

FINAL REPORT



PACKAGING CORPORATION OF AMERICA

FILER CITY, MICHIGAN

2023 BIOGAS EVALUATION

RWDI #2303319

June 16, 2023

SUBMITTED TO

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1 INTRODUCTION

1.1 Overview

RWDI USA LLC (RWDI) was retained by Packaging Corporation of America (PCA) to complete testing for heat content and hydrogen sulfide (H₂S) of the biogas routed to the EUBIOGASFLARE (biogas flare) at their facility located at 2246 Udell St, Filer City, Michigan. The test program was conducted to fulfill the requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) MI-ROP-B3692-2015b, special conditions V.2 and VI.1 of FGBIOGASSYSTEM. PCA is required by permit to document the British Thermal Units (BTUs) in the biogas fuel on an annual basis.

1.2 Schedule and Summary of Testing Parameters

RWDI completed the testing on April 26th, 2023.

1.3 Test Program Organization

Details with respect to the key individuals involved with the stack sampling survey are provided below:

Company Name:	Packaging Corporation of America
Company Address:	2246 Udell St, Filer City, Michigan
Environmental Contact:	Zeb Jones
Cellular No:	231-723-9951 ext. 1455
E-mail:	Zebjones@packagingcorp.com

Sampling Company:	RWDI USA LLC
Project Manager:	Steve Smith
Telephone Number:	971-940-5038
Email:	Steve.Smith@rwdi.com

2 SOURCE DESCRIPTION

2.1 Plant Overview

PCA operates the biogas flare as part of the FGBIOGASSYSTEM that is used to combust biogas during upset or malfunction conditions that may occur with the biogas generating system or the combustion boilers. If no upset conditions occur in the process, the biogas is directed to EUBOILER4A and combined with natural gas to generate steam from various mill process operations, and for electrical generation.



3 DESCRIPTION OF TESTING METHODOLOGIES

The following section provides brief descriptions of the sampling methods and discusses modifications that were completed per the test conditions. A summary of test durations, methodologies and sampling location are provided in **Section 1.2**.

3.1 Summary of Specific Methodologies

3.1.1 ASTM D-5504

Three (3) approximately 60-minute tests were performed on the biogas system in accordance with specifications stipulated in ASTM D-5504 and in accordance with Michigan EGLE requirements on April 26th, 2023. A minimum of 5 remaining inches of mercury were required on the evacuated summa canister to ensure proper sample collection.

4 PROCESS DATA

During the testing program, plant process data was monitored and collected by PCA personnel to ensure representative operation of the facility.

EUBOILER4A

- Average biogas flowrate during each test

5 SUMMARY OF RESULTS

Table 1: Summary of Results

Parameter	Target Pollutant	Emission Rate / Value	Limit
FGBIOGASFLARE	Pre combustion H ₂ S	0.74 lb/hr	4.49 lb/hr
	Post combustion H ₂ S	0.0074 lb/hr	0.0449 lb/hr
	SO ₂	1.39 lb/hr	8.45 lb/hr
	Higher Heating Value (HHV)	530 BTU/dscf	--



5.1 Discussion of Results

The measured average biogas flare H₂S emission rates were less than the EGLE permit requirements of MI-ROP-B3692-2015b.

6 CONCLUSIONS

Testing was completed on April 26th, 2023. All measured results from the testing resulted in the average biogas flare H₂S emission rates being less than the limits set out in MI-ROP-B3692-2015b.

