Quarterly Report 2020-Q4

JANUARY 2021

Odor Task Force

THE CITY OF Kalamazoo

Executive Summary

Per City of Kalamazoo Commission action taken September 2020, the Odor Task Force presents this Quarterly Report for fourth quarter, 2020. The members of the Odor Task Force continue to work collaboratively to develop solutions to community concerns with odors generated within the control of the members.

HISTORY

Formally originated in 2018, the Odor Task Force (OTF) is a technical workgroup of members from Graphic Packaging International, Inc., community committees, local and State agencies, elected officials, and the City of Kalamazoo. The primary goal of the OTF is to provide a collaborative forum to discuss the community's concerns with and potential mitigation efforts regarding industrial odors emitted from the City of Kalamazoo Water Reclamation Plant (KWRP) and Graphic Packaging International, Inc. (GPI) as both industrial facilities have the potential to emit odors of differing compounds and of differing concentrations. Odors emitted to or generated within a community falls under the regulatory jurisdiction of the Michigan Department of Environment, Great Lakes, and Environment (EGLE) Air Quality Division.

CITY OF KALAMAZOO PRIOR ACCOMPLISHMENTS

Investments have been made completing projects leading up to the origination of the OTF. Various investments in treatment processes operations of increased byproduct hauling offsite and point source chemical treatments have been piloted with some implemented as part of the current odor mitigation efforts. The City has continued its investment in capital improvement projects specifically targeted at odor emission mitigation. Currently under construction, is the construction of four carbon scrubbers to treat odors at the source of generation. In addition, the KWRP implemented the EnviroSuite odor management with e-Nose monitoring technology for the real-time monitoring, historic investigation and forecasting of the fugitive odor transmission of those generated at the KWRP. In the pursuit of continuous odor source identification and mitigation opportunities, the KWRP commissioned J&H to conduct an initial study to identify additional point sources of odors within City owned infrastructure. These

are only a few of the prior accomplishments and investment commissioned and completed by the City.

CITY OF KALAMAZOO CURRENT QUARTER ACCOMPLISHMENTS

The fourth quarter of 2020 has brought several milestone accomplishments in the mitigation of emitted odors from the KWRP. The KWRP performed startup and beneficial use of the one of the four carbon scrubbers currently under construction; with the remaining 3 scheduled for startup and beneficial use beginning second quarter of 2021, following when temperatures allow for construction to continue once again. Local and State regulatory approvals for the construction of a biofilter to treat odors generated from within and emitted from the interceptors connect to the KWRP have successfully progressed forward with infrastructure and process design underway. A detailed odor analytical report conducted by J&H as commissioned by the City has been completed. Along with these accomplishments, the KWRP will continue the pursuit of mitigating the emission of odors generated within the KWRP facility and owned infrastructure.

CITY OF KALAMAZOO UPCOMING ANTICIPATED ACCOMPLISHMENTS

The KWRP has several investments underway, proposed, and in the planning phases to aid in the identification and mitigation of odors emitted from the KWRP and City owned sanitary sewer collections system. The remaining three process point source carbon scrubbers are expected to undergo startup and begin beneficial use early to mid-2021. The biofilter and supporting infrastructure is anticipated to begin ground breaking in early 2021 with startup in late 2021 and beneficial use in late 2021 to early 2022. Continued management and monitoring of hauling offsite of process byproducts along with the monitoring and source investigation utilizing the EnviroSuite system. The KWRP is in the planning phase of determining if studies are necessary to determine if odors are being generated and emitted into the community from additional sanitary sewer interceptors owned by the City.

GRAPHIC PACKAGING INTERNATIONAL, INC UPDATE

Thomas J. Olstad
Kalamazoo Board Mill
Resident Mill Manager
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Date: December 11, 2020

RE: 2020 4th Quarter Odor Management Update

As required in Resolution No. 20-50, provision 3, Graphic Packaging International, LLCs ("Graphic Packaging") is providing our 4th quarter 2020 Odor Management Update to the Kalamazoo City Administration for submission to the City of Kalamazoo Commissioners.

Included in this update is the RK & Associates, Inc. odor investigation results and Graphic Packaging's response to an EGLE Violation Notice dated November 20, 2020. Although the Violation Notice is not relevant to the Odor management program, we are providing the response from Graphic Packaging to EGLE to provide context on why we do not believe there was a violation.

RK & Associates Odor Investigation Summary

Graphic Packaging International hired RK & Associates to conduct a thorough odor investigation requested by the Michigan Department of Environment, Great Lakes, and Energy (EGLE). EGLE approved the scope of the study in June, which included a plan to use two devices to detect and measure odor thresholds and hydrogen sulfide (H2S) concentrations.

In a comprehensive report that was submitted to EGLE on November 3, RK & Associates concluded that GPI does not emit nuisance odors in the community. Even with these favorable findings, GPI will continue to take proactive steps to minimize odors connected to its operations and work with local and state regulators. To that end, GPI will submit a Nuisance Minimization Plan for Odors to EGLE no later than January 1, 2021, which will include measures designed to minimize the potential for odors to be generated from its facility.

A summary of the study, its key findings and our ongoing commitments to the community follows below:

H2S measurements

During its field work, RK & Associates took 624 measurements of H2S concentrations at the GPI property perimeter and community locations during a 60-day study period. A total of 580 of those measurements registered a result of either less than 0.002 parts per million (PPM) or registered zero PPM.

Those measurements were taken from five locations on the perimeter of GPI's mill and 19 locations throughout the community/neighborhood. The monitoring locations were approved by EGLE. The table below summarizes the number of odor readings which fall within various H2S concentration ranges during the study period:

H_2S Concentration Range (ppm)	Number of Odor Readings
0	368
>0 and ≤0.002	212
>0.002 and ≤0.004	25
>0.004 and ≤0.006	12
>0.006 and ≤0.008	5
>0.008 and ≤0.010	2
>0.010	0
	624

Odor Threshold Measurements

In terms of general odor measurements, the results were separated between mill perimeter locations and community locations. According to RK & Associates, it is important to separate the two "because any well-run industrial facility will have some odors at its property perimeter."

A total of 416 measurements were taken to measure general odor readings throughout the community. For approximately 90% of those readings, there was either no odor or the odor was characterized as "other" common community odors. There were 38 readings where an odor was detected that was characterized as "paper mill." However, the study concluded that, "In RKA's professional opinion, these potential paper mill odor levels do not constitute an odor 'nuisance' within the neighboring community."

Summary of the key findings:

- Approximately 90% of the odor measurements in the community found that there was either no odor or odor associated with common community odors such as cut grass, asphalt/tar, mulch, etc.
- The hydrogen sulfide measured concentrations were extremely low, with the highest being 0.010 PPM
- Odor thresholds measured at the mill perimeter locations were consistent with expected odors near an industrial facility

This study is just one part of GPI's efforts to better understand the odor issues in the surrounding community and to address those issues. We are using this study to further refine our approach to minimizing potential odors from our operations. As part of our agreement with EGLE, we will use this study to develop a Nuisance Minimization Plan for Odors that will be submitted to EGLE on or before January 1, 2021.

In addition, Graphic Packaging will:

- Provide quarterly reports to the City of Kalamazoo summarizing our odor mitigation efforts
- Continue to work with the community's Odor Task Force
- Continue to remove sludge from the concrete pad along Patterson Street five to six days per week. Historically this was performed two or three days per week. This has reduced the potential for composting odors.
- Continue to add chemical treatments to the clarifier to reduce the potential for odor.

- Continue to use the Envirosuite monitoring network installed in September to monitor H2S ambient air concentrations at various locations.
- Continue to work with RK & Associates and other consultants to finalize the operational practices to minimize odors from GPI's operations.

The Odor investigation was reviewed by EGLE and has met the department's requirements for issuance of the air permit.

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Attachment A – RK & Associates Odor Investigation Report – dated November 3, 2020

2020-11-03 RKA
Odor Investigation I

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Odor Investigation Results
Graphic Packaging International, LLC's Recycled Paperboard Mill in Kalamazoo, MI

November, 2020

Prepared for:

Graphic Packaging International, LLC

Prepared by:

RK & ASSOCIATES, INC

RK & Associates, Inc.

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1. INTRODUCTION

RK & Associates, Inc. (RKA) is retained to investigate and to evaluate potential odor impact in the nearby community of the Graphic Packaging International, LLC (GPI) recycled paperboard mill facility, located at 1500 North Pitcher Street in Kalamazoo, Michigan. An Odor Investigation Plan for determining this potential odor impact was submitted to, and subsequently approved by, the Michigan Department of Environment, Great Lakes and Energy (EGLE) on June 4, 2020 prior to initiating field investigation activities. Appendix A provides this approved Odor Investigation Plan.

The odor investigations included odor monitoring at 24 GPI property perimeter and nearby community locations (as approved by EGLE) which were conducted three times per week for a period of 60 days. These odor monitoring events included characterizing odors, measuring odor thresholds and taking hydrogen sulfide (H_2S) concentration measurements. In addition, RKA selected nine locations on site at the GPI facility to measure H_2S concentrations and collect air samples to be evaluated by an RKA odor panel and analyzed by RKA with an Olfactometer for odor threshold. RKA also reviewed meteorological data for evaluation of potential odor impact in the nearby community.

In the balance of this document, details of the investigation are presented including the procedures used, data results, and our findings.

2. INITIAL ODOR EVALUATION AND MONITORING LOCATION SELECTION

2.1 Initial Site Visit

RKA visited the GPI facility in Kalamazoo to evaluate its current odor status and conducted the following activities:

- Toured the facility to get familiar with the process and current operation, and to identify potential odor sources and identify locations to measure H_2S concentrations and collect air samples for subsequent evaluation
- Interviewed management personnel about daily operations, identified and inspected suspected odor sources, regulatory issues, and odor complaints
- Reviewed available history of odor complaints, frequency of odor complaints, location of complaints, and odor characteristics of the complaints, including publicly available information on complaints compiled by EGLE
- Reviewed predominant wind conditions and assessed correlation against historical odor complaints
- Toured the facility perimeter and neighboring communities to identify potential odor monitoring locations, and other potential odor sources, such as the adjoining City of Kalamazoo Water Reclamation Plant
- Selected odor monitoring locations along mill property line or appropriate mill perimeter locations. Selected odor monitoring locations located in the community in nearby

residential areas.

2.2 Monitoring Locations Selection

Five mill perimeter monitoring locations, P-1 through P-5, were selected along facility fence lines. Nineteen (19) community locations, C-1 through C-19, were identified in the nearby community. A map of monitoring locations is shown in Figure 1A and 1B (Figure 1B is a zoom version which shows further details of the selected locations).

Further review of initially selected locations showed that locations C-1 & C-2 were placed at the facility property line. Location C-6, which was initially placed at the intersection of E. Paterson St and Riverview Drive, was moved for safety reasons to the parking lot of Verburg Park, which is just across the GPI property line. These three locations were reclassified as perimeter locations for the analysis of the monitoring data.

3. ODOR MONITORING

RKA retained Fishbeck, Inc. (Fishbeck) to conduct the field odor monitoring activities. Fishbeck personnel were trained by RKA at the GPI mill on June 30, 2020.

Field odor monitoring was conducted by Fishbeck up to three times per week for a period of sixty days. Odor monitoring began July 9, 2020 and concluded on September 4, 2020 which resulted in odor monitoring being completed on a total of 26 days and yielding 624 total monitoring events. The day and time of the odor monitoring were randomly selected throughout the week, but during GPI's operating hours.

During each field odor monitoring day, Fishbeck completed the following activities at each of the 24 odor monitoring locations:

- Determine whether an odor characteristic (paper mill/process wastewater, municipal wastewater, mixed paper mill/process wastewater and municipal wastewater, or "other" can be detected by the individual (personal olfactory determination);
- Determine the number of air dilutions using a Scentometer field olfactometer until the odor characteristic could not be detected by the individual. The Scentometer allows for the odor threshold to be evaluated within six dilution to threshold (D/T) increments (Table 1);
- Measure the H_2S concentration using a Jerome 631-X analyzer;
- Record all measurements along with the date and time;
- Check Weather Underground KMIKALAM120 station data to verify and record wind direction and wind speed.

Recorded measurements of the odor characteristics, D/T intervals, H_2S concentrations, and wind directions and speeds are presented in Appendix B.

Table 1. Scentometer Standard Dilution To Threshold Increments

Dilutions to Odor Threshold (D/T) Interval	Description
<170	Odor D/T value is greater than 31 but less than 170
<31	Odor D/T value is greater than 15 but less than 31
< 15	Odor D/T value is greater than 7 but less than 15
< 7	Odor D/T value is greater than 4 but less than 7
< 4	Odor D/T value is greater than 2 but less than 4
< 2	Odor D/T value is greater than 0 but less than 2
Note: For example, D/T of <2 means that there is detectable odor in the ambient air but after the sample is diluted 2 times, odor is no longer detected; D/T of <4 means that there is detectable odor when the sample is diluted 2 times, but odor is no longer detected when the odor is diluted 4 times. Since the device has standard dilution quantities, no other dilution measurements between those quantities listed above are available (e.g., 3 dilutions).	

4. ODOR MONITORING RESULTS

4.1 D/T Measurements for All Monitoring Locations

Table 1 presents a summary of Scentometer measurements collected during the 624 odor monitoring events conducted over 26 days at the 24 monitoring locations during the course of this odor investigation. No odors were detected during 433 of these monitoring events along with odors characterized as solely "Other" being detected during 68 monitoring events. Stated another way, during 80 percent (501 out of 624) of the odor monitoring events, no odor was identified relating to GPI's operations.

102 Scentometer monitoring events identified likely paper mill related odor and 12 monitoring events identified the municipal wastewater treatment plant related odor. The remaining nine monitoring events identified a mixed paper mill/municipal wastewater treatment plant related odor.

Table 2. Summary of Measurable Odor Threshold Values and Corresponding Odor Characteristic at all Monitoring Locations

Odor Threshold (D/T)	Odor Characteristic Frequency			
	Paper Mill	Municipal WW	Mixed	Other
<15	3	0	0	0
<7	2	0	0	2
<4	10	1	2	4
<2	87	11	7	62

4.2 D/T Odor Threshold Measurements at Community Locations

Monitoring results were separated between mill perimeter locations and community locations to better evaluate the odor impact if any on the neighboring communities. It is important to recognize the difference between mill perimeter and community locations because any well-run industrial facility will have some odors at its property boundary. This point is important in determining normal odor levels versus what could be odor nuisance levels.

Odor measurements at community locations, which are C-3 through C-6 and C-7 through C-19, are presented in Table 3. A total of 416 odor monitoring events were performed at community locations during the odor investigation. During 319 of these monitoring events no odor was identified and during 53 of these events the odor was characterized as "Other", or about 89.5% of the time there were no odors associated with GPI's operation in the community.

Of the remaining 44 monitoring events at community locations where an odor characterized as something besides "other", 38 monitoring events identified the "paper mill" odor characteristic, 3 events identified the "municipal wastewater" characteristic, and 3 events identified the "mixed" odor characteristic (includes both wastewater and paper mill).

Table 3. Summary of Measurable Odor Threshold Values and Odor Characteristics From 416 Events at Community Monitoring Locations

Odor Threshold (D/T)	Odor Characteristic Frequency			
	Paper Mill	Municipal WW	Mixed	Other
<15	0	0	0	0
<7	0	0	0	2
<4	4	0	0	4
<2	34	3	3	47

In terms of odor threshold levels measured during the investigation, in 319 out of 416 off-site measurements no odor was detected.; 87 out of 416 measurements determined a D/T less than

two,; eight measurements determined a D/T greater than two but less than four,; and two measurements (both not identified as having a "paper mill" characteristic) determined a D/T greater than four but less than seven.

We understand that the state of Michigan, unlike several other states, does not currently have an objective odor nuisance standard or require the Scentometer to measure the level of odors. Nevertheless, looking to the regulatory programs of other states and localities that do rely upon the Scentometer (or similar device) to measure odors helps put the current odor study data in context. See Table 4 below.

Thomas Mahin, in his paper *Measurement and Regulation of Odors in the USA*, references a study conducted for the California Air Resources Board that itself reviewed six published studies related to the recognizability, unpleasantness and annoyance associated with a variety of odors. The study found that for unpleasant odors the threshold of annoyance is about five times the threshold of detection. He also reports that the California's South Coast Air Quality Management District found that at 5 D/T people become aware of an odor and that at 5 to 10 D/T odors may be strong enough to trigger complaints.

During the odor investigation in the community there were four odor threshold measurements with D/T less than four and 34 measurements with D/T less than two associated with the likely paper mill odor characteristic. There were two measurements with D/T less than four and three measurements with D/T less than two identified as "mixed" (paper mill and municipal wastewater) odor characteristic. In RKA's professional opinion, these potential paper mill odor levels do not constitute an odor "nuisance" within the neighboring community.

Table 4. Odor "nuisance" standards by other states.

State or Locality	Source of Standard	Determination Criteria
Colorado	5 CCR 1001-4: Odor Emission	7:1 D/T (2 samples over 1-hour period)
Connecticut	Sec. 22a-174-23: Control of Odors	(a) Nuisance standard; (b) 7:1 D/T (3 samples over 1-hour period); and (c) Ambient air limits for certain substances in Table 23-1 (e.g. Hydrogen sulfide: 0.0045 ppm (15-minute average))
Illinois	Section 9(a) of the Act and 35 IAC 245.121: Objectionable Odor Nuisance Determination	Nuisance standard. 8:1 D/T (Scentometer)
Kentucky	401 KAR 53:010: Ambient Air Quality Standards	7:1 D/T (Nasal Ranger/Scentometer)

State or Locality	Source of Standard	Determination Criteria
Missouri	10 CSR 10-6.165: Restriction of Emission of Odors	7:1 D/T (Nasal Ranger) (2 samples over 1-hour)
North Dakota	Section 33-15-16: Restriction of Odorous Air Contaminants	Objectionable odors prohibited. 7:1 D/T (Scentometer)
San Francisco Bay Area Air Quality District		5 D/T applied after at least 10 complaints within 90 days.[1]
State of Massachusetts	Draft policy and guidance for composting facilities	5 D/T
City of San Diego WWTP		5 D/T average over 5 minutes
City of Seattle WWTP		5 D/T average over 5 minutes

4.3 D/T Odor Threshold Measurements at Mill Perimeter Locations

Odor measurements at locations P-1 through P-5, C-1, C-2, and C-6 are shown in Table 5. A total of 208 measurements were performed at mill perimeter locations during the course of the odor investigation. Out of the 208 measurements, 63 measurements were characterized as paper mill odor, nine were characterized as municipal wastewater, and six were of mixed characterization.

In terms of odor threshold measurements events, 114 times during the 208 measurements no odor was detected. 16 measurements were identified with the "Other" odor characteristic and nine measurements identified the municipal wastewater characteristic. Therefore, during 69.7% of the measurement events there were no odors potentially associated with GPI's operations near the GPI property line.

There were three odor threshold measurements with D/T greater than 7 but less than 15 on-site, and all other detected odors thresholds were below a D/T of 7.

[1] Thomss Mahin, *Measurement and Regulation of Odors in the USA*, 64

Table 5. Odor Readings at Mill Perimeter Locations

Odor Threshold (D/T)	Odor Characteristic Frequency			
	Paper Mill	Municipal WW	Mixed	Other
<15	3	0	0	0
<7	2	0	0	0
<4	5	1	2	1
<2	53	8	4	15

4.4 H_2S Readings

Hydrogen sulfide concentrations were measured during the 624 odor monitoring events in the odor investigation period. A summary of the results is shown in Table 6. The highest measured H_2S concentration was 0.010 ppm on July 9, 2020 at location C-2, a mill perimeter location. As demonstrated in Table 6, there were mostly zero or extremely low H_2S concentrations.

