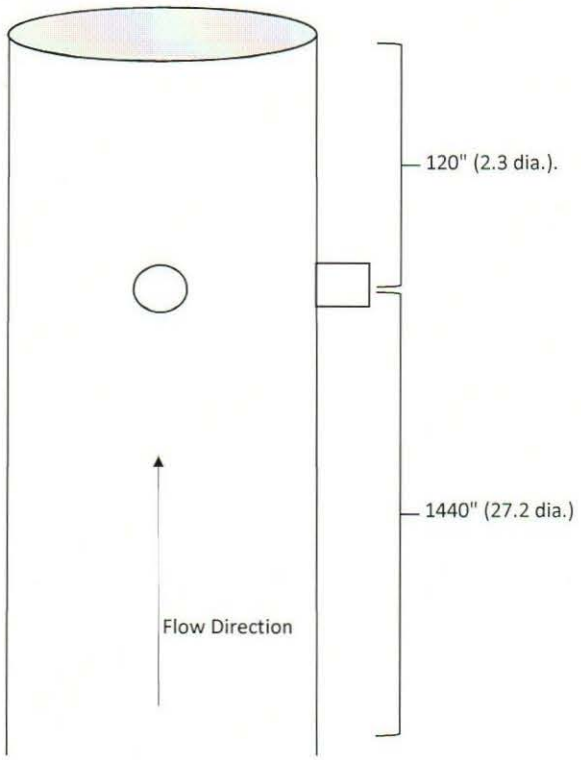
[1] Referenced flow rate expressed as dry at 101.3 kPa, 68 °F, and Actual Oxygen

Table 4: Summary of Results - Particulate Matter Results

Source	Parameter	Concentration & Emission Rate				
		Test 1	Test 2	Test 3	Average	Permit Limit
EUSHIPRECEIVE	Filterable Particulate Matter (lb/hr)	0.28	0.06	0.05	0.13	--
	Filterable Particulate Matter (gr./dscf) 2023 Source Only	0.0007	0.0002	0.0001	0.0003	*0.01*
	Filterable Particulate Matter (lb/1000 lb wet stack gas) 2023 Stack Testing Event	0.0013	0.0003	0.0002	0.0006	--
	Filterable Particulate Matter (lb/1000 lb wet stack gas) 2020 Stack Testing Event	0.0013	0.0005	0.0006	0.0008	--
	Filterable Particulate Matter (lb/1000 lb wet stack gas) (Total 2023 + 2020 Stack Testing Events)	0.0026	0.0008	0.0008	0.0014	*0.10*

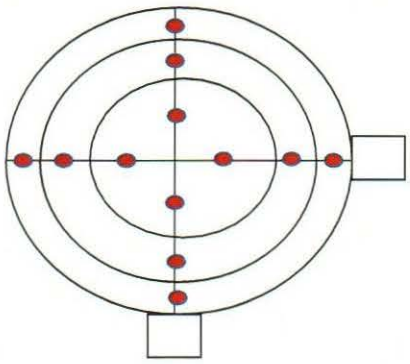
FIGURES

Figure No. 1: EUSHIPRECEIVE Stack Diagram



Diameter: 53

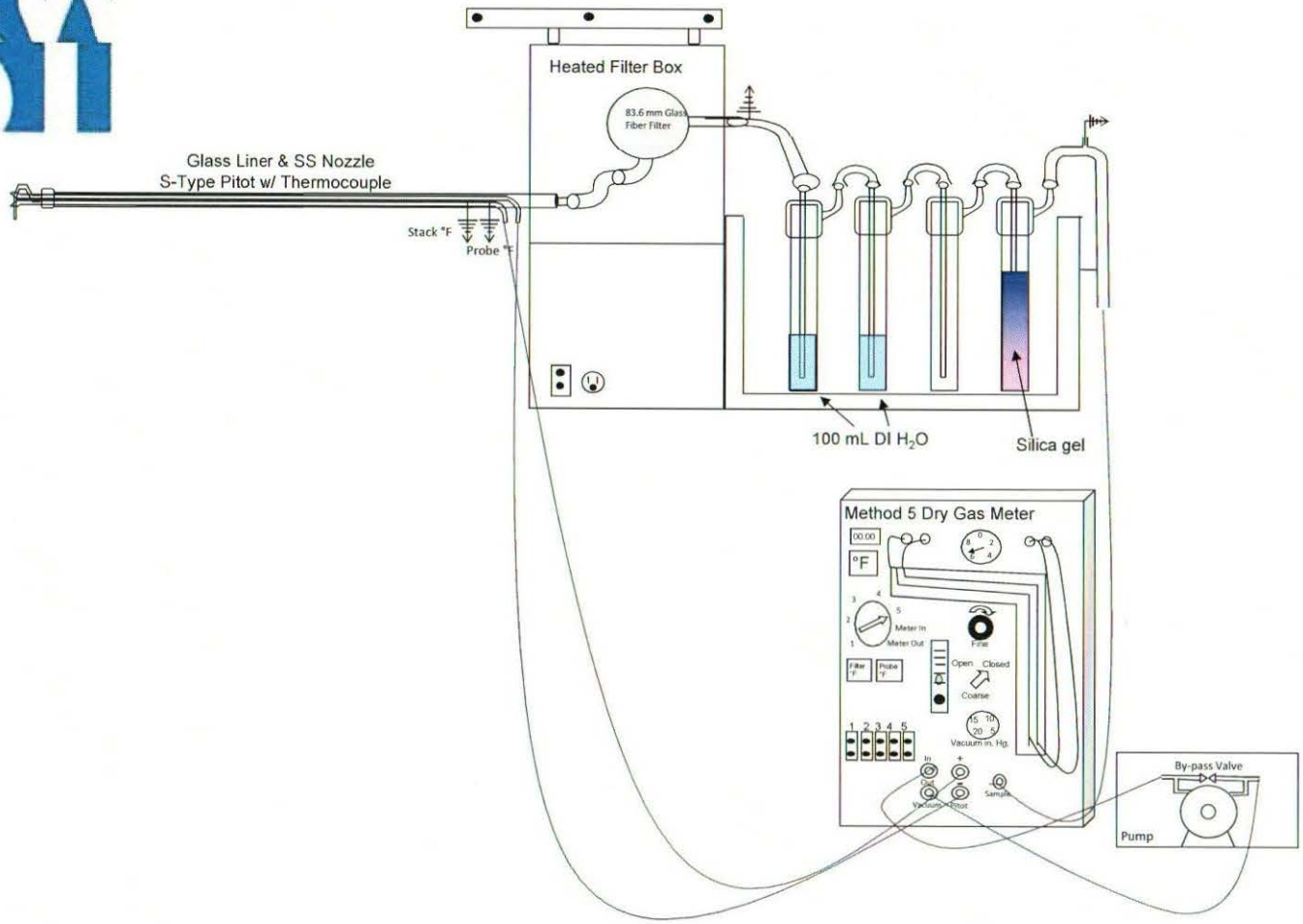
Sampling Points (in.)	
1	2.33
2	7.74
3	15.69
4	37.31
5	45.26
6	50.67



Not to scale

EUSHIPRECEIVE ZFS Ithaca Ithaca, Michigan	Date: November 9th, 2023	**RWDI USA LLC** 2239 Star Court Rochester Hills, MI 48309

Figure No. 2: US EPA Method 5 Diagram



USEPA Method 5

ZFS Ithaca

EUSHIPRECEIVE

Ithaca, Michigan

November 9th, 2023