TABLE

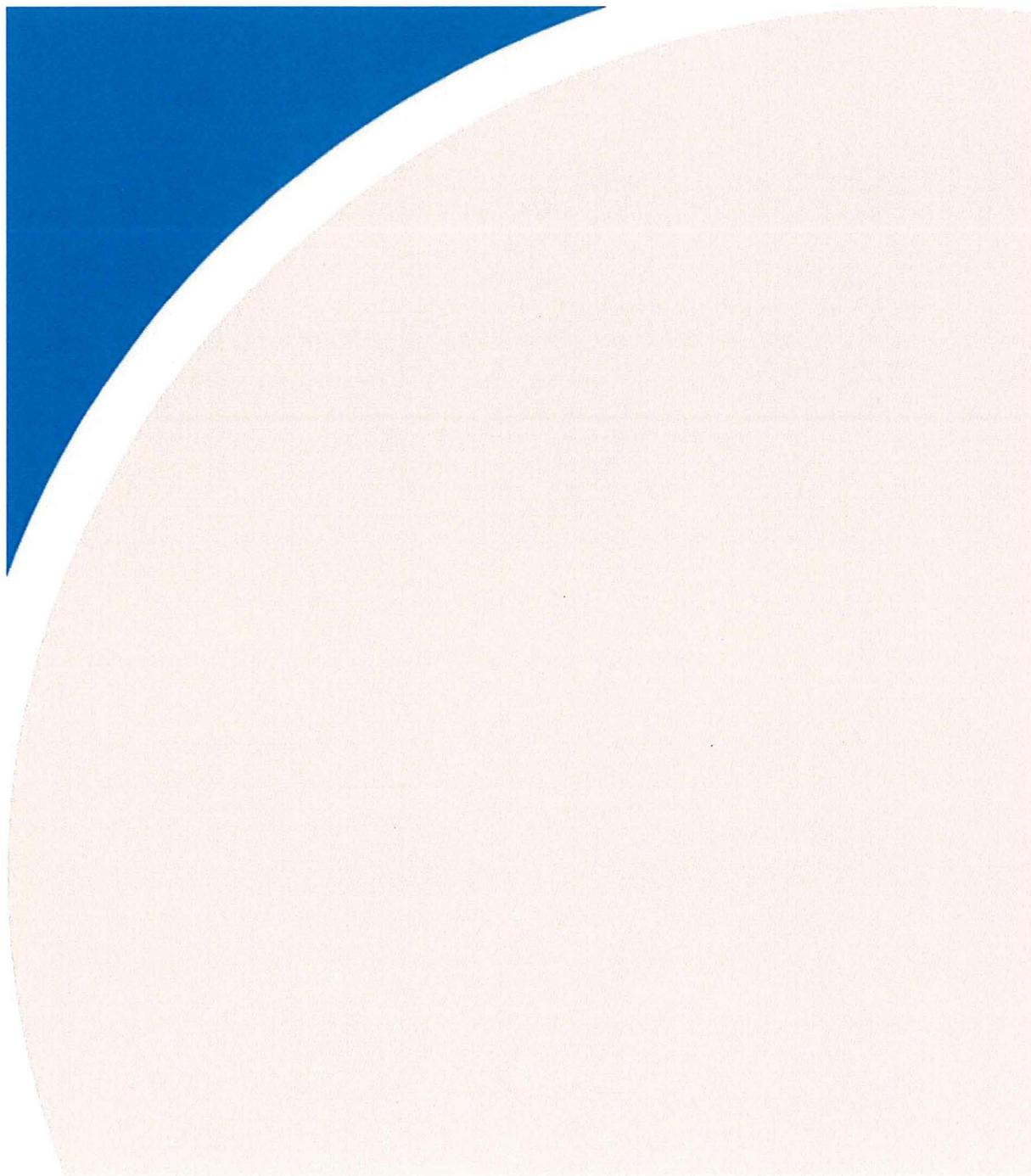


Table 1
EUBIOGAS Results

Test	1	2	3	Average
Date	26-Apr	26-Apr	26-Apr	--
Time	8:03-9:03	9:07-10:07	10:13-11:13	--
H ₂ S Concentration ppm	2400	2700	2300	2467
Average Flow (cfm)	30.74	55.09	82.12	55.98
Standard Flow (scfm)	31.33	56.15	83.70	57.06
H ₂ S lb/hr (mass flow)	0.40	0.80	1.02	0.74
H ₂ S lb/hr (emitted) ¹	0.0040	0.0080	0.0102	0.0074
SO ₂ lb/hr (emitted) ²	0.75	1.51	1.91	1.39
HHV	490	619	481	530

1 Calculated by assuming 99% destruction of H₂S during combustion

2 Calculated by assuming complete combustion of H₂S to SO₂

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