Table 6. H_2S Reading Measured During Odor Surveys

H_2S Concentration Range (ppm)	Number of H_2S Readings
0	368
➢ 0 and ≤ 0.002	212
➢ 0.002 and ≤ 0.004	25
➢ 0.004- and ≤ 0.006	12
➢ 0.006 and ≤ 0.008	5
➢ 0.008 and ≤ 0.010	2
Total	**624**

5. OLFACTOMETRY ANALYSIS OF ODOR SAMPLES

RKA collected nine (9) ambient air samples on site at the GPI facility for olfactometry analysis. The samples were collected August 10 and 11, 2020 and were analyzed August 12, 2020 at the RKA Olfactometry lab. Samples were collected near potential facility odor sources as follows:

- K1 Operating Floor - Coating Kitchen
- K3 Dryer Mezzanine
- Stock Prep Building at News Pulper
- AES Building between Screens
- Clarifier (Downwind of Clarifier)

- Sludge Pile (Downwind of Sludge Pile)
- Sludge Drum Filter Outlet
- Parking Lot B (near discharge to WWTP)
- North of Stock Prep Building

A Jerome 631-X portable H2S analyzer was used to measure ambient H_2S levels during the sample collection. Samples were collected in 10-liter Tedlar bags, labeled, and transported with chain of custody to RKA's office in Warrenville, Illinois, for odor analysis.

Samples were analyzed using an Olfactometer to measure odor thresholds in accordance with ASTM Method E-679-11. Samples were also analyzed for odor characterization using relative intensity scale of 0 to 5 (faint to strong). For each sample, panelists were asked to characterize the odor in one of the "feels like" and "smells like" descriptors.

A detailed report describing sample collection, Olfactometry analysis and odor characterization is included in Appendix C. Table 7 includes a summary of the results. Results show that samples collected at the GPI process wastewater treatment plant, AES Building and Sludge Drum Filter Outlet, have the highest detection threshold levels, followed by samples collected in processing areas which include the K1 Coating Kitchen, K3 Dryer Mezzanine and Stock Prep Building near the news pulper. Samples collected near outdoor sources, Parking Lot B, North of Stock Prep Building, Sludge Pile, and Clarifier, have the lowest detection to threshold values.

Table 7. Summary of Olfactometry Analysis for odor samples collected from GPI facility.

Sample Description	Detection Threshold (ou/scf)	Recognition Threshold (ou/scf)	H_2S Reading (ppm)
Parking Lot B	4	3	0.004
N. of Stock Prep Bldg	3	3	0.003
Sludge Pile	4	3	0.002
Clarifier	41	15	0.033
K1 – Coating Kitchen	94	41	0.091
K3 Dryer Mezzanine	76	28	0.160
AES Building	210	99	0.560
Stock Prep Bldg Pulper	127	46	0.810
Sludge Drum Filter Outlet	294	177	0.510

6. CONCLUSIONS

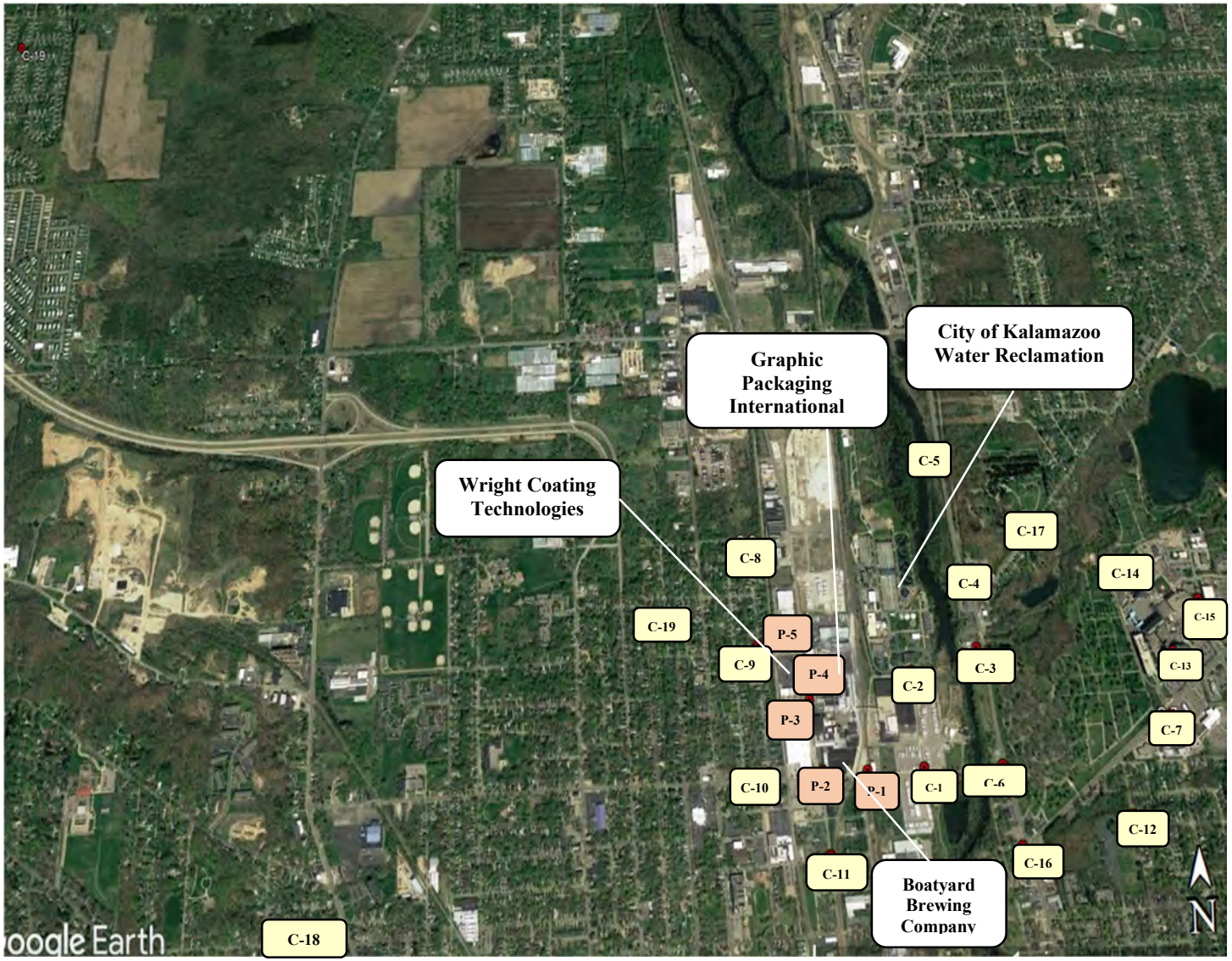
The Odor Investigation Study, as approved by Michigan EGLE, was conducted from July 9, 2020 through September 4, 2020. During the odor investigation, 624 odor and H_2S measurements were taken at all 24 mill perimeter and community locations. Based on the following factors derived from the course of the odor investigation study, in RKA's professional opinion, the odor levels associated with the mill's operations do not constitute an odor "nuisance" situation at the neighboring community:

1. Ninety percent (90%) of the odor measurements taken in the community locations either identified no odor or an odor associated with community types of odors (e.g., cut grass, asphalt/tar, wet mulch, flowers, burnt rubber, burnt plastic, mold/mildew, etc.);
2. The H_2S measured concentrations were extremely low, with the highest being 0.010 ppm;
3. Odor thresholds observed at mill perimeter locations were consistent with expected odors near an industrial facility; and.; and
4. Paper mill odor thresholds measured at community locations were mostly determined to have a D/T less than two and in only four instances had a D/T greater than or equal to two but less than four, with no measurements above four.

Odor Investigation Results
Graphic Packaging International, LLC's Recycled Paperboard Mill
in Kalamazoo, MI

November, 2020

FIGURES



N

RK No.	Location
	Perimeter
P-1	Paterson St & Walbridge St
P-2	Paterson St & Porter St
P-3	Graphic Packaging – Gate 2
P-4	Graphic Packaging – Gate 5
P-5	Graphic Packaging – Gate 6
C-1	Paterson St & Harrison St
C-2	Harrison St at WWT Plant gate
C-6	East side of Verburg Park Parking Lot
	Community
C-3	Kalamazoo River Watershed Council Parking Lot
C-4	Kalamazoo Township Parking Lot
C-5	Riverview Dr & Old Riverview Sav Rd
C-7	Kalamazoo County Juvenile Home Parking Lot
C-8	Dunkley St & Edwards St
C-9	Prouty St & Edwards St
C-10	Paterson S & Edwards St
C-11	Parsons St & Porter St
C-12	St. Mary Catholic Church Parking Lot
C-13	Borgress Medical Center Entrance Parking Lot
C-14	Neurosurgery of Kalamazoo Parking Lot
C-15	Borgress Medical Center at Lawrence Education Center Parking Lot
C-16	Gull Rd & Riverview Dr. at Walgreens Parking Lot
C-17	Front Entrance of Mt Olivet Cemetery
C-18	1248 Blakeslee Street
C-19	Union St. & E. Hopkins St.

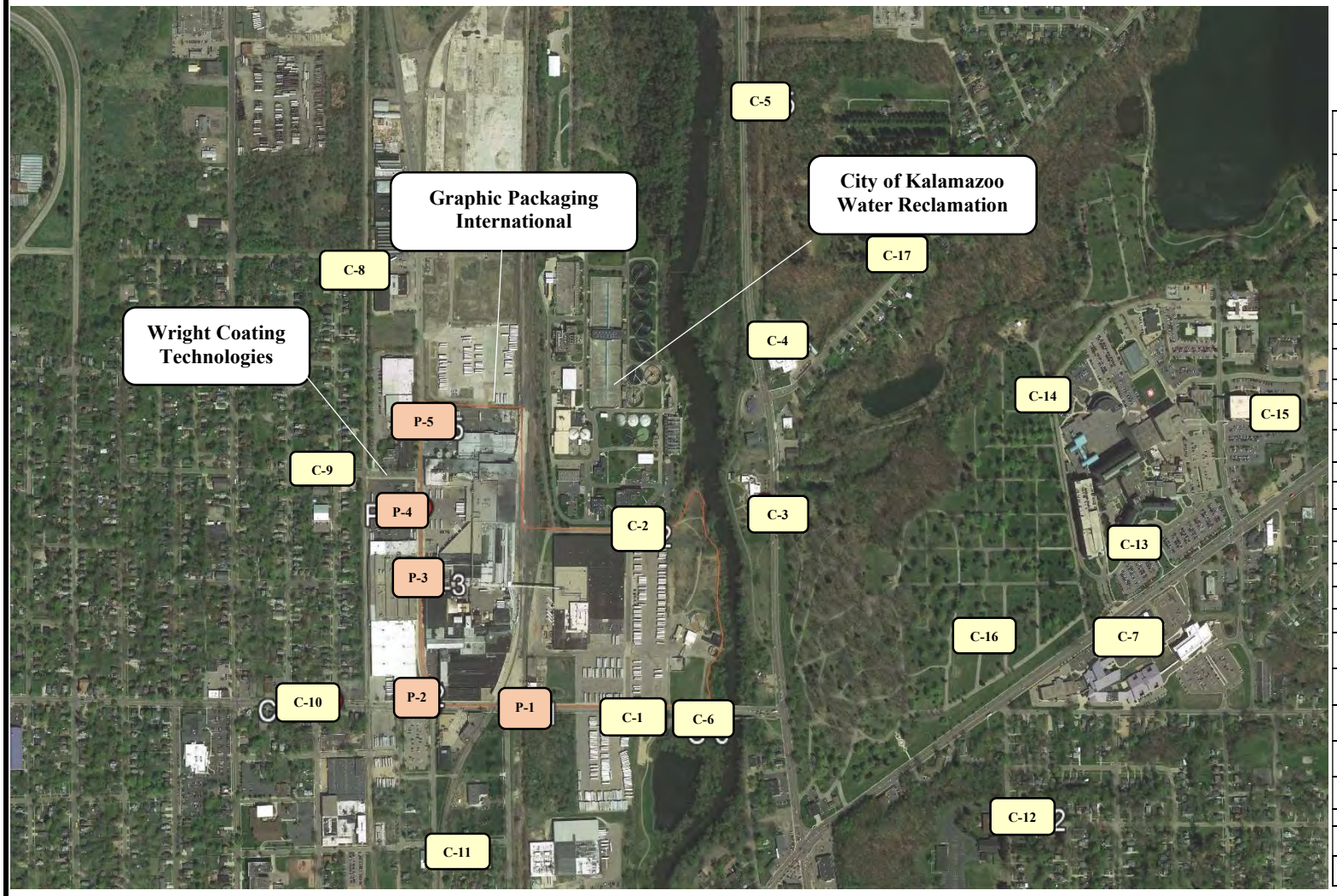
2S631 ROUTE 59, SUITE B
WARRENVILLE, IL 60555
630-393-9000
630-790-2966

COMMENTS: Perimeter and Community Odor Monitoring Location

Graphic Packaging International
Kalamazoo, MI

FIGURE 1A

DRAWN BY:	APPROVED BY:	PROJECT NUMBER:	DATE DRAWN:	REVISED DATE
SS	SR	R19444	01-16-2020	07-02-2020



N

RK No.	Location
	Perimeter
P-1	Paterson St & Walbridge St
P-2	Paterson St & Porter St
P-3	Graphic Packaging – Gate 2
P-4	Graphic Packaging – Gate 5
P-5	Graphic Packaging – Gate 6
C-1	Paterson St & Harrison St
C-2	Harrison St at WWT Plant gate
C-6	East side of Verburg Park Parking Lot
	Community
C-3	Kalamazoo River Watershed Council Parking Lot
C-4	Kalamazoo Township Parking Lot
C-5	Riverview Dr & Old Riverview Sav Rd
C-7	Kalamazoo County Juvenile Home Parking Lot
C-8	Dunkley St & Edwards St
C-9	Prouty St & Edwards St
C-10	Paterson S & Edwards St
C-11	Parsons St & Porter St
C-12	St. Mary Catholic Church Parking Lot
C-13	Borgress Medical Center Entrance Parking Lot
C-14	Neurosurgery of Kalamazoo Parking Lot
C-15	Borgress Medical Center at Lawrence Education Center Parking Lot
C-16	Gull Rd & Riverview Dr. at Walgreens Parking Lot
C-17	Front Entrance of Mt Olivet Cemetery
C-18	1248 Blakeslee Street
C-19	Union St. & E. Hopkins St.

2S631 ROUTE 59, SUITE B
WARRENVILLE, IL 60555
630-393-9000
630-790-2966

COMMENTS: Perimeter and Community Odor Monitoring Location

Graphic Packaging International
Kalamazoo, MI

FIGURE 1B

DRAWN BY:	APPROVED BY:	PROJECT NUMBER:	DATE DRAWN:	REVISED DATE
SS	SR	R19444	01-16-2020	09-24-2020

Odor Investigation Results

Graphic Packaging International, LLC's Recycled Paperboard Mill

in Kalamazoo, MI

November, 2020

APPENDIX A

Odor Investigation Plan for Graphic Packaging International, LLC's Recycled Paperboard Mill in Kalamazoo, MI

July 6, 2020

Prepared for:

Graphic Packaging International, LLC

Prepared by:

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RK & Associates, Inc.

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Odor Investigation Plan
Graphic Packaging Int'l – Kalamazoo, Michigan

INTRODUCTION

RK & Associates, Inc. (RKA) has been retained to evaluate the operations at the Graphic Packaging International, LLC (GPI) recycled paperboard mill, located at 1500 North Pitcher Street in Kalamazoo, Michigan, to investigate community odor levels. This investigation plan will also identify potential odor sources within GPI facility and any nearby other odor sources. In addition, this investigation will assist in the assessment of community odor levels compared to Michigan Rule 901 odor criteria.

Additionally, as part of the investigation, RKA will review historical odor complaint records in the area and evaluate those complaints against sources identified at the GPI mill and any other relevant neighboring operations.

1. ODOR STANDARDS

A. Michigan Administrative Code, Environment, Great Lakes, and Energy, Air Quality Division, Air Pollution Control

R 336.1901 Air contaminant or water vapor; prohibition.

Rule 901. Notwithstanding the provisions of any other rule, a person shall not cause or permit the emission of an air contaminant or water vapor in quantities that cause, alone or in reaction with other air contaminants, either of the following:

(a) Injurious effects to human health or safety, animal life, plant life of significant economic value, or property.

(b) Unreasonable interference with the comfortable enjoyment of life and property.

The Michigan Department of Environment, Great Lakes, and Energy (MEGLE), formerly Michigan Department of Environmental Quality (MDEQ), uses the following scale to identify objectionable odors:

Odor Intensity Odor Scale

0 – Non-Detect
1 – Just barely detectable
2 – Distinct and definite odor
3 – Distinct and definite objectionable odor
4 – Odor strong enough to cause a person to attempt to avoid it completely
5 – Odor so strong as to be overpowering and intolerable for any length of time

It is RKA's understanding that MEGLE considers anything at level 3 or above as a potential unreasonable interference with the comfortable enjoyment of life and property, depending on

the intensity and duration of the odor.

B. Objectionable odor using objective measurements at other states and localities.

RKA understands that the State of Michigan does not currently have an odor nuisance standard that requires a Scentometer or other analytical device to measure the level of odors. Nevertheless, looking to the regulatory programs of other states and localities that do rely upon the Scentometer or similar devices to measure odors helps put the GPI operations and other odor sources nearby in context:

State or Locality	Source of Standard	Determination Criteria
Colorado	5 CCR 1001-4: Odor Emission	7:1 Dilution to Threshold (D/T); (2 samples over 1-hour period)
Connecticut	Sec. 22a-174-23: Control of Odors	(a) Nuisance standard. (b) 7:1 D/T (3 samples over 1-hour period); and (c) Ambient air limits for certain substances in Table 23-1 (e.g. Hydrogen sulfide: 0.0045 ppm (15-minute average))
Illinois	Section 9(a) of the Act and 35 IAC 245.121: Objectionable Odor Nuisance Determination	Nuisance standard. 8:1 D/T (Scentometer)
Kentucky	401 KAR 53:010: Ambient Air Quality Standards	7:1 D/T (Nasal Ranger/Scentometer)
Missouri	10 CSR 10-6.165: Restriction of Emission of Odors	7:1 D/T (Nasal Ranger) (2 samples over 1-hour)
North Dakota	Section 33-15-16: Restriction of Odorous Air Contaminants	Objectionable odors prohibited. 7:1 D/T (Scentometer)
San Francisco Bay Area Air Quality District		5 D/T applied after at least 10 complaints within 90 days.1
State of Massachusetts	Draft policy and guidance for composting facilities	5 D/T
City of San Diego WWTP		5 D/T average over 5 minutes
City of Seattle, WWTP		5 D/T average over 5 minutes

[1] Thomas Mahin, *Measurement and Regulation of Odors in the USA*, 64

Thomas Mahin, in his paper Measurement and Regulation of Odors in the USA, references a study conducted for the California Air Resources Board that itself reviewed six published studies related to the recognizability, unpleasantness and annoyance associated with a variety of odors. The study found that for unpleasant odors, the threshold of annoyance is about five times the threshold of detection. He also reports that the California's South Coast Air Quality Management District found that at 5 D/T, people become aware of an odor and that at 5 to 10 D/T, odors may be strong enough to trigger complaints.

2. INITIAL ODOR EVALUATION

RKA visited the GPI facility in Kalamazoo to evaluate its current odor status and conducted the following activities:

- Toured the facility to get familiar with the process and current operation, and to identify potential odor sources
- Interviewed management personnel about daily operations, identified and inspected suspected odor sources, regulatory issues, and odor complaints
- Reviewed available history of odor complaints, frequency of odor complaints, location of complaints, and odor characteristics of the complaints, including publicly available information on complaints compiled by Michigan EGLE.
- Reviewed predominant wind conditions and assessed correlation against historical odor complaints
- Toured the facility perimeter and neighborhood areas to identify potential odor monitoring locations. Odor monitoring locations are selected along facility property line or appropriate perimeter locations. Odor monitoring locations are also located in the nearby residential areas.
- Additional monitoring locations are also located near other potential odor sources such as the City of Kalamazoo Water Reclamation facility, and Wright Coating Technologies.

3. ODOR MONITORING

RKA will either conduct, or arrange and oversee, odor monitoring activities which are planned to occur three (3) times per week for a period of sixty days (2 months). A Scentometer device, will be used to measure odor thresholds of various potential sources. The day and time of the odor monitoring will be selected randomly throughout the week, during facility operating hours. In addition to Scentometer readings, H_2S ambient air concentrations will be measured using a portable H_2S analyzer.

Scentometer and H_2S Readings at Selected Perimeter (fence line) Locations

Perimeter Scentometer readings will be taken at the selected perimeter locations along facility

fence lines. Five (5) perimeter locations, P-1 through P-5, were selected. A map of perimeter monitoring locations is shown in Figure 1A and 1B (Figure 1B is a zoom version which shows further details of locations).

Scentometer and H_2S Readings at Selected Community Locations

Community Scentometer readings will be taken at the selected community locations. Nineteen (19) community locations, C-1 through C-19 were identified. A map of community monitoring locations is shown on Figure 1A and Figure 1B.

Documenting Field Sampling Data

Odor readings taken with the Scentometer or other appropriate devices will be documented on the Perimeter and Community Log sheet included in Figure 2. If odor is present, the field operator will identify: 1, odor intensity as measured by Scentometer; and 2, odor character or the nature (such as chemical, rotten egg, or ethanol, etc.) of smell. Based on these measurements of odor intensity, odor character and wind direction, RKA trained field personnel will identify the source of the odor at a given location.

On-Site Meteorological Data

GPI will provide onsite meteorological data that includes time, wind speed, wind direction, temperature, humidity, barometric pressure, and rainfall related information. These data are used in the evaluation of potential off-site impacts from the facility and for investigating odor complaints.

Olfactometry Analysis of Potential Odor Sources from GPI Facility

RKA will collect up to 12 odor samples from potential odor sources from the GPI Facility in 10-liters Tedlar sample bags. The selected potential odor sources may include a clarifier, exhaust stacks and other selected odor sources located within the GPI Facility. A portable H_2S analyzer will be used to measure H_2S at the GPI sources selected to be sampled for odors. H_2S readings will be taken simultaneously with sample collection.

It is estimated that after about a month of field odor measurements, RKA will determine odor source locations within the GPI facility for collecting odor samples. In a month's time, RKS staff will have necessary community odor measurement levels to make an educated determination of potential odor sources within the facility.

The sample bags will then be taken to an onsite RKA Olfactometry lab for odor analysis to determine the odor threshold value and odor characterization using ASTM 679-11 and ASTM DATA Series DS 61.

a) Odor Threshold Value

Odor threshold value will be determined by performing triangular forced-choice odor analysis in accordance with ASTM 679-04, Standard Practice for Determination of Odor and Taste Thresholds by a Forced-Choice Ascending Concentration Series Method of Limits. Result will be reported in Odor Units.

b) Odor Characterization

Odor samples will also be analyzed for odor characterization using eight recognized odor descriptor categories for odor "smells like" and eight sensation descriptors for odor "feels like". Results will be plotted on a spider graph.

4. DATA ANALYSIS AND REPORTS

RKA will compile the data from the odor monitoring events that will include community and perimeter locations, Scentometer readings, odor character determination, daily meteorological data, and odor complaint data. This report will be updated after each monitoring event. Report template is shown on Figure 3.

RKA will evaluate the impact from the various odor sources at the GPI and neighboring operations against the odors measured at each monitoring location to determine the potential contribution against the Rule 901 criteria.

A final report will be issued in accordance with Michigan EGLE requirements within 60 days of last date of sampling.

Odor Investigation Plan for Graphic Packaging International, LLC's Recycled Paperboard Mill in Kalamazoo, MI

July 6, 2020

FIGURES

N

RK No.	Location
	Perimeter
P-1	Paterson St & Walbridge St
P-2	Paterson St & Porter St
P-3	Graphic Packaging – Gate 2
P-4	Graphic Packaging – Gate 5
P-5	Graphic Packaging – Gate 6
	Community
C-1	Paterson St & Harrison St
C-2	Harrison St at WWT Plant gate
C-3	Kalamazoo River Watershed Council Parking Lot
C-4	Kalamazoo Township Parking Lot
C-5	Riverview Dr & Old Riverview Sav Rd
C-6	East side of Verburg Park Parking Lot
C-7	Kalamazoo County Juvenile Home Parking Lot
C-8	Dunkley St & Edwards St
C-9	Prouty St & Edwards St
C-10	Paterson S & Edwards St
C-11	Parsons St & Porter St
C-12	St. Mary Catholic Church Parking Lot
C-13	Borgress Medical Center Entrance Parking Lot
C-14	Neurosurgery of Kalamazoo Parking Lot
C-15	Borgress Medical Center at Lawrence Educational Center Parking Lot
C-16	E Paterson St & Riverview Dr. at Walgreens Parking Lot
C-17	Front Entrance of Mt Olivet Cemetery
C-18	1248 Blakeslee Street
C-19	Union St & E. Hopkins St.

RK & Associates, Inc.
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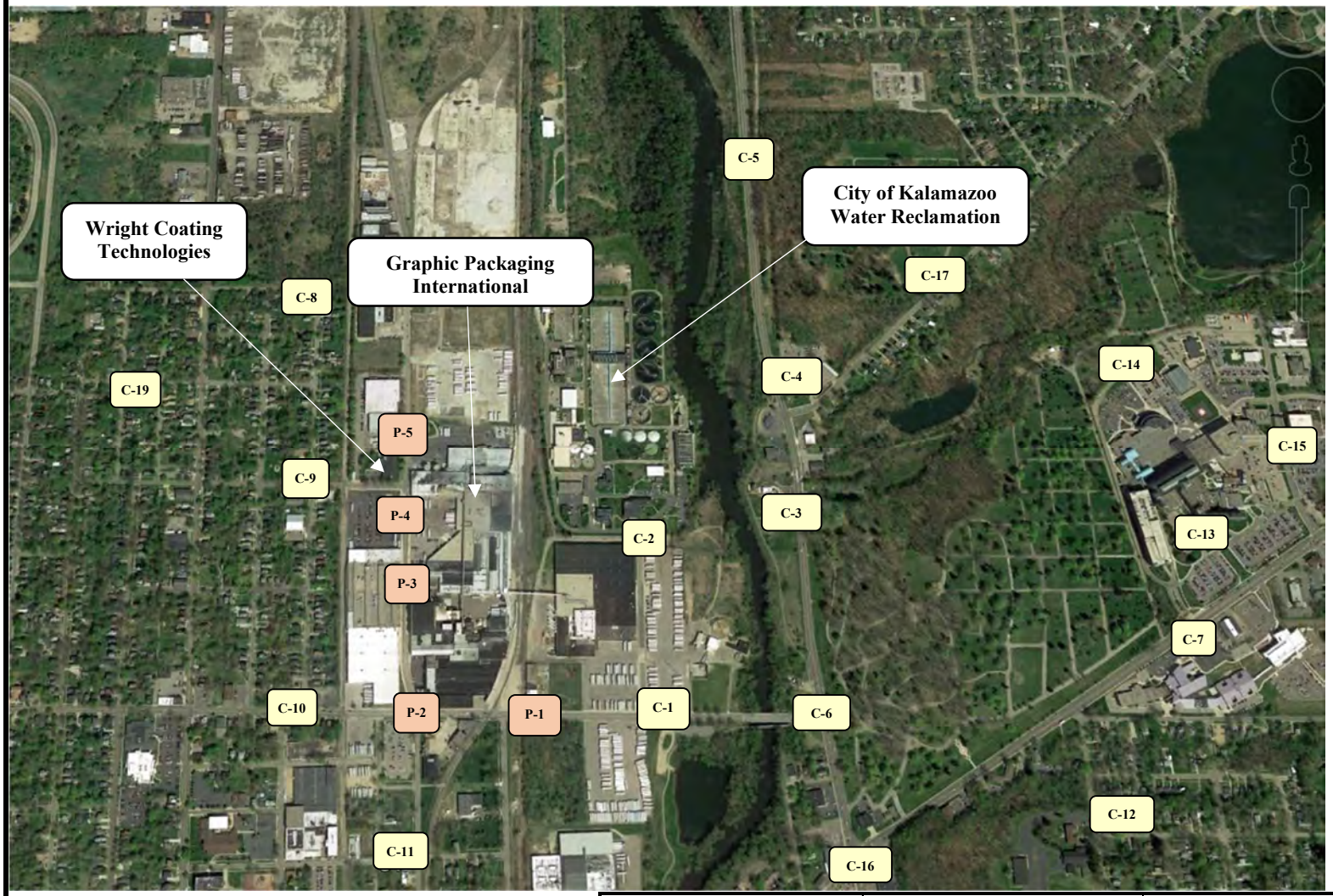
630-790-2966

COMMENTS: Perimeter and Community Odor Monitoring Location

Graphic Packaging International
Kalamazoo, MI

FIGURE 1A

DRAWN BY:	APPROVED BY:	PROJECT NUMBER:	DATE DRAWN:	REVISED DATE
SS	SR	R19444	01-16-2020	07-06-2020



N

RK No.	Location
	Perimeter
P-1	Paterson St & Walbridge St
P-2	Paterson St & Porter St
P-3	Graphic Packaging – Gate 2
P-4	Graphic Packaging – Gate 5
P-5	Graphic Packaging – Gate 6
	Community
C-1	Paterson St & Harrison St
C-2	Harrison St at WWT Plant gate
C-3	Kalamazoo River Watershed Council Parking Lot
C-4	Kalamazoo Township Parking Lot
C-5	Riverview Dr & Old Riverview Sav Rd
C-6	East side of Verburg Park Parking Lot
C-7	Kalamazoo County Juvenile Home Parking Lot
C-8	Dunkley St & Edwards St
C-9	Prouty St & Edwards St
C-10	Paterson S & Edwards St
C-11	Parsons St & Porter St
C-12	St. Mary Catholic Church Parking Lot
C-13	Borgress Medical Center Entrance Parking Lot
C-14	Neurosurgery of Kalamazoo Parking Lot
C-15	Borgress Medical Center at Lawrence Educational Center Parking Lot
C-16	E Paterson St & Riverview Dr. at Walgreens Parking Lot
C-17	Front Entrance of Mt. Olivet Cemetery
C-18	1248 Blakeslee Street
C-19	Union St & E. Hopkins St.

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COMMENTS: Perimeter and Community Odor Monitoring Location

Graphic Packaging International
Kalamazoo, MI

FIGURE 1B

DRAWN BY:	APPROVED BY:	PROJECT NUMBER:	DATE DRAWN:	REVISED DATE
SS	SR	R19444	01-16-2020	07-06-2020

Figure 2

RK & Associates, Inc.

Graphic Packaging International
Scentometer Readings
Perimeter & Community Locations

Date _____ Field Person _____

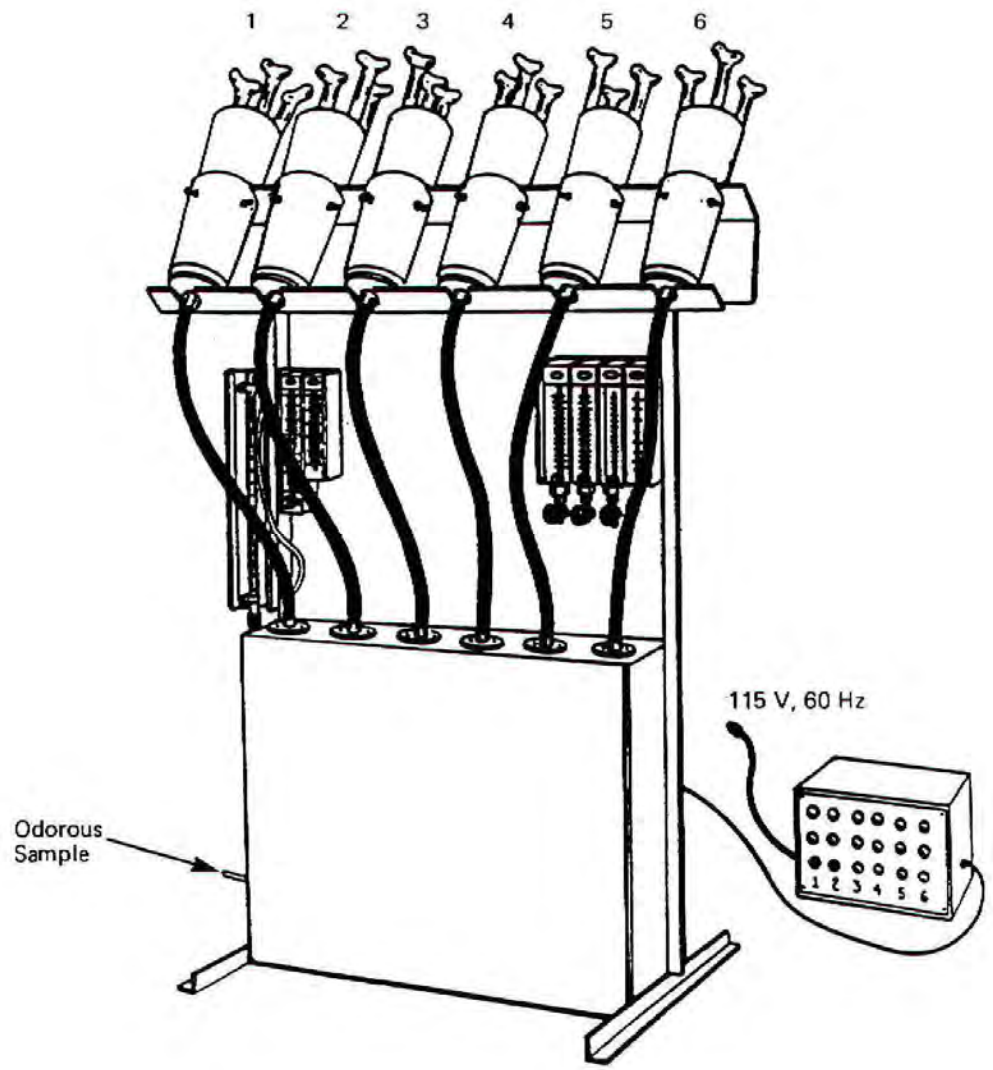
Locations		Wind Direction	Wind Speed	Scentometer Reading	H_2S Reading (ppm)	Time	Odor Description
Perimeter Locations	#						
Paterson St & Walbridge St	P-1						
Paterson St & Porter St	P-2						
Graphic Packaging – Gate 2	P-3						
Graphic Packaging – Gate 5	P-4						
Graphic Packaging – Gate 6	P-5						
Community Receptors	#						
Paterson St & Harrison St	C-1						
Harrison St at WWT Plant gate	C-2						
Kalamazoo River Watershed Council Parking Lot	C-3						
Kalamazoo Township Parking Lot	C-4						
Riverview Dr & Old Riverview Sav Rd	C-5						
East side of Verburg Park Parking Lot	C-6						
Kalamazoo County Juvenile Home Parking Lot	C-7						
Dunkley St & Edwards St	C-8						
Prouty St & Edwards St	C-9						
Paterson S & Edwards St	C-10						
Parsons St & Porter St	C-11						
St. Mary Catholic Church Parking Lot	C-12						
Borgress Medical Center Entrance Parking Lot	C-13						
Neurosurgery of Kalamazoo Parking Lot	C-14						
orgress Medical at Lawrence Educational Ctr Parking Lot	C-15						
E Paterson St & Riverview Dr at Walgreens Parking Lot	C-16						
Front Entrance of Mt. Olivet Cemetery	C-17						
1248 Blakeslee Street	C-18						
Union St & E. Hopkins St.	C-19						

Figure 3

RK & Associates, Inc.

Graphic Packaging International
Scentometer Readings
Perimeter & Community Locations

Odor Monitoring Event								Average
Wind Direction								
Odor Complaints								
Monitoring Time								
Downwind Scentometer Readings								
Perimeter Locations								
Paterson St & Walbridge St	P-1							
Paterson St & Porter St	P-2							
Graphic Packaging – Gate 2	P-3							
Graphic Packaging – Gate 5	P-4							
Graphic Packaging – Gate 6	P-5							
Community Locations								
Paterson St & Harrison St	C-1							
Harrison St at WWT Plant gate	C-2							
Kalamazoo River Watershed Council Parking Lot	C-3							
Kalamazoo Township Parking Lot	C-4							
Riverview Dr & Old Riverview Sav Rd	C-5							
East side of Verburg Park Parking Lot	C-6							
Kalamazoo County Juvenile Home Parking Lot	C-7							
Dunkley St & Edwards St	C-8							
Prouty St & Edwards St	C-9							
Paterson S & Edwards St	C-10							
Parsons St & Porter St	C-11							
St. Mary Catholic Church Parking Lot	C-12							
Borgress Medical Center Entrance Parking Lot	C-13							
Neurosurgery of Kalamazoo Parking Lot	C-14							
Borgress Medical at Lawrence Educational Ctr Parking Lot	C-15							
E Paterson St & Riverview Dr at Walgreens Parking Lot	C-16							
Front Entrance of Mt. Olivet Cemetery	C-17							
1248 Blakeslee Street	C-18							
Union St & E. Hopkins St.	C-19							
Upwind Scentometer Readings								
Perimeter Locations								
Paterson St & Walbridge St	P-1							
Paterson St & Porter St	P-2							
Graphic Packaging – Gate 2	P-3							
Graphic Packaging – Gate 5	P-4							
Graphic Packaging – Gate 6	P-5							
Community Locations								
Paterson St & Harrison St	C-1							
Harrison St at WWT Plant gate	C-2							
Kalamazoo River Watershed Council Parking Lot	C-3							
Kalamazoo Township Parking Lot	C-4							
Riverview Dr & Old Riverview Sav Rd	C-5							
East side of Verburg Park Parking Lot	C-6							
Kalamazoo County Juvenile Home Parking Lot	C-7							
Dunkley St & Edwards St	C-8							
Prouty St & Edwards St	C-9							
Paterson S & Edwards St	C-10							
Parsons St & Porter St	C-11							
St. Mary Catholic Church Parking Lot	C-13							
Borgress Medical Center Entrance Parking Lot	C-14							
Neurosurgery of Kalamazoo Parking Lot	C-15							
Borgress Medical at Lawrence Educational Ctr Parking Lot	C-16							
E Paterson St & Riverview Dr at Walgreens Parking Lot	C-17							
Front Entrance of Mt. Olivet Cemetery	C-18							
1248 Blakeslee Street	C-19							
Union St & E. Hopkins St.								



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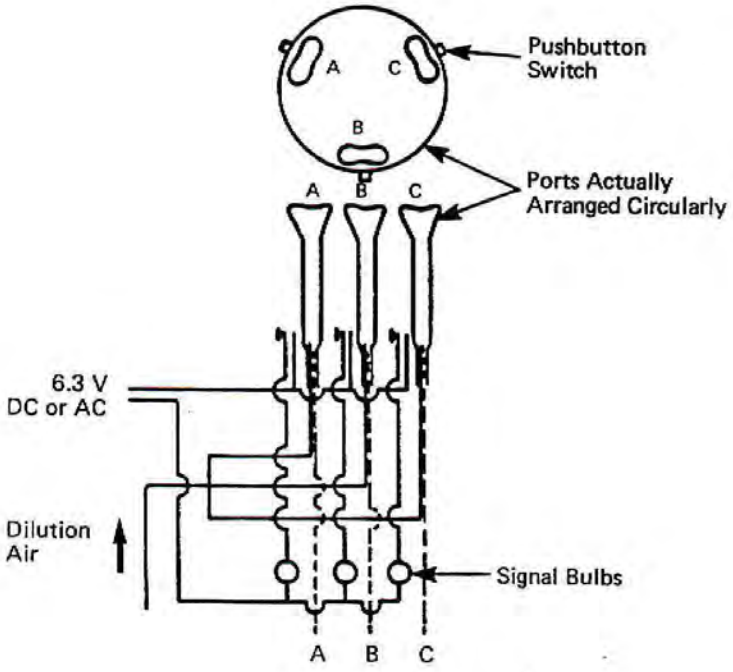
COMMENTS:
Odor Management and Monitoring Plan – Graphic Packaging International

OLFACTOMETER

FIGURE
4

DRAWN BY::	APPROVED BY::	PROJECT NUMBER	DATE DRAWN:	REVISED DATE



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COMMENTS:
Odor Management and Monitoring Plan – Graphic Packaging International

OLFACTOMETER DILUTION LEVEL

FIGURE
5

DRAWN BY::	APPROVED BY::	PROJECT NUMBER	DATE DRAWN:	REVISED DATE

Odor Investigation Results

Graphic Packaging International, LLC's Recycled Paperboard Mill

in Kalamazoo, MI

November, 2020

APPENDIX B

Graphic Packaging International
Scentometer Readings
Perimeter & Community Locations

Odor Monitoring Date		9-Jul-20		10-Jul-20		13-Jul-20		14-Jul-20		16-Jul-20		20-Jul-20		22-Jul-20	
Monitoring Time		11:00 - 14:13		14:16-16:57		14:21-16:24		14:36-16:40		8:46-10:38		8:43-10:22		13:56-15:43	
Wind Direction		SSW-SSE		NW-SW		NNW-NNE		WSW-ESE		N-NNW		N-W		S-SSW	
Downwind Scentometer Readings															
Perimeter Locations		D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm
Paterson St & Walbridge St	P-1	-	-	< 15	0.000	< 15	0.001	-	-	< 2	0.000	-	-	-	-
Paterson St & Porter St	P-2	-	-	0	0.000	< 4	0.001	-	-	< 2	0.000	-	-	-	-
Graphic Packaging – Gate 2	P-3	-	-	-	-	-	-	0	0.002	< 2	0.000	-	-	-	-
Graphic Packaging – Gate 5	P-4	-	-	-	-	-	-	0	0.001	< 2	0.000	-	-	-	-
Graphic Packaging – Gate 6	P-5	-	-	-	-	-	-	< 2	0.001	-	-	-	-	-	-
Paterson St & Harrison St	C-1	-	-	< 2	0.002	0	0.000	-	-	0	0.000	< 2	0.001	-	-
Harrison St at WWT Plant gate	C-2	< 7	0.010	-	-	-	-	0	0.001	-	-	< 4	0.002	< 2	0.000
East side of Verburg Park Parking Lot	C-6	-	-	< 4	0.001	< 15	0.001	-	-	< 2	0.000	0	0.000	0	0.000
Community Locations															
Kalamazoo River Watershed Council Parking Lot	C-3	< 4	0.002	< 2	0.002	-	-	-	-	-	-	-	-	< 2	0.000
Kalamazoo Township Parking Lot	C-4	< 2	0.003	< 2	0.001	-	-	-	-	-	-	-	-	0	0.000
Riverview Dr & Old Riverview Sav Rd	C-5	< 2	0.002	-	-	-	-	< 2	0.001	-	-	-	-	0	0.000
Kalamazoo County Juvenile Home Parking Lot	C-7	-	-	0	0.000	-	-	-	-	-	-	0	0.000	-	-
Dunkley St & Edwards St	C-8	< 2	0.003	-	-	-	-	-	-	-	-	-	-	-	-
Prouty St & Edwards St	C-9	< 2	0.002	-	-	-	-	-	-	-	-	-	-	-	-
Paterson S & Edwards St	C-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parsons St & Porter St	C-11	-	-	-	-	< 4	0.002	-	-	-	-	-	-	-	-
St. Mary Catholic Church Parking Lot	C-12	-	-	< 2	0.001	-	-	-	-	-	-	< 2	0.000	-	-
Borgress Medical Center Entrance Parking Lot	C-13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neurosurgery of Kalamazoo Parking Lot	C-14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Borgress Medical at Lawrence Educational Ctr Parking Lot	C-15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E Paterson St & Riverview Dr at Walgreens Parking Lot	C-16	-	-	< 2	0.002	-	-	-	-	-	-	< 2	0.001	-	-
Front Entrance of Mt. Olivet Cemetery	C-17	-	-	< 2	0.000	-	-	-	-	-	-	-	-	< 2	0.000
1248 Blakeslee Street	C-18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Union St & E. Hopkins St.	C-19	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upwind Scentometer Readings															
Perimeter Locations		D/T	H_2S ppm												
Paterson St & Walbridge St	P-1	0	0.007	-	-	-	-	0	0.001	-	-	< 2	0.001	< 2	0.000
Paterson St & Porter St	P-2	< 2	0.009	-	-	-	-	0	0.002	-	-	0	0.000	0	0.000
Graphic Packaging – Gate 2	P-3	0	0.006	0	0.000	< 2	0.000	-	-	-	-	< 2	0.000	0	0.000
Graphic Packaging – Gate 5	P-4	< 2	0.006	< 2	0.000	0	0.000	-	-	-	-	0	0.000	0	0.000
Graphic Packaging – Gate 6	P-5	0	0.008	0	0.001	< 2	0.001	-	-	0	0.000	0	0.000	0	0.000
Paterson St & Harrison St	C-1	0	0.007	-	-	-	-	0	0.002	-	-	-	-	0	0.000
Harrison St at WWT Plant gate	C-2	-	-	< 4	0.002	< 2	0.001	-	-	0	0.000	-	-	-	-
East side of Verburg Park Parking Lot	C-6	< 2	0.005	-	-	-	-	0	0.000	-	-	-	-	-	-
Community Locations															
Kalamazoo River Watershed Council Parking Lot	C-3	-	-	-	-	0	0.001	0	0.001	0	0.000	0	0.000	-	-
Kalamazoo Township Parking Lot	C-4	-	-	-	-	0	0.000	0	0.000	0	0.000	0	0.000	-	-
Riverview Dr & Old Riverview Sav Rd	C-5	-	-	< 2	0.000	0	0.000	-	-	0	0.000	0	0.000	-	-
Kalamazoo County Juvenile Home Parking Lot	C-7	< 2	0.002	-	-	0	0.000	< 2	0.000	0	0.000	-	-	0	0.000
Dunkley St & Edwards St	C-8	-	-	< 2	0.000	< 2	0.000	< 2	0.001	< 2	0.000	0	0.000	< 2	0.000
Prouty St & Edwards St	C-9	-	-	< 2	0.001	0	0.000	0	0.001	0	0.000	0	0.000	0	0.001
Paterson S & Edwards St	C-10	0	0.002	0	0.000	0	0.000	0	0.002	0	0.000	0	0.000	0	0.000
Parsons St & Porter St	C-11	< 2	0.002	0	0.000	-	-	0	0.001	0	0.000	0	0.000	0	0.000
St. Mary Catholic Church Parking Lot	C-12	< 2	0.006	-	-	0	0.001	0	0.001	< 2	0.000	-	-	0	0.000
Borgress Medical Center Entrance Parking Lot	C-13	0	0.002	0	0.001	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Neurosurgery of Kalamazoo Parking Lot	C-14	< 2	0.002	< 2	0.000	0	0.001	0	0.000	0	0.000	0	0.000	< 2	0.000
Borgress Medical at Lawrence Educational Ctr Parking Lot	C-15	< 2	0.002	0	0.008	< 2	0.000	0	0.000	0	0.000	0	0.000	0	0.000
E Paterson St & Riverview Dr at Walgreens Parking Lot	C-16	0	0.005	-	-	0	0.000	0	0.001	0	0.000	-	-	0	0.000
Front Entrance of Mt. Olivet Cemetery	C-17	< 7	0.002	-	-	0	0.000	< 2	0.000	< 2	0.000	< 2	0.000	-	-
1248 Blakeslee Street	C-18	< 7	0.002	0	0.001	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Union St & E. Hopkins St.	C-19	< 2	0.002	< 4	0.001	< 2	0.000	< 2	0.001	0	0.000	< 2	0.000	< 2	0.000

Odor Monitoring Date		24-Jul-20		28-Jul-20		29-Jul-20		30-Jul-20		4-Aug-20		5-Aug-20	
Monitoring Time		8:07-9:54		10:59-12:30		14:36-16:40		14:01-15:59		8:03-10:04		11:09-13:00	
Wind Direction		N-ENE		WNW-SW		WSW-S		N-NE		NNW		WNW-WSW	
Downwind Scentometer Readings													
Perimeter Locations		D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm
Paterson St & Walbridge St	P-1	< 2	0.002	0	0.000	-	-	< 2	0.000	< 2	0.000	< 2	0.000
Paterson St & Porter St	P-2	0	0.002	-	-	-	-	< 2	0.001	< 2	0.000	-	-
Graphic Packaging – Gate 2	P-3	< 2	0.000	-	-	-	-	-	-	0	0.000	-	-
Graphic Packaging – Gate 5	P-4	< 2	0.003	-	-	-	-	-	-	< 2	0.000	-	-
Graphic Packaging – Gate 6	P-5	-	-	-	-	-	-	-	-	-	-	-	-
Paterson St & Harrison St	C-1	< 2	0.000	0	0.001	-	-	< 4	0.000	< 2	0.000	< 4	0.006
Harrison St at WWT Plant gate	C-2	-	-	< 2	0.008	< 2	0.004	-	-	-	-	< 2	0.002
East side of Verburg Park Parking Lot	C-6	-	-	0	0.001	-	-	-	-	< 2	0.001	< 2	0.002
Community Locations													
Kalamazoo River Watershed Council Parking Lot	C-3	-	-	< 2	0.002	< 2	0.002	-	-	-	-	< 2	0.001
Kalamazoo Township Parking Lot	C-4	-	-	0	0.001	0	0.001	-	-	-	-	0	0.000
Riverview Dr & Old Riverview Sav Rd	C-5	-	-	-	-	0	0.001	-	-	-	-	-	-
Kalamazoo County Juvenile Home Parking Lot	C-7	-	-	< 2	0.001	0	0.000	-	-	-	-	0	0.000
Dunkley St & Edwards St	C-8	-	-	-	-	-	-	-	-	-	-	-	-
Prouty St & Edwards St	C-9	-	-	-	-	-	-	-	-	-	-	-	-
Paterson S & Edwards St	C-10	0	0.000	-	-	-	-	< 4	0.000	-	-	-	-
Parsons St & Porter St	C-11	0	0.000	-	-	-	-	< 2	0.000	< 2	0.000	-	-
St. Mary Catholic Church Parking Lot	C-12	-	-	< 2	0.000	-	-	-	-	-	-	-	-
Borgress Medical Center Entrance Parking Lot	C-13	-	-	0	0.000	0	0.000	-	-	-	-	< 2	0.000
Neurosurgery of Kalamazoo Parking Lot	C-14	-	-	-	-	< 2	0.001	-	-	-	-	< 2	0.000
Borgress Medical at Lawrence Educational Ctr Parking Lot	C-15	-	-	< 2	0.000	0	0.000	-	-	-	-	0	0.000
E Paterson St & Riverview Dr at Walgreens Parking Lot	C-16	-	-	-	-	-	-	-	-	< 2	0.000	-	-
Front Entrance of Mt. Olivet Cemetery	C-17	-	-	< 2	0.000	< 2	0.000	-	-	-	-	-	-
1248 Blakeslee Street	C-18	-	-	-	-	-	-	-	-	-	-	-	-
Union St & E. Hopkins St.	C-19	-	-	-	-	-	-	-	-	-	-	-	-
Upwind Scentometer Readings													
Perimeter Locations													
Paterson St & Walbridge St	P-1	-	-	-	-	0	0.001	-	-	-	-	-	-
Paterson St & Porter St	P-2	-	-	0	0.000	0	0.000	-	-	-	-	0	0.000
Graphic Packaging – Gate 2	P-3	-	-	0	0.000	0	0.000	0	0.000	-	-	0	0.001
Graphic Packaging – Gate 5	P-4	-	-	< 2	0.000	0	0.000	0	0.005	-	-	0	0.000
Graphic Packaging – Gate 6	P-5	0	0.000	0	0.001	< 2	0.001	0	0.001	0	0.000	0	0.000
Paterson St & Harrison St	C-1	-	-	-	-	0	0.000	-	-	-	-	-	-
Harrison St at WWT Plant gate	C-2	0	0.000	-	-	-	-	< 2	0.000	< 2	0.000	-	-
East side of Verburg Park Parking Lot	C-6	< 2	0.002	-	-	0	0.001	0	0.000	-	-	-	-
Community Locations													
Kalamazoo River Watershed Council Parking Lot	C-3	0	0.000	-	-	-	-	0	0.000	0	0.000	-	-
Kalamazoo Township Parking Lot	C-4	0	0.000	-	-	-	-	0	0.000	0	0.000	-	-
Riverview Dr & Old Riverview Sav Rd	C-5	0	0.000	0	0.002	-	-	0	0.000	0	0.000	0	0.000
Kalamazoo County Juvenile Home Parking Lot	C-7	0	0.000	-	-	-	-	0	0.000	0	0.000	-	-
Dunkley St & Edwards St	C-8	0	0.000	0	0.000	0	0.001	< 2	0.000	0	0.000	0	0.000
Prouty St & Edwards St	C-9	0	0.000	0	0.001	< 4	0.001	0	0.001	0	0.000	0	0.000
Paterson S & Edwards St	C-10	-	-	0	0.000	0	0.002	-	-	0	0.001	0	0.000
Parsons St & Porter St	C-11	-	-	0	0.000	0	0.001	-	-	-	-	0	0.000
St. Mary Catholic Church Parking Lot	C-12	0	0.000	-	-	0	0.001	0	0.000	0	0.000	0	0.000
Borgress Medical Center Entrance Parking Lot	C-13	0	0.000	-	-	-	-	0	0.000	0	0.000	-	-
Neurosurgery of Kalamazoo Parking Lot	C-14	0	0.000	0	0.000	-	-	0	0.000	0	0.000	-	-
Borgress Medical at Lawrence Educational Ctr Parking Lot	C-15	0	0.000	-	-	-	-	0	0.000	0	0.000	-	-
E Paterson St & Riverview Dr at Walgreens Parking Lot	C-16	0	0.000	0	0.000	0	0.001	0	0.001	-	-	0	0.000
Front Entrance of Mt. Olivet Cemetery	C-17	< 2	0.000	-	-	-	-	0	0.000	< 2	0.000	0	0.000
1248 Blakeslee Street	C-18	0	0.000	0	0.000	0	0.000	< 2	0.000	0	0.000	0	0.000
Union St & E. Hopkins St.	C-19	0	0.000	0	0.000	0	0.000	0	0.000	< 2	0.000	0	0.000

Odor Monitoring Date		7-Aug-20		10-Aug-20		12-Aug-20		13-Aug-20		17-Aug-20		18-Aug-20		21-Aug-20	
Monitoring Time		11:01-12:32		8:03-9:22		14:13-15:47		11:05-12:31		10:59-12:28		14:-08-15:53		11:05-12:34	
Wind Direction		NNE-SE		S-W		NW-SSE		N-NE		N-NW		NE-NW		WSW-NW	
Downwind Scentometer Readings															
Perimeter Locations		D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm
Paterson St & Walbridge St	P-1	< 2	0.000	-	-	< 2	0.002	< 2	0.002	< 2	0.002	< 2	0.000	-	-
Paterson St & Porter St	P-2	< 2	0.002	-	-	< 2	0.002	< 2	0.006	-	-	-	-	-	-
Graphic Packaging – Gate 2	P-3	0	0.001	-	-	0	0.002	0	0.000	< 2	0.004	0	0.002	-	-
Graphic Packaging – Gate 5	P-4	< 4	0.004	-	-	-	-	< 4	0.005	< 2	0.000	< 2	0.003	-	-
Graphic Packaging – Gate 6	P-5	-	-	-	-	< 2	0.004	-	-	-	-	-	-	-	-
Paterson St & Harrison St	C-1	-	-	< 2	0.002	-	-	< 2	0.001	< 2	0.002	0	0.000	< 2	0.004
Harrison St at WWT Plant gate	C-2	-	-	-	-	< 2	0.002	-	-	< 2	0.000	< 2	0.001	< 2	0.004
East side of Verburg Park Parking Lot	C-6	-	-	-	-	-	-	-	-	0	0.001	< 7	0.001	< 2	0.001
Community Locations															
Kalamazoo River Watershed Council Parking Lot	C-3	-	-	0	0.000	-	-	-	-	< 2	0.001	-	-	-	-
Kalamazoo Township Parking Lot	C-4	-	-	0	0.000	-	-	-	-	-	-	-	-	-	-
Riverview Dr & Old Riverview Sav Rd	C-5	-	-	0	0.000	-	-	-	-	-	-	-	-	-	-
Kalamazoo County Juvenile Home Parking Lot	C-7	-	-	< 2	0.001	-	-	-	-	-	-	-	-	0	0.000
Dunkley St & Edwards St	C-8	-	-	-	-	< 2	0.002	-	-	-	-	-	-	-	-
Prouty St & Edwards St	C-9	< 2	0.002	-	-	0	0.001	0	0.000	-	-	-	-	-	-
Paterson S & Edwards St	C-10	< 2	0.001	-	-	0	0.001	0	0.001	-	-	-	-	-	-
Parsons St & Porter St	C-11	< 2	0.000	-	-	0	0.001	0	0.000	-	-	< 4	0.002	-	-
St. Mary Catholic Church Parking Lot	C-12	-	-	-	-	-	-	-	-	-	-	0	0.000	-	-
Borgress Medical Center Entrance Parking Lot	C-13	-	-	< 2	0.000	-	-	-	-	-	-	-	-	0	0.000
Neurosurgery of Kalamazoo Parking Lot	C-14	-	-	< 2	0.000	-	-	-	-	-	-	-	-	0	0.000
Borgress Medical at Lawrence Educational Ctr Parking Lot	C-15	-	-	0	0.000	-	-	-	-	-	-	-	-	0	0.000
E Paterson St & Riverview Dr at Walgreens Parking Lot	C-16	-	-	-	-	-	-	-	-	0	0.000	-	-	-	-
Front Entrance of Mt. Olivet Cemetery	C-17	-	-	< 2	0.000	-	-	-	-	-	-	-	-	-	-
1248 Blakeslee Street	C-18	-	-	-	-	-	-	0	0.000	-	-	-	-	-	-
Union St & E. Hopkins St.	C-19	-	-	-	-	< 2	0.002	-	-	-	-	-	-	-	-
Upwind Scentometer Readings															
Perimeter Locations															
Paterson St & Walbridge St	P-1	-	-	0	0.000	-	-	-	-	-	-	-	-	0	0.001
Paterson St & Porter St	P-2	-	-	0	0.000	-	-	-	-	0	0.000	0	0.001	0	0.000
Graphic Packaging – Gate 2	P-3	-	-	0	0.000	-	-	-	-	-	-	-	-	0	0.001
Graphic Packaging – Gate 5	P-4	-	-	0	0.000	0	0.002	-	-	-	-	-	-	0	0.000
Graphic Packaging – Gate 6	P-5	0	0.002	0	0.002	-	0.004	0	0.001	0	0.001	0	0.002	0	0.001
Paterson St & Harrison St	C-1	0	0.001	-	-	0	0.001	-	-	-	-	-	-	-	-
Harrison St at WWT Plant gate	C-2	0	0.000	0	0.000	-	-	0	0.000	-	-	-	-	-	-
East side of Verburg Park Parking Lot	C-6	< 2	0.001	0	0.000	0	0.002	< 2	0.002	-	-	-	-	-	-
Community Locations															
Kalamazoo River Watershed Council Parking Lot	C-3	< 2	0.000	-	-	0	0.002	0	0.001	-	-	0	0.000	0	0.000
Kalamazoo Township Parking Lot	C-4	< 4	0.001	-	-	0	0.001	0	0.001	0	0.001	0	0.000	0	0.000
Riverview Dr & Old Riverview Sav Rd	C-5	< 2	0.001	-	-	0	0.002	0	0.000	0	0.000	0	0.001	0	0.000
Kalamazoo County Juvenile Home Parking Lot	C-7	0	0.000	-	-	0	0.001	0	0.001	0	0.000	0	0.000	-	-
Dunkley St & Edwards St	C-8	0	0.000	0	0.000	-	-	0	0.000	0	0.000	0	0.000	0	0.000
Prouty St & Edwards St	C-9	-	-	0	0.000	-	-	-	-	0	0.000	0	0.000	0	0.000
Paterson S & Edwards St	C-10	-	-	0	0.000	-	-	-	-	0	0.000	0	0.001	0	0.000
Parsons St & Porter St	C-11	-	-	0	0.000	-	-	-	-	0	0.000	-	-	0	0.000
St. Mary Catholic Church Parking Lot	C-12	0	0.000	0	0.000	0	0.001	0	0.000	< 2	0.000	-	-	0	0.000
Borgress Medical Center Entrance Parking Lot	C-13	0	0.001	-	-	0	0.000	0	0.000	0	0.000	0	0.000	-	-
Neurosurgery of Kalamazoo Parking Lot	C-14	0	0.000	-	-	0	0.001	0	0.001	0	0.000	0	0.001	-	-
Borgress Medical at Lawrence Educational Ctr Parking Lot	C-15	0	0.000	-	-	< 2	0.001	0	0.000	0	0.000	0	0.001	-	-
E Paterson St & Riverview Dr at Walgreens Parking Lot	C-16	0	0.002	0	0.000	0	0.002	0	0.006	-	-	0	0.001	0	0.000
Front Entrance of Mt. Olivet Cemetery	C-17	0	0.000	-	-	0	0.001	0	0.000	0	0.000	0	0.000	0	0.000
1248 Blakeslee Street	C-18	0	0.000	< 2	0.000	0	0.000	-	-	0	0.000	0	0.000	0	0.000
Union St & E. Hopkins St.	C-19	0	0.000	0	0.000	-	-	0	0.000	0	0.000	0	0.000	0	0.001

Odor Monitoring Date		25-Aug-20		26-Aug-20		27-Aug-20		1-Sep-20		3-Sep-20		4-Sep-20		Average	
Monitoring Time		8:15-9:37		8:05-9:28		8:10-9:27		11:04-12:27		11:04-12:28		8:02-9:29			
Wind Direction		S-N		S-E		SW-WNW		NE-N		WSW-SSW		S-ENE			
Downwind Scentometer Readings															
Perimeter Locations		D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm	D/T	H_2S ppm
Paterson St & Walbridge St	P-1	< 2	0.000	-	-	-	-	< 2	0.001	< 2	0.000	0	0.003	3.3	0.001
Paterson St & Porter St	P-2	-	-	-	-	-	-	0	0.001	-	-	-	-	1.6	0.002
Graphic Packaging – Gate 2	P-3	-	-	-	-	-	-	0	0.000	-	-	-	-	0.6	0.001
Graphic Packaging – Gate 5	P-4	< 2	0.000	-	-	-	-	0	0.001	-	-	-	-	2.0	0.002
Graphic Packaging – Gate 6	P-5	-	-	0	0.004	-	-	-	-	< 2	0.005	-	-	1.5	0.004
Paterson St & Harrison St	C-1	< 2	0.000	-	-	-	-	0	0.000	-	-	0	0.002	1.5	0.001
Harrison St at WWT Plant gate	C-2	< 2	0.002	0	0.002	< 2	0.003	< 2	0.001	< 2	0.004	< 2	0.003	2.2	0.003
East side of Verburg Park Parking Lot	C-6	< 2	0.000	-	-	-	-	< 2	0.001	-	-	0	0.002	2.7	0.001
Community Locations															
Kalamazoo River Watershed Council Parking Lot	C-3	-	-	-	-	< 2	0.002	-	-	< 2	0.000	-	-	2.0	0.001
Kalamazoo Township Parking Lot	C-4	-	-	0	0.001	0	0.000	-	-	< 2	0.000	< 2	0.002	0.7	0.001
Riverview Dr & Old Riverview Sav Rd	C-5	-	-	0	0.001	-	-	-	-	0	0.001	< 2	0.003	0.8	0.001
Kalamazoo County Juvenile Home Parking Lot	C-7	-	-	-	-	0	0.000	0	0.000	-	-	-	-	0.4	0.000
Dunkley St & Edwards St	C-8	-	-	-	-	-	-	-	-	-	-	-	-	2.0	0.003
Prouty St & Edwards St	C-9	-	-	0	0.002	-	-	-	-	-	-	-	-	0.8	0.001
Paterson S & Edwards St	C-10	-	-	-	-	-	-	-	-	-	-	-	-	1.2	0.001
Parsons St & Porter St	C-11	-	-	-	-	-	-	-	-	-	-	-	-	1.8	0.001
St. Mary Catholic Church Parking Lot	C-12	-	-	-	-	-	-	-	-	-	-	-	-	1.5	0.000
Borgress Medical Center Entrance Parking Lot	C-13	-	-	-	-	-	-	-	-	-	-	-	-	0.8	0.000
Neurosurgery of Kalamazoo Parking Lot	C-14	-	-	-	-	< 2	0.002	-	-	0	0.001	-	-	1.3	0.001
Borgress Medical at Lawrence Educational Ctr Parking Lot	C-15	-	-	-	-	-	-	-	-	-	-	-	-	0.4	0.000
E Paterson St & Riverview Dr at Walgreens Parking Lot	C-16	< 2	0.000	-	-	-	-	0	0.003	-	-	0	0.001	1.1	0.001
Front Entrance of Mt. Olivet Cemetery	C-17	-	-	-	-	0	0.000	-	-	0	0.002	< 2	0.003	1.5	0.001
1248 Blakeslee Street	C-18	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.000
Union St & E. Hopkins St.	C-19	-	-	-	-	-	-	-	-	-	-	-	-	2.0	0.002
Upwind Scentometer Readings															
Perimeter Locations															
Paterson St & Walbridge St	P-1	-	-	0	0.002	< 4	0.000	-	-	-	-	-	-	0.9	0.001
Paterson St & Porter St	P-2	0	0.000	< 2	0.002	0	0.000	-	-	0	0.000	0	0.003	0.3	0.001
Graphic Packaging – Gate 2	P-3	0	0.000	0	0.002	< 2	0.005	-	-	0	0.001	< 2	0.003	0.5	0.001
Graphic Packaging – Gate 5	P-4	-	-	0	0.002	0	0.000	-	-	0	0.000	0	0.000	0.4	0.001
Graphic Packaging – Gate 6	P-5	0	0.000	-	-	0	0.000	0	0.003	-	-	< 2	0.000	0.3	0.001
Paterson St & Harrison St	C-1	-	-	0	0.002	0	0.000	-	-	0	0.001	-	-	0.0	0.002
Harrison St at WWT Plant gate	C-2	-	-	-	-	-	-	-	-	-	-	-	-	1.1	0.000
East side of Verburg Park Parking Lot	C-6	-	-	0	0.002	0	0.000	-	-	0	0.001	-	-	0.7	0.001
Community Locations															
Kalamazoo River Watershed Council Parking Lot	C-3	0	0.000	0	0.003	-	-	0	0.001	-	-	< 2	0.002	0.3	0.001
Kalamazoo Township Parking Lot	C-4	0	0.000	-	-	-	-	0	0.000	-	-	-	-	0.3	0.000
Riverview Dr & Old Riverview Sav Rd	C-5	< 4	0.000	-	-	< 2	0.000	0	0.001	-	-	-	-	0.6	0.000
Kalamazoo County Juvenile Home Parking Lot	C-7	0	0.000	0	0.003	-	-	-	-	0	0.001	0	0.002	0.2	0.001
Dunkley St & Edwards St	C-8	0	0.000	< 2	0.002	0	0.000	0	0.000	0	0.001	0	0.002	0.6	0.000
Prouty St & Edwards St	C-9	0	0.000	-	-	0	0.000	0	0.000	0	0.001	0	0.001	0.3	0.000
Paterson S & Edwards St	C-10	0	0.000	0	0.002	0	0.000	0	0.001	0	0.000	0	0.001	0.0	0.001
Parsons St & Porter St	C-11	0	0.000	0	0.002	0	0.000	0	0.000	0	0.000	0	0.001	0.1	0.000
St. Mary Catholic Church Parking Lot	C-12	< 2	0.000	0	0.003	0	0.000	0	0.001	0	0.001	0	0.002	0.4	0.001
Borgress Medical Center Entrance Parking Lot	C-13	0	0.000	0	0.002	0	0.000	0	0.000	0	0.001	0	0.001	0.0	0.000
Neurosurgery of Kalamazoo Parking Lot	C-14	0	0.000	0	0.002	-	-	0	0.000	-	-	0	0.002	0.3	0.001
Borgress Medical at Lawrence Educational Ctr Parking Lot	C-15	0	0.000	0	0.002	0	0.000	0	0.000	0	0.001	0	0.002	0.3	0.001
E Paterson St & Riverview Dr at Walgreens Parking Lot	C-16	-	-	0	0.003	0	0.000	-	-	0	0.001	-	-	0.0	0.001
Front Entrance of Mt. Olivet Cemetery	C-17	0	0.000	0	0.002	-	-	0	0.000	-	-	-	-	0.9	0.000
1248 Blakeslee Street	C-18	0	0.000	< 2	0.000	0	0.000	0	0.000	0	0	< 2	0	0.6	0.000
Union St & E. Hopkins St.	C-19	0	0.000	0	0.002	0	0.000	0	0.000	0	0.000	0	0.001	0.6	0.000

Papermill/Porcess Wastewater

Municipal Wastewater

Mixed (Papermill Process WW and Municipal WW)

Other (not papermill & wastewater related)

Odor Investigation Results
Graphic Packaging International, LLC's Recycled Paperboard Mill
in Kalamazoo, MI

November, 2020

APPENDIX C

Odor Sample Collection and Olfactometry Analysis for Graphic Packaging International, LLC's Recycled Paperboard Mill in Kalamazoo, MI

August 18, 2020

Prepared for:

Graphic Packaging International, LLC

Prepared by:

RK & ASSOCIATES, INC

RK & Associates, Inc.

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1. INTRODUCTION

RK & Associates, Inc. (RKA) has been retained to investigate and evaluate odor levels at the Graphic Packaging International, LLC (GPI) recycled paperboard mill, located at 1500 North Pitcher Street in Kalamazoo, Michigan. An Odor Investigation Plan was developed for the GPI facility. The plan was approved by the Michigan Department of Environment, Great Lakes and Energy (MEGLE) on June 4, 2020.

The Odor Investigation Plan includes odor monitoring at selected locations along GPI property line and in nearby community, conducted three times a week, odor intensity being measured by Scentometer. The odor monitoring began on July 9, 2020. After about a month of field odor monitoring, the plan includes collecting samples inside the GPI facility for laboratory Olfactometry analysis using ASTM Method 679-11 and ASTM Data Series DS 61.

Sample were collected at the GPI facility for olfactometry analysis on August 10 & 11, 2020. Samples were analyzed at the RKA Olfactometry lab on August 12, 2020.

2. SAMPLE COLLECTION

RKA walked through the GPI facility on August 3, 2020 to identify sampling locations. GPI proposed sampling locations that could help with odor characterization of fugitive odor sources within the GPI facility. Nine (9) ambient air samples were collected as follows:

- K1 Operating Floor - Coating Kitchen
- K3 Dryer Mezzanine
- Stock Prep Building at News Pulper
- AES Building between Screens
- Clarifier (Downwind of Clarifier)
- Sludge Pile (Downwind of Sludge Pile)
- Sludge Drum Filter Outlet
- Parking Lot B (near discharge to WWTP)
- North of Stock Prep Building

A map of sampling locations and picture of each sampling spot are presented in Appendix A.

A Jerome J605 portable H_2S analyzer was used to measure ambient H_2S levels during sample collection. Samples were collected in 10-liter Tedlar bags, labeled, and transported to RKA Office for odor analysis. All samples were delivered in good condition.

3. SAMPLE ANALYSIS

Samples were analyzed for odor parameters as described below.

Odor Threshold: Samples were analyzed using an Olfactometer to measure odor thresholds of odorous samples in accordance with ASTM Method E-679-11 *Standard Practice for Determination of Odor and Taste Thresholds by a Forced-Choice Ascending Concentration Series Methods of Limits*. This method is performed using a group of odor panelists to smell various concentrations of an odorous sample diluted in odor free air to determine the number of dilutions required before the odor is no longer detected and the number of dilutions at which odor is recognizable. The responses of panelists are recorded and statically evaluated to determine the effective dilutions (ED) at which 50% of the panelists can no longer detect the presence of an odor. Dilution at which panelists can recognize odor is also reported.

Odor Characterization – "smells like" & "feels like": Samples were analyzed for odor characterization using relative intensity scale of 0 to 5 (faint to strong). For each sample panelists were asked to characterize the odor in one of the "feels like" and "smells like" descriptors.

Eight sensation descriptions of "feels like" were used: itching, tingling, warmth, burning, pungent, sharp, cool, and metallic.

Eight odor descriptor categories of "smells like" were used: vegetable, fruity, floral, medicinal, chemical, fishy, offensive, and earthy. Specific descriptors within each category are presented in Table 1.

Sample Sequence

The odor sample Chain of Custody was reviewed to rank the samples from the lowest to the highest odor level to determine the sequence of analysis to prevent a stronger odor from affecting a subsequent analysis of a weaker odor.

Table 1. Odor Descriptors

Vegetable	Fruity	Floral	Medicinal	Chemical	Fishy	Offensive	Earthy
Celery	Apple	Almond	Alcohol	Burnt Plastic	Amine	Flood	Ashes
Cucumber	Cherry	Cinnamon	Ammonia	Car Exhaust	Dead Fish	Burnt	Burnt Wood
Dill	Citrus	Coconut	Anesthetic	Cleaning fluid	Perm	Burnt Rubber	Chalk Like
Garlic	Cloves	Eucalyptus	Camphor	Coal	Solution	Decay	Coffee
Green pepper	Grapes	Fragrant	Chlorinous	Creosote		Fecal	Grain Silage
Nutty	Lemon	Herbal	Disinfectant	Diesel		Garbage	Grassy
Tomato	Maple	Lavender	Methanol	Gasoline		LF Leachate	Mold
Onion	Melon	Marigolds	Soapy	Grease		Manure	Mouse-like
	Minty	Perfumy	Vinegar	Foundry		Mercaptan	Mushroom
	Orange	Rose-like		Kerosene		Putrid	Musky
	Strawberry	Spicy		Molasses		Rancid	Musty
	Sweet	Vanilla		Mothball		Raw Meat	Peat-like
				Oil		Rotten Eggs	Pine
				Paint		Septic	Smokey
				Petroleum		Sewer	Stale
				Plastic		Sour	Swampy
				Resins		Spoiled Milk	Woody
				Solvent		Urine	Yeast
				Styrene		Vomit	
				Sulfur			
				Tar/Asphalt			
				Turpentine			
				Varnish			
				Vinegar			
				Vinyl			

4. ODOR ANALYSIS RESULTS

The measured odor detection thresholds ED_{50}, odor recognition threshold, and measured H_2S values are presented in Appendix B. Odor characterization for "smells like" and "feels like" spider graphs and histograms are shown in Appendix C.

If you have any questions or required any additional information, please do not hesitate to contact me at your convenience at 630-393-9000.

Respectfully submitted,
RK & Associates, Inc.

Darina Demirev
Project Engineer

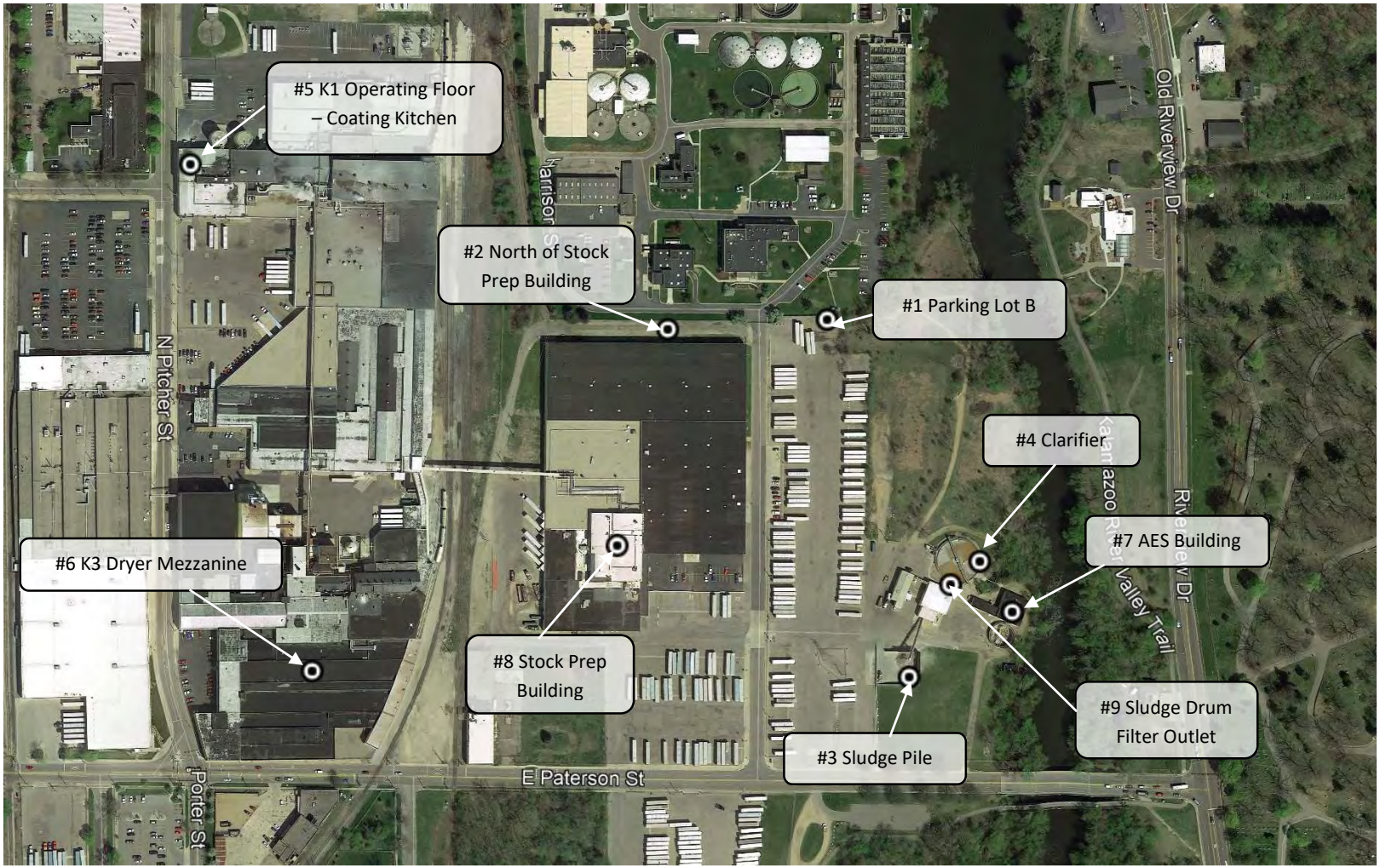
Attachments: Odor Panel Worksheets and Results

RK
& Associates, Inc.

Appendix A

GPI Sampling Locations

Samples Collected August 10 & 11, 2020



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630-393-9000
630-790-2966

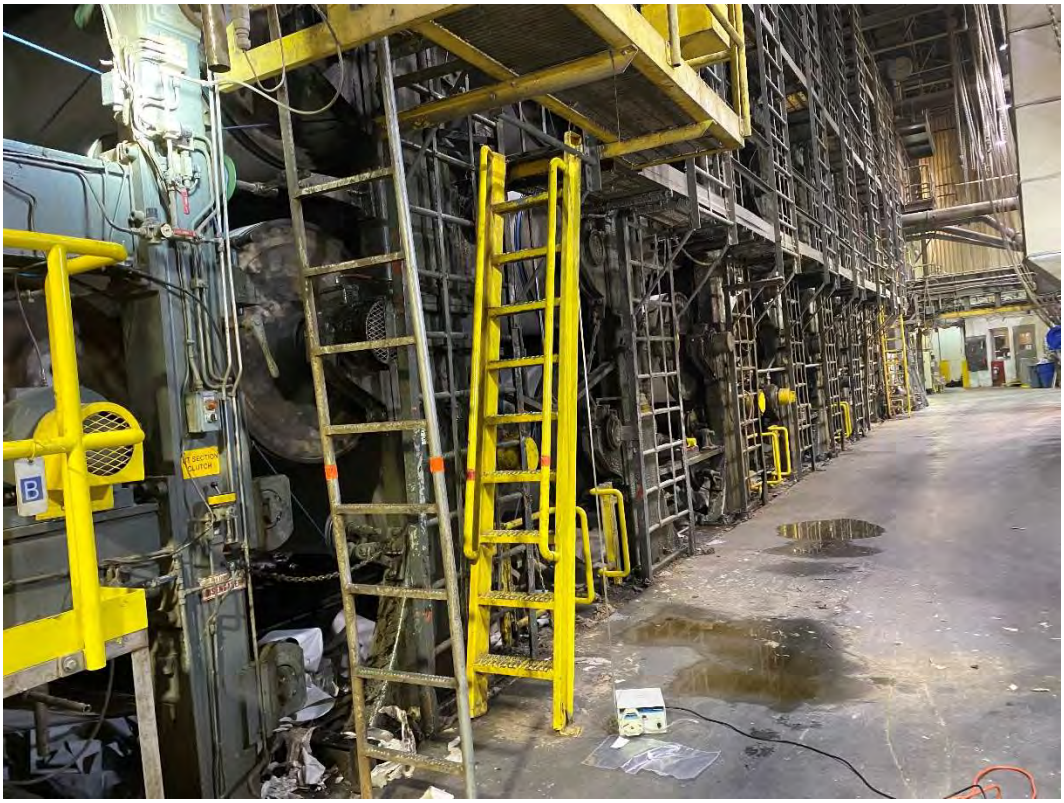
COMMENTS: Sampling Locations

Graphic Packaging International
Kalamazoo, MI

FIGURE 1

DRAWN BY:	APPROVED BY:	PROJECT NUMBER:	DATE DRAWN:	REVISED DATE
DD	SR	R19444	08-28-2020	01-18-2020

K1 Operationg Floor – Coating Kitchen



K3 Dryer Mezzanine

Stock Prep Building at News Pulper

AES Building between Screens

Clarifier (Downwind of Clarifier)

Sludge Pile (Downwind of Sludge Pile)

Sludge Drum Filter Outlet

Parking Lot B (near discharge to WWTP)

North of Stock Prep Building

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Appendix B

Odor Thresholds ED_{50} & Recognition Threshold

Odor Panel Results
Graphic Packaging International, LLC's

Analyzed on August 12, 2020

SUMMARY OF ODOR PANEL RESULTS

Client: **Graphic Packaging International** Date: **08/12/20**

Source: **Olfactometry Analysis**

Total No. of Samples: **9**

Sample No.	Sample Identification	Detection Threshold (ou/scf)	Recognition Threshold (ou/scf)	H_2S Reading (ppm)
1	Parking Lot B (near discharge to WWTP)	4	3	0.004
2	North of Stock Prep Building	3	3	0.003
3	Sludge Pile	4	3	0.002
4	Clarifier	41	15	0.033
5	K1 Operating Floor - Coating Kitchen	94	41	0.091
6	K3 Drayer Mezzanine	76	28	0.160
7	AES Building Between Screens	210	99	0.560
8	Stock Prep Building at News Pulper	127	46	0.810
9	Sludge Drum Filter Outlet	294	177	0.510
Detection Level		**3**	**3**	**0.001**

Suresh Relwani

signature

Suresh M. Relwani
Principal Engineer

12-Aug-20

date

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **Parking Lot B (near discharge to WWTP)**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **1** of **9**

Correct Choice	B

Attenuator Used	N
Sample Dil. Rate	

Panelist	Olfactometer Ports						
	1	2	3	4	5	6	>6
1121	T	T	C	C	B	T	B
1004	B	T	B	T	T	C	B
1002	B	T	C	B	B	T	B
1003	B	B	T	T	T	C	B
1074	T	T	B	B	C	C	B
1131	C	T	B	V	B	T	B
1132	C	T	B	B	T	B	
1130	T	T	C	C	C	B	

Log of ED_{50}:	0.61

ED_{50}:	4

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **North of Stock Prep Building**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **2** of **9**

Correct Choice	B

Attenuator Used	N
Sample Dil. Rate	

Panelist	Olfactometer Ports						
	1	2	3	4	5	6	>6
1121	B	T	B	B	T	C	B
1004	T	C	C	B	T	T	B
1002	B	C	C	C	C	T	B
1003	C	C	T	B	T	C	B
1074	T	C	C	C	C	C	B
1131	C	B	C	B	T	T	B
1132	C	B	T	C	C	C	B
1130	B	C	C	C	C	T	B

Log of ED_{50}:	0.47

ED_{50}:	3

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **Sludge Pile**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **3** of **9**

Correct Choice	B

Attenuator Used	N
Sample Dil. Rate	

	Olfactometer Ports						
Panelist	1	2	3	4	5	6	>6
1121	B	T	T	C	T	B	
1004	T	B	T	T	B	T	B
1002	B	C	B	C	C	T	B
1003	B	B	T	B	B	T	B
1074	C	B	T	T	C	T	B
1131	C	C	C	B	T	C	B
1132	T	C	B	B	T	C	B
1130	B	C	C	C	T	B	

Log of ED_{50}:	0.61

ED_{50}:	4

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **Clarifier**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **4** of **9**

Correct Choice	B

Attenuator Used	N
Sample Dil. Rate	

	Olfactometer Ports						
Panelist	1	2	3	4	5	6	>6
1121	T	C	C	B	B	B	
1004	T	T	T	B	B	B	
1002	B	T	C	B	B	B	
1003	B	B	B	B	T	B	
1074	T	C	T	B	B	B	
1131	B	C	B	B	C	B	
1132	B	T	T	B	B	B	
1130	B	C	B	C	B	B	

Log of ED_{50}:	1.62

ED_{50}:	41

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **K1 Operating Floor - Coating Kitchen**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **5** of **9**

Correct Choice	B

Attenuator Used	N
Sample Dil. Rate	

	Olfactometer Ports						
Panelist	1	2	3	4	5	6	>6
1121	B	T	C	**B**	B	B	
1004	B	T	T	**B**	B	B	
1002	B	C	**B**	B	B	B	
1003	T	C	T	**B**	B	B	
1074	T	C	**B**	B	B	B	
1131	B	C	T	C	**B**	B	
1132	T	**B**	B	B	B	B	
1130	T	B	C	T	**B**	B	

Log of ED_{50}:	1.97

ED_{50}:	94

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **K3 Drayer Mezzanine**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **6** of **9**

Correct Choice	B

Attenuator Used	N
Sample Dil. Rate	

	Olfactometer Ports						
Panelist	1	2	3	4	5	6	>6
1121	T	C	C	B	B	B	
1004	C	C	B	B	B	B	
1002	T	C	C	B	B	B	
1003	C	T	B	B	B	B	
1074	B	B	T	B	B	B	
1131	T	C	B	T	B	B	
1132	B	C	C	B	B	B	
1130	B	T	B	T	B	B	

Log of ED_{50}:	1.88

ED_{50}:	76

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **AES Building Between Screens**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **7** of **9**

Correct Choice	B

Attenuator Used	N
Sample Dil. Rate	

Panelist	Olfactometer Ports						
	1	2	3	4	5	6	>6
1121	T	C	B	B	B	B	
1004	T	B	T	B	B	B	
1002	T	C	B	B	B	B	
1003	T	T	B	B	B	B	
1074	T	B	B	B	B	B	
1131	T	B	B	B	B	B	
1132	T	B	B	B	B	B	
1130	T	T	C	B	B	B	

Log of ED_{50}:	2.32

ED_{50}:	210

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **Stock Prep Building at News Pulper**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **8** of **9**

Correct Choice	B

Attenuator Used	N
Sample Dil. Rate	

	Olfactometer Ports						
Panelist	1	2	3	4	5	6	>6
1121	C	C	B	B	B	B	
1004	T	C	B	B	B	B	
1002	B	C	T	B	B	B	
1003	C	B	C	B	B	B	
1074	T	C	B	B	B	B	
1131	B	C	C	B	B	B	
1132	T	C	B	B	B	B	
1130	T	C	C	B	B	B	

Log of ED_{50}:	2.10

ED_{50}:	127

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **Sludge Drum Filter Outlet**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **9** of **9**

Correct Choice	B

Attenuator Used	N
Sample Dil. Rate	

Panelist	Olfactometer Ports						
	1	2	3	4	5	6	>6
1121	C	B	B	B	B	B	
1004	T	C	B	B	B	B	
1002	B	C	B	B	B	B	
1003	B	C	B	B	B	B	
1074	B	T	B	B	B	B	
1131	T	B	B	B	B	B	
1132	T	B	B	B	B	B	
1130	C	B	B	B	B	B	

Log of ED_{50}:	2.47

ED_{50}:	294

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ODOR SAMPLE RECOGNITION THRESHOLD EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **Parking Lot B (near discharge to WWTP)**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **1** of **9**

Correct Choice	R

Attenuator Used	N
Sample Dil. Rate	

Panelist	Olfactometer Ports						
	1	2	3	4	5	6	>6
1121	NR	NR	NR	NR	NR	NR	R
1004	NR	NR	NR	NR	NR	NR	R
1002	NR	NR	NR	NR	NR	NR	R
1003	NR	NR	NR	NR	NR	NR	R
1074	NR	NR	NR	NR	NR	NR	R
1131	NR	NR	NR	NR	NR	NR	R
1132	NR	NR	NR	NR	NR	NR	R
1130	NR	NR	NR	NR	NR	NR	R

Log of ED_{50}:	0.47

ED_{50}:	3

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ODOR SAMPLE RECOGNITION THRESHOLD EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **North of Stock Prep Building**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **2** of **9**

Correct Choice	R

Attenuator Used	N
Sample Dil. Rate	

Panelist	Olfactometer Ports						
	1	2	3	4	5	6	>6
1121	NR	NR	NR	NR	NR	NR	R
1004	NR	NR	NR	NR	NR	NR	R
1002	NR	NR	NR	NR	NR	NR	R
1003	NR	NR	NR	NR	NR	NR	R
1074	NR	NR	NR	NR	NR	NR	R
1131	NR	NR	NR	NR	NR	NR	R
1132	NR	NR	NR	NR	NR	NR	R
1130	NR	NR	NR	NR	NR	NR	R

Log of ED_{50}:	0.47

ED_{50}:	3

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ODOR SAMPLE RECOGNITION THRESHOLD EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **Sludge Pile**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **3** of **9**

Correct Choice	R

Attenuator Used	N
Sample Dil. Rate	

Panelist	Olfactometer Ports						
	1	2	3	4	5	6	>6
1121	NR	NR	NR	NR	NR	NR	R
1004	NR	NR	NR	NR	NR	NR	R
1002	NR	NR	NR	NR	NR	NR	R
1003	NR	NR	NR	NR	NR	NR	R
1074	NR	NR	NR	NR	NR	NR	R
1131	NR	NR	NR	NR	NR	NR	R
1132	NR	NR	NR	NR	NR	NR	R
1130	NR	NR	NR	NR	NR	NR	R

Log of ED_{50}:	0.47

ED_{50}:	3

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ODOR SAMPLE RECOGNITION THRESHOLD EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **Clarifier**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **4** of **9**

Correct Choice	R

Attenuator Used	N
Sample Dil. Rate	

	Olfactometer Ports						
Panelist	1	2	3	4	5	6	>6
1121	NR	NR	NR	NR	R	R	
1004	NR	NR	NR	NR	R	R	
1002	NR	NR	NR	NR	R	R	
1003	NR	NR	NR	NR	NR	NR	R
1074	NR	NR	NR	NR	R	R	
1131	NR	NR	NR	NR	NR	R	
1132	NR	NR	NR	R	R	NR	
1130	NR	NR	NR	NR	NR	R	

Log of ED_{50}:	1.18

ED_{50}:	15

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **K1 Operating Floor - Coating Kitchen**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **5** of **9**

Correct Choice	R

Attenuator Used	N
Sample Dil. Rate	

	Olfactometer Ports						
Panelist	1	2	3	4	5	6	>6
1121	NR	NR	NR	R	R	R	
1004	NR	NR	NR	R	R	R	
1002	NR	NR	NR	R	R	R	
1003	NR	NR	NR	NR	R	R	
1074	NR	NR	NR	R	R	R	
1131	NR	NR	NR	NR	NR	R	
1132	NR	NR	NR	R	R	R	
1130	NR	NR	NR	NR	NR	R	

Log of ED_{50}:	1.62

ED_{50}:	41

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **K3 Drayer Mezzanine**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **6** of **9**

Correct Choice	R

Attenuator Used	N
Sample Dil. Rate	

	Olfactometer Ports						
Panelist	1	2	3	4	5	6	>6
1121	NR	NR	NR	R	R	R	
1004	NR	NR	NR	NR	R	R	
1002	NR	NR	NR	NR	R	R	
1003	NR	NR	NR	NR	NR	R	
1074	NR	NR	NR	NR	R	R	
1131	NR	NR	NR	NR	NR	R	
1132	NR	NR	NR	R	R	R	
1130	NR	NR	NR	NR	R	R	

Log of ED_{50}:	1.44

ED_{50}:	28

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **AES Building Between Screens**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **7** of **9**

Correct Choice	R

Attenuator Used	N
Sample Dil. Rate	

Panelist	Olfactometer Ports						
	1	2	3	4	5	6	>6
1121	NR	NR	NR	R	R	R	
1004	NR	NR	NR	R	R	R	
1002	NR	NR	NR	R	R	R	
1003	NR	NR	NR	R	R	R	
1074	NR	NR	R	R	R	R	
1131	NR	NR	R	R	R	R	
1132	NR	NR	NR	R	R	R	
1130	NR	NR	NR	R	R	R	

Log of ED_{50}:	1.99

ED_{50}:	99

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ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **Stock Prep Building at News Pulper**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **8** of **9**

Correct Choice	R

Attenuator Used	N
Sample Dil. Rate	

	Olfactometer Ports						
Panelist	1	2	3	4	5	6	>6
1121	NR	NR	NR	R	R	R	
1004	NR	NR	NR	R	R	R	
1002	NR	NR	NR	NR	R	R	
1003	NR	NR	NR	NR	NR	R	
1074	NR	NR	NR	R	R	R	
1131	NR	NR	NR	NR	R	R	
1132	NR	NR	NR	R	R	R	
1130	NR	NR	NR	R	R	R	

Log of ED_{50}:	1.67

ED_{50}:	46

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RK & Associates, Inc.

ODOR SAMPLE
ED_{50} EVALUATION FORM

Client: **Graphic Packaging International** Date: **08/12/20**

Project: **Olfactometry Analysis**

Sample ID: **Sludge Drum Filter Outlet**

Sample Dilution: **NA**

Operator: **Jenny** Sample: **9** of **9**

Correct Choice	R

Attenuator Used	N
Sample Dil. Rate	

Panelist	Olfactometer Ports						
	1	2	3	4	5	6	>6
1121	NR	NR	R	R	R	R	
1004	NR	NR	NR	R	R	R	
1002	NR	NR	R	R	R	R	
1003	NR	NR	R	R	R	R	
1074	NR	NR	NR	R	R	R	
1131	NR	NR	R	R	R	R	
1132	NR	R	R	R	R	R	
1130	NR	NR	R	R	R	R	

Log of ED_{50}:	2.25

ED_{50}:	177

2 South 631 Route 59 - Suite B
Warrenville, Illinois 60555

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FLOW CALIBRATION FOR DYNAMIC TRIANGLE OLFACTOMETER
(all flows in cc/min)

Date: **08/12/20** Time: **11:00 AM** Temp: **74.0** °F

Client: **Graphic Packaging International** Operator: **Jenny**

Project: **Olfactometry Analysis**

Enter Flow Measurements Below When Using Attenuator		
Flow Through Carbon	By-Pass Flow	Sample Attenuation Factor

Port No.	Dilution Level No.	Odor Sample Flow (at port)	Dilution Air Flow (at port)	Direct Sample Dilution Factor	No Attenuator		Attenuator Data		
					Log of Dilution Factor	Avg. Log Dilution Factor	Attenuator Dilution Factor	Log Dilution Factor	Avg. Log Dilution Factor
	7								
						0.47			
6	6	82.3	501.0	7.09	0.85				
						1.03			
5	5	31.9	491.0	16.39	1.21				
						1.43			
4	4	11.5	496.0	44.13	1.64				
						1.89			
3	3	3.7	498.0	134.51	2.13				
						2.32			
2	2	1.6	502.0	320.75	2.51				
						2.62			
1	1	0.9	505.0	538.23	2.73				
						2.97			
	< 1								

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Appendix C

Odor Characterization

Odor Panel Results
Graphic Packaging International, LLC's

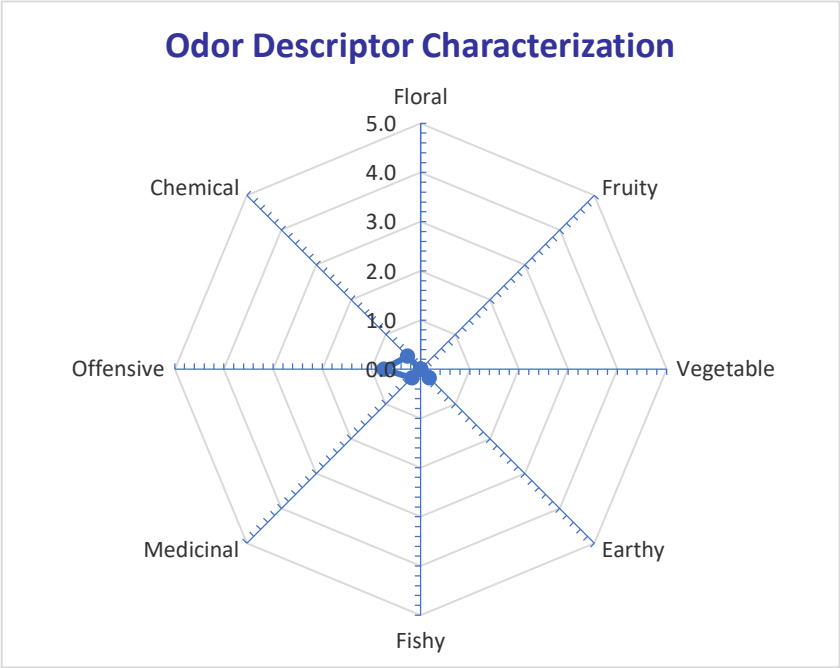
Analyzed on August 12, 2020

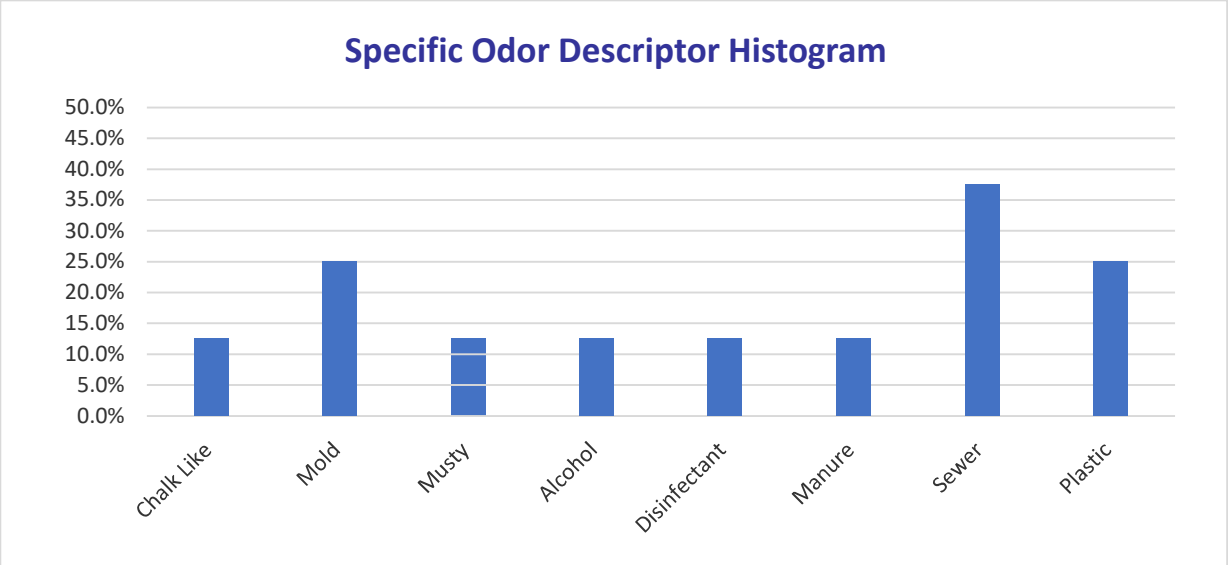
ODOR CHARACTERIZATION

Client: **Graphic Packaging International** Date: **08/12/20**

Sample ID: **Parking Lot B (near discharge to WWTP)**

Odor Descriptor Category	Odor Descriptor Intensity
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.3
Fishy	0.0
Medicinal	0.3
Offensive	0.8
Chemical	0.4



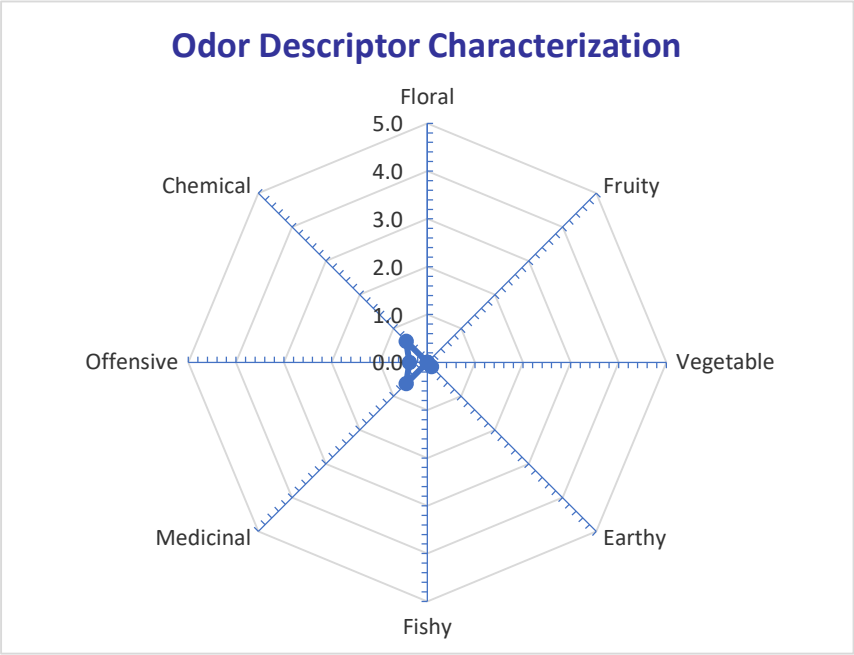


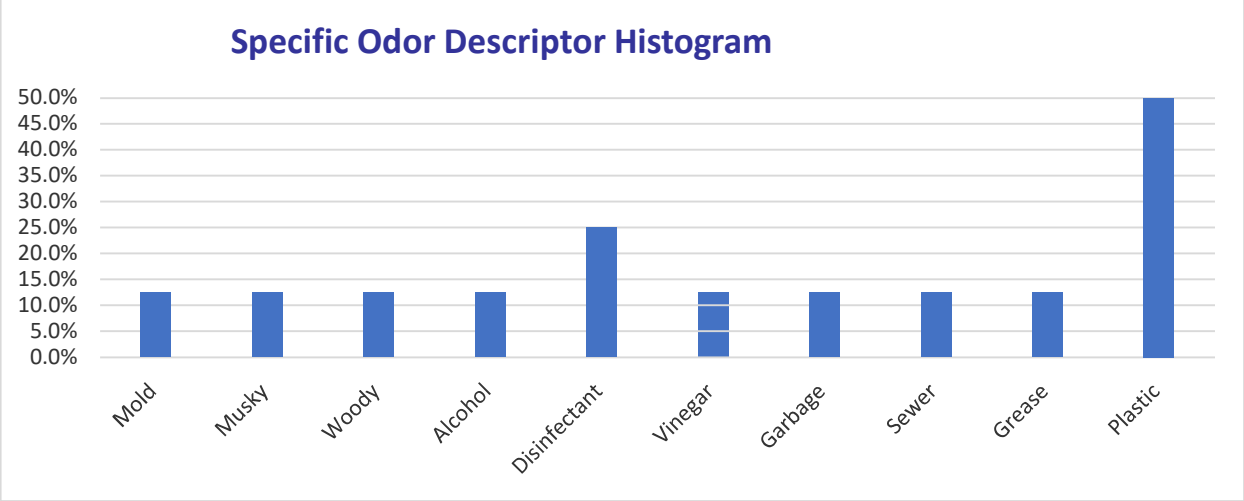
ODOR CHARACTERIZATION

Client: **Graphic Packaging International** Date: **08/12/20**

Sample ID: **North of Stock Prep Building**

Odor Descriptor Category	Odor Descriptor Intensity
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.1
Fishy	0.0
Medicinal	0.6
Offensive	0.4
Chemical	0.6



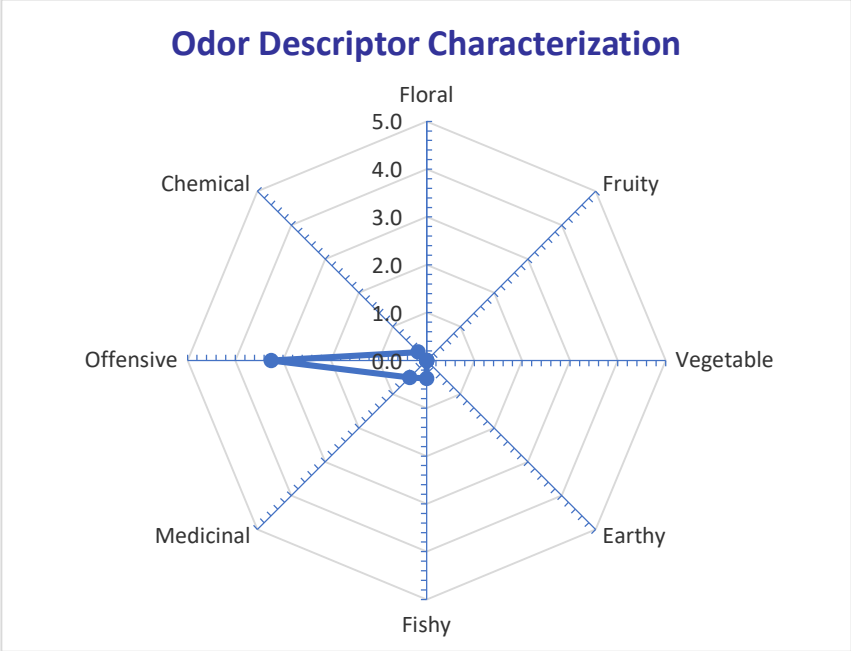


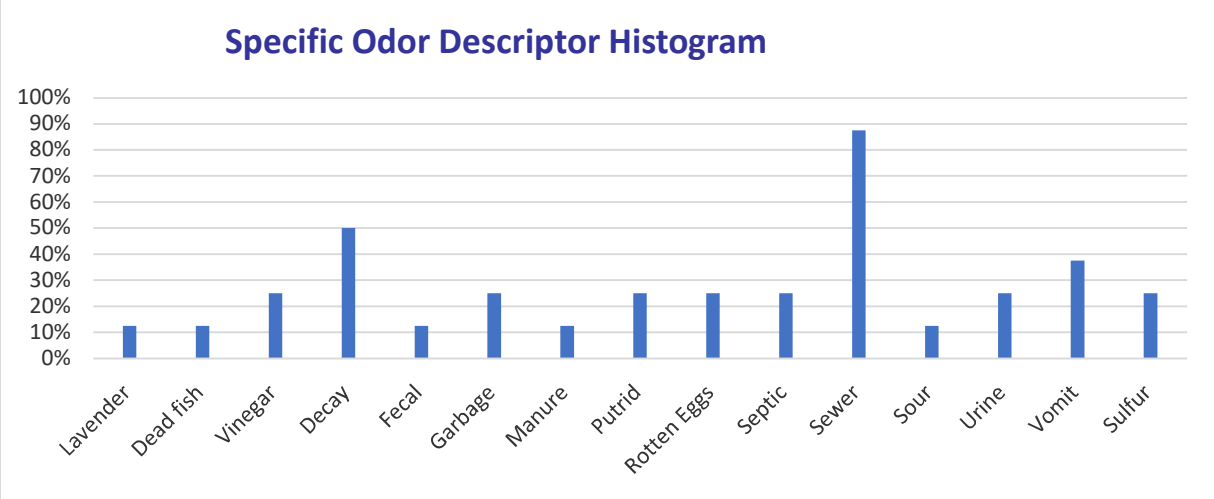
ODOR CHARACTERIZATION

Client: **Graphic Packaging International** Date: **08/12/20**

Sample ID: **Sludge Pile**

Odor Descriptor Category	Odor Descriptor Intensity
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.0
Fishy	0.4
Medicinal	0.5
Offensive	3.3
Chemical	0.3



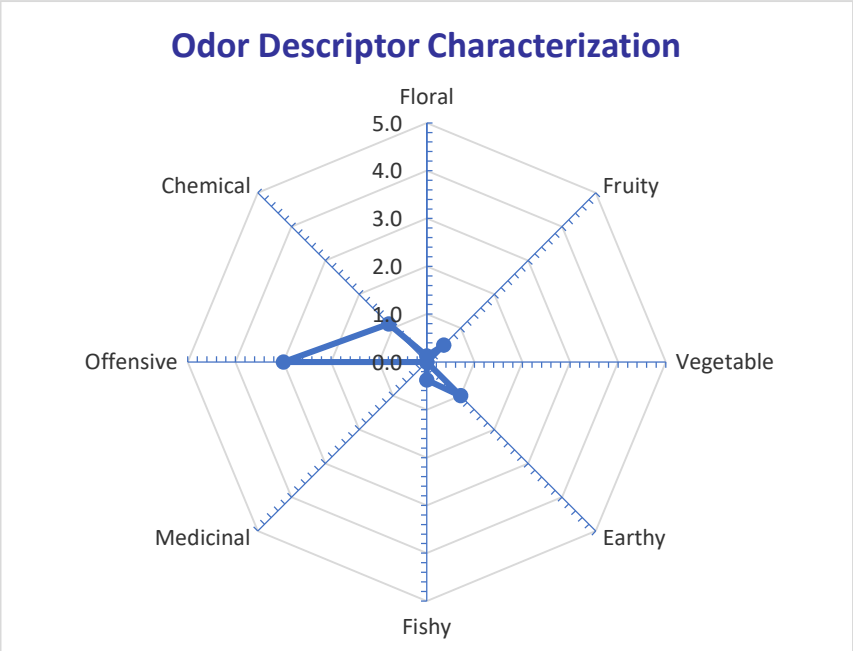


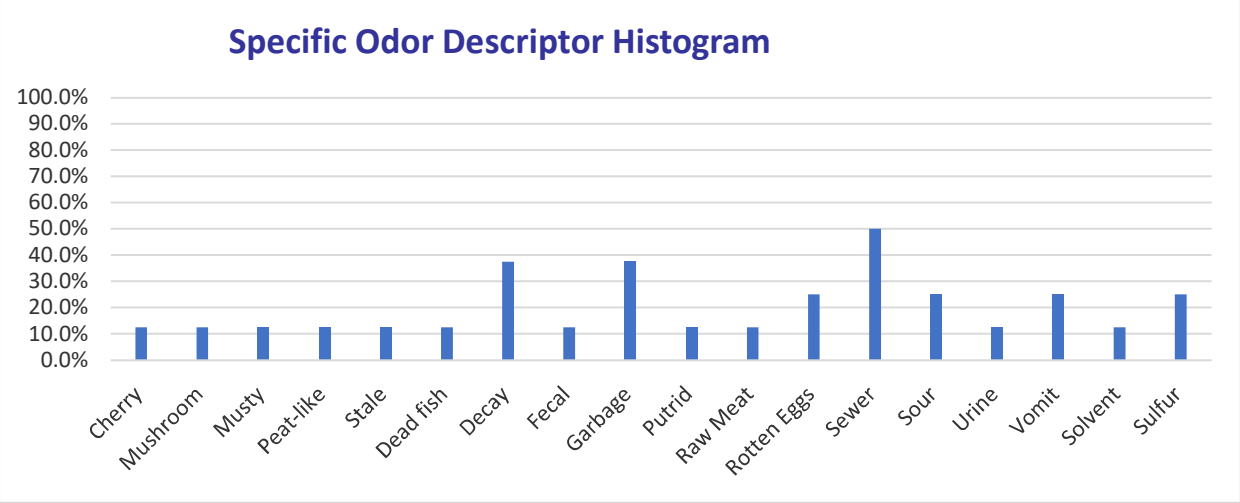
ODOR CHARACTERIZATION

Client: **Graphic Packaging International** Date: **08/12/20**

Sample ID: **Clarifier**

Odor Descriptor Category	Odor Descriptor Intensity
Floral	0.1
Fruity	0.5
Vegetable	0.0
Earthy	1.0
Fishy	0.4
Medicinal	0.0
Offensive	3.0
Chemical	1.1



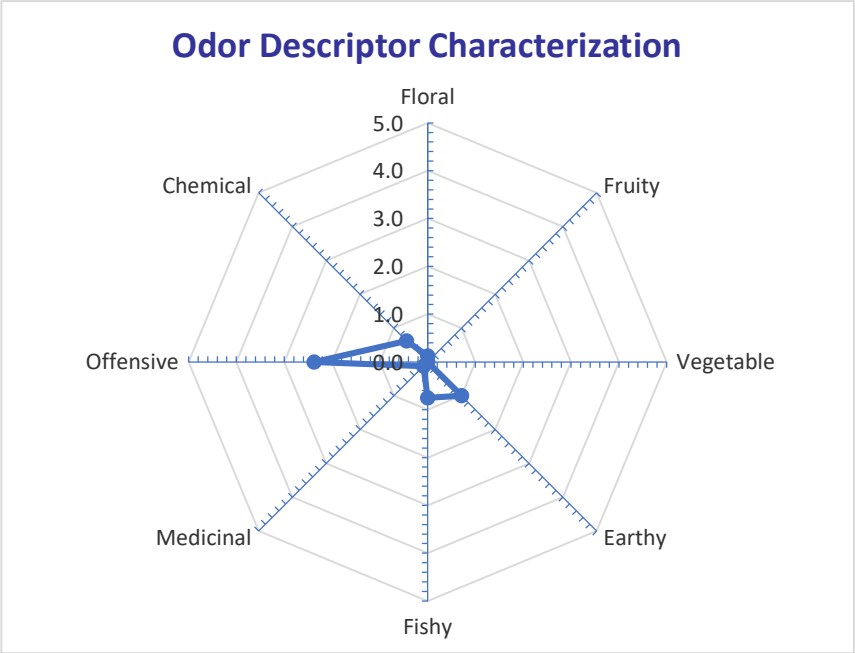


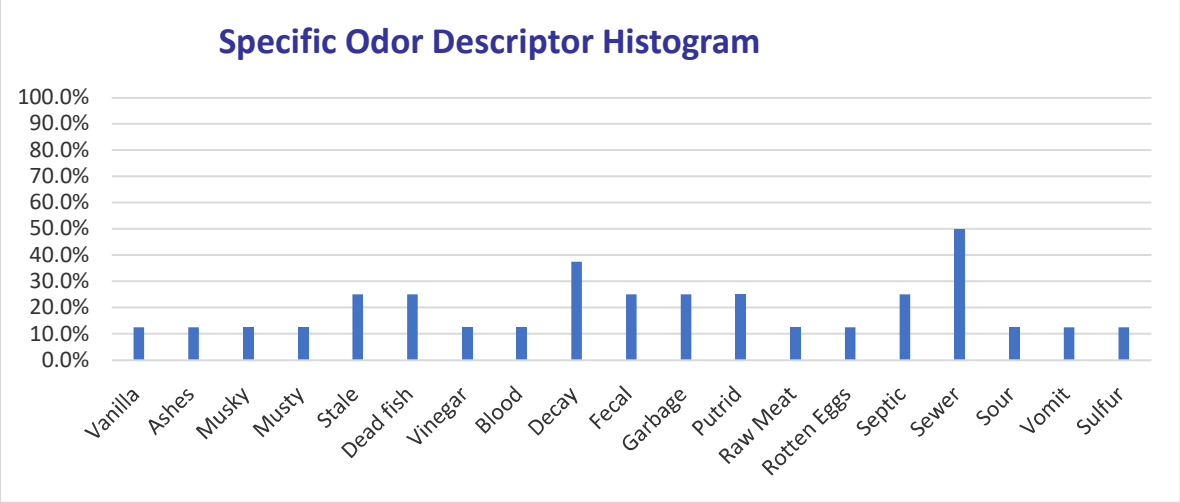
ODOR CHARACTERIZATION

Client: **Graphic Packaging International** Date: **08/12/20**

Sample ID: **K1 Operating Floor - Coating Kitchen**

Odor Descriptor Category	Odor Descriptor Intensity
Floral	0.1
Fruity	0.0
Vegetable	0.0
Earthy	1.0
Fishy	0.8
Medicinal	0.1
Offensive	2.4
Chemical	0.6



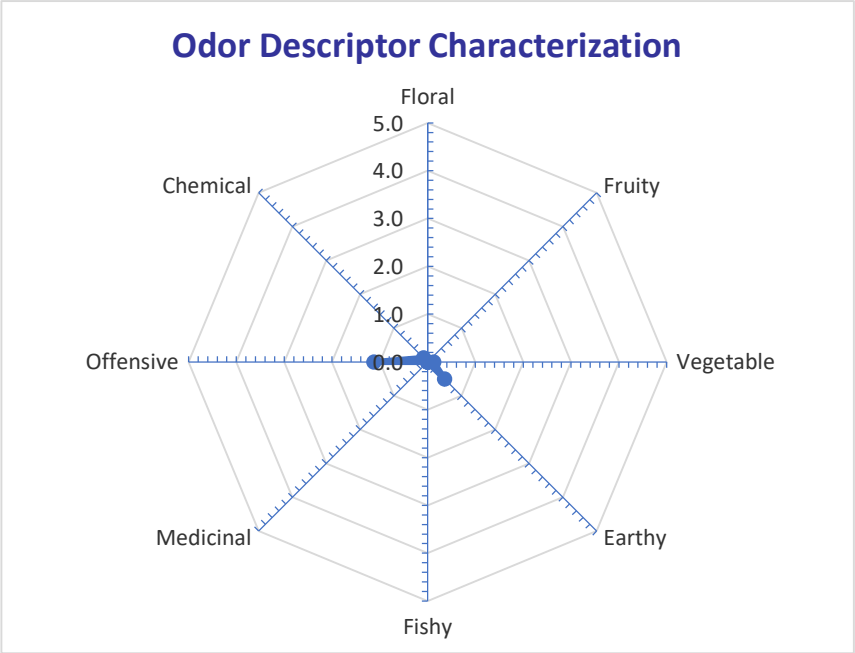


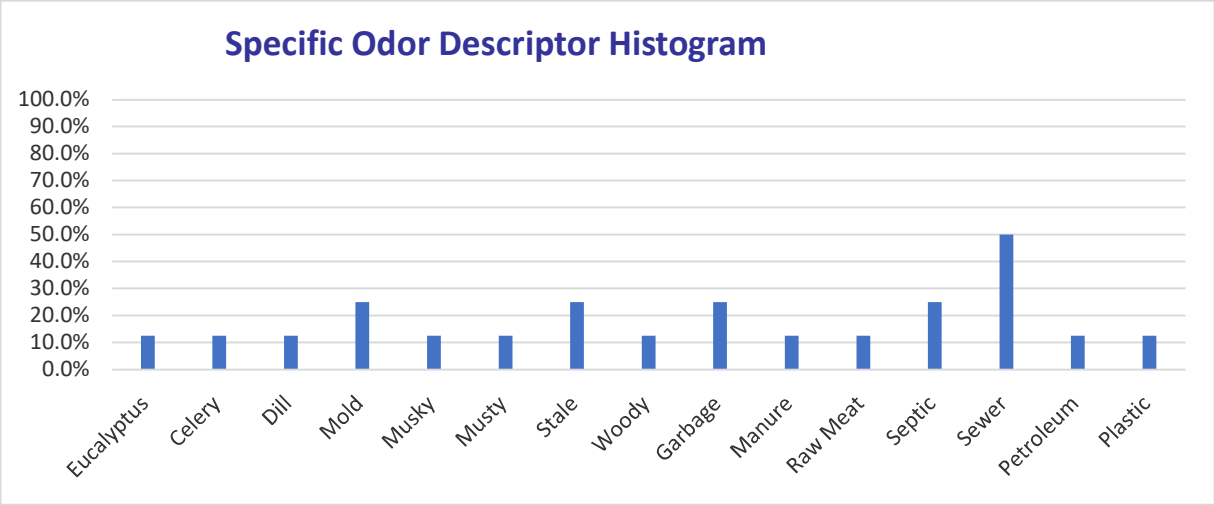
ODOR CHARACTERIZATION

Client: **Graphic Packaging International** Date: **#REF!**

Sample ID: **K3 Drayer Mezzanine**

Odor Descriptor Category	Odor Descriptor Intensity
Floral	0.0
Fruity	0.0
Vegetable	0.1
Earthy	0.5
Fishy	0.0
Medicinal	0.0
Offensive	1.1
Chemical	0.1



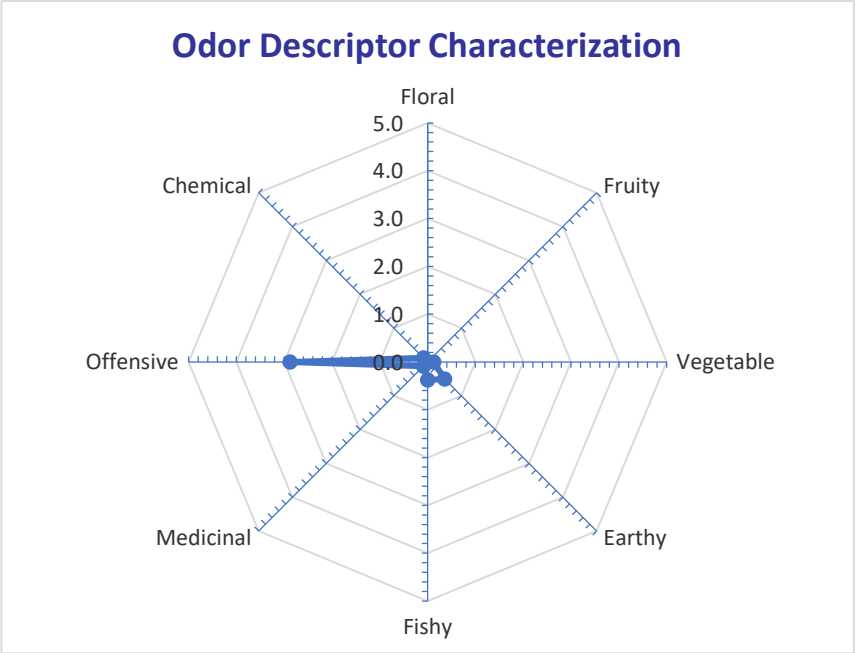


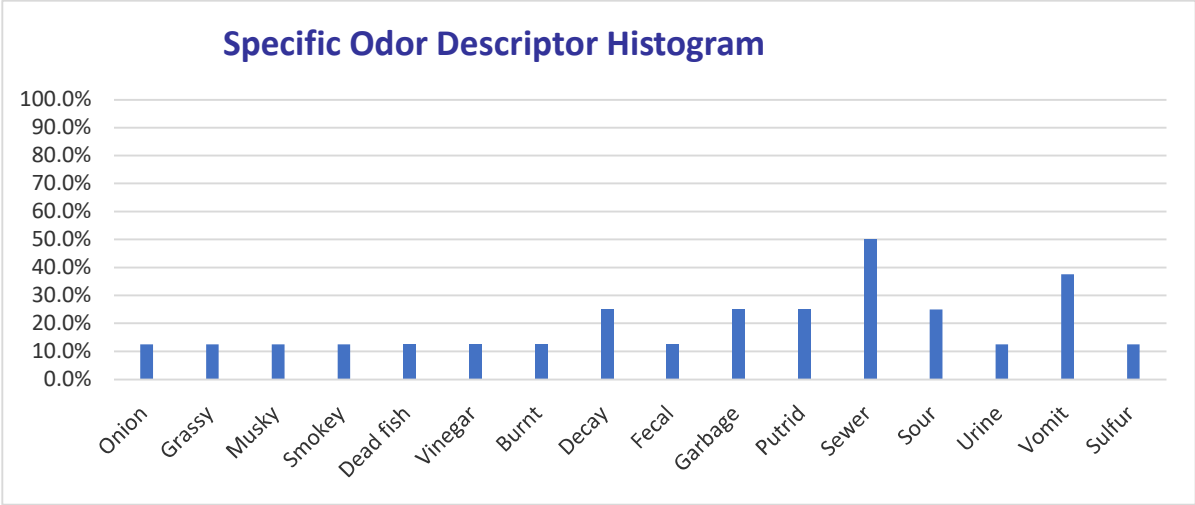
ODOR CHARACTERIZATION

Client: **Graphic Packaging International** Date: **08/12/20**

Sample ID: **AES Building Between Screens**

Odor Descriptor Category	Odor Descriptor Intensity
Floral	0.0
Fruity	0.0
Vegetable	0.1
Earthy	0.5
Fishy	0.4
Medicinal	0.1
Offensive	2.9
Chemical	0.1



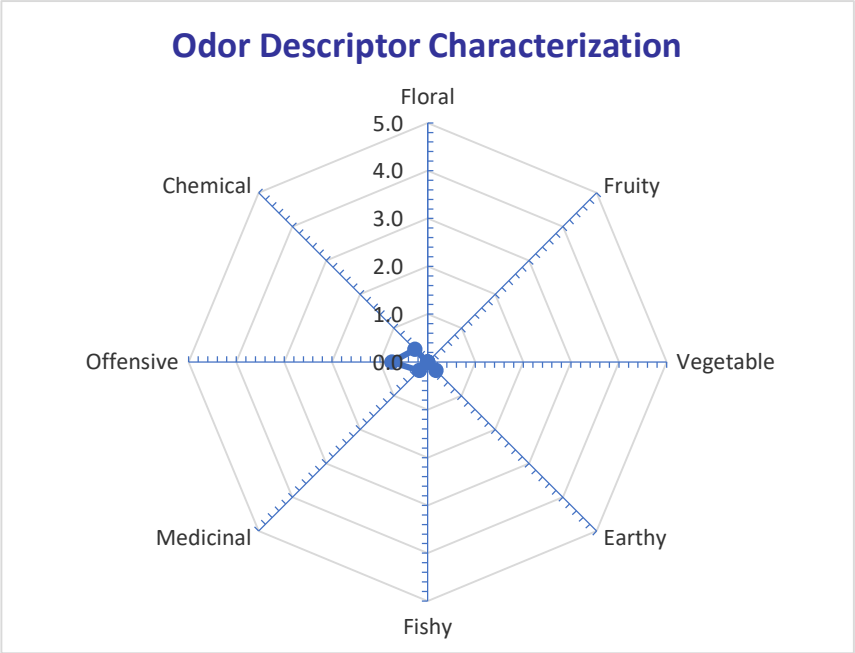


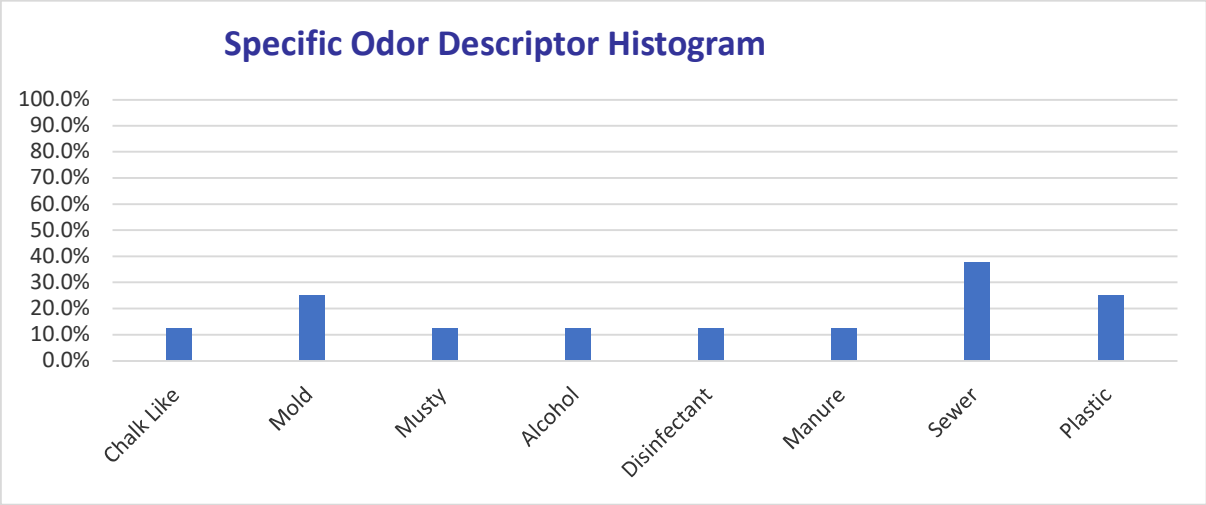
ODOR CHARACTERIZATION

Client: **Graphic Packaging International** Date: **08/12/20**

Sample ID: **Stock Prep Building at News Puler**

Odor Descriptor Category	Odor Descriptor Intensity
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.3
Fishy	0.0
Medicinal	0.3
Offensive	0.8
Chemical	0.4



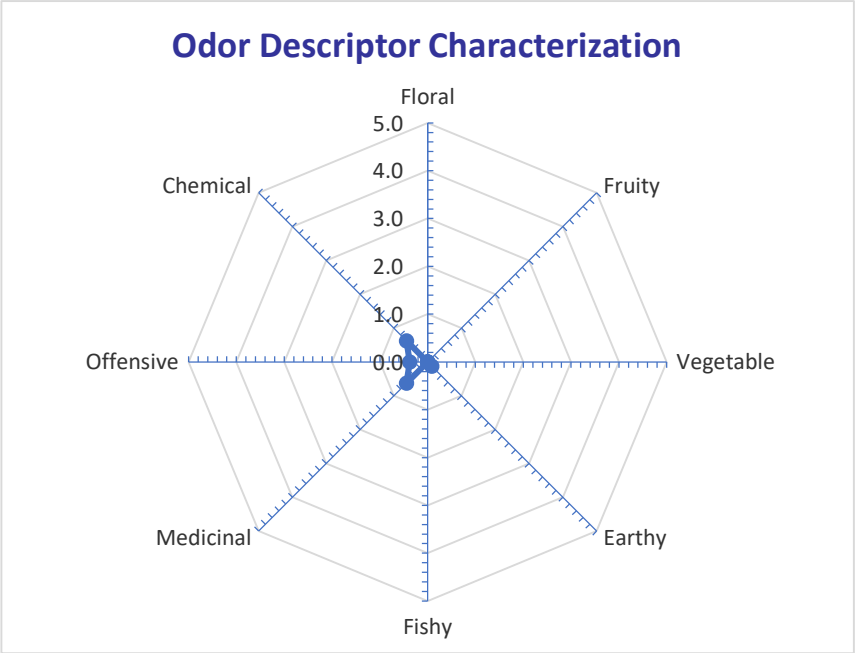


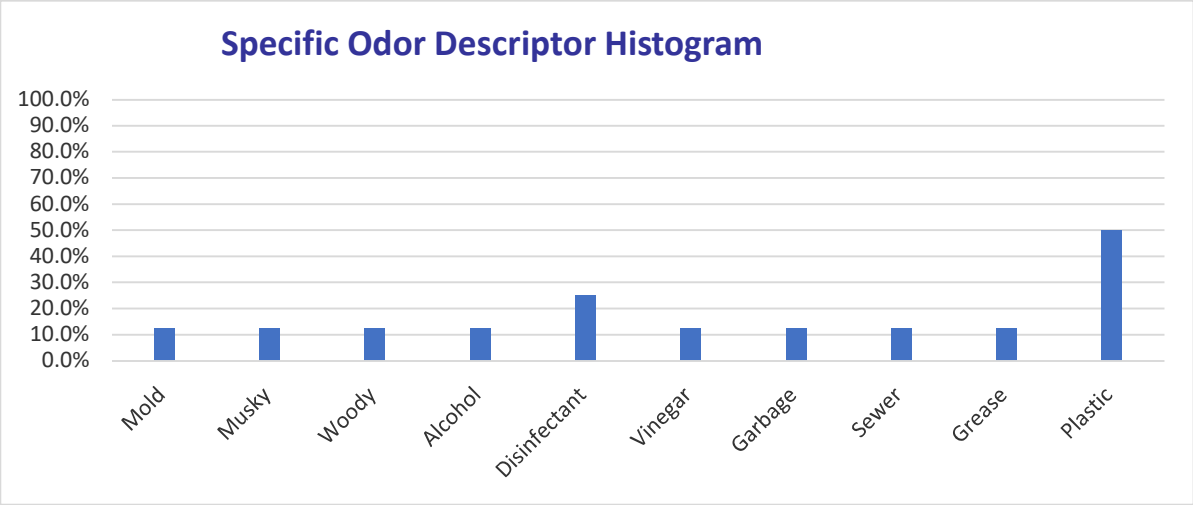
ODOR CHARACTERIZATION

Client: **Graphic Packaging International** Date: **08/12/20**

Sample ID: **Sludge Drum Filter Outlet**

Odor Descriptor Category	Odor Descriptor Intensity
Floral	0.0
Fruity	0.0
Vegetable	0.0
Earthy	0.1
Fishy	0.0
Medicinal	0.6
Offensive	0.4
Chemical	0.6





RK & Associates, Inc.

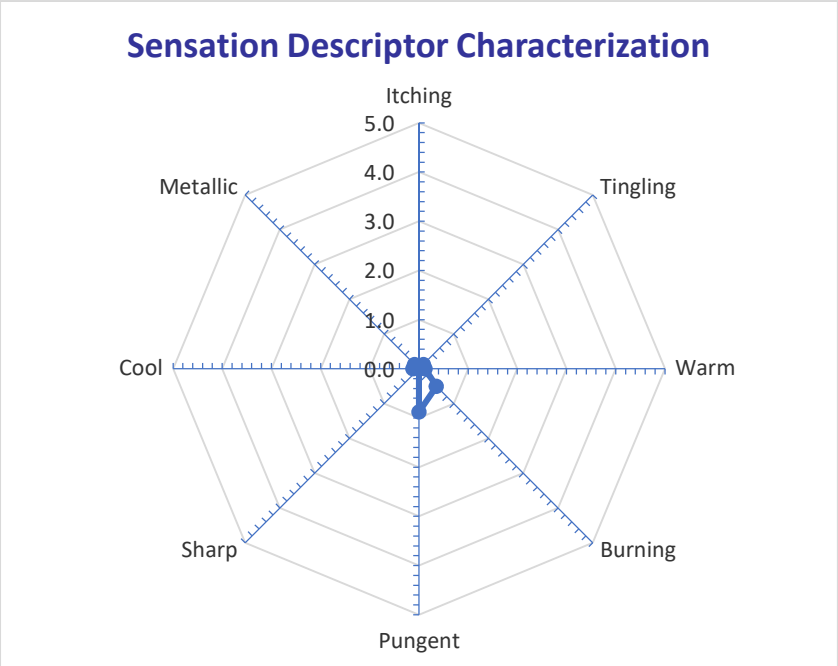
ODOR CHARACTERIZATION

Client: **MWRD** Date: **08/12/20**

Project: **Contract 19-101-11**

Sample ID: **Parking Lot B (near discharge to WWTP)**

Sensation Descriptor	Sensation Descriptor Intensity
Itching	0.0
Tingling	0.1
Warm	0.1
Burning	0.5
Pungent	0.9
Sharp	0.0
Cool	0.1
Metallic	0.1



RK & Associates, Inc.

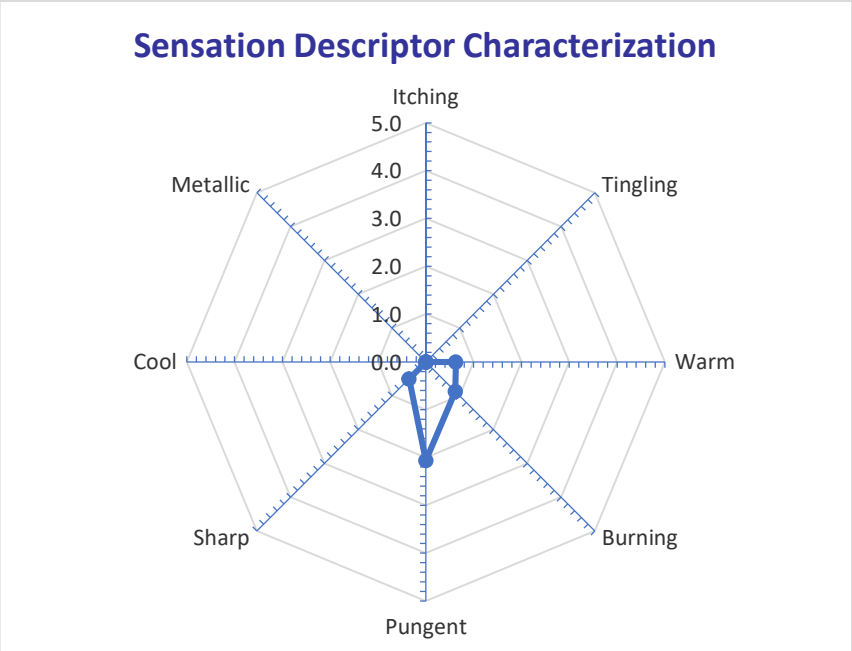
ODOR CHARACTERIZATION

Client: **MWRD** Date: **08/12/20**

Project: **Contract 19-101-11**

Sample ID: **North of Stock Prep Building**

Sensation Descriptor	Sensation Descriptor Intensity
Itching	0.0
Tingling	0.0
Warm	0.6
Burning	0.9
Pungent	2.1
Sharp	0.5
Cool	0.0
Metallic	0.0



RK & Associates, Inc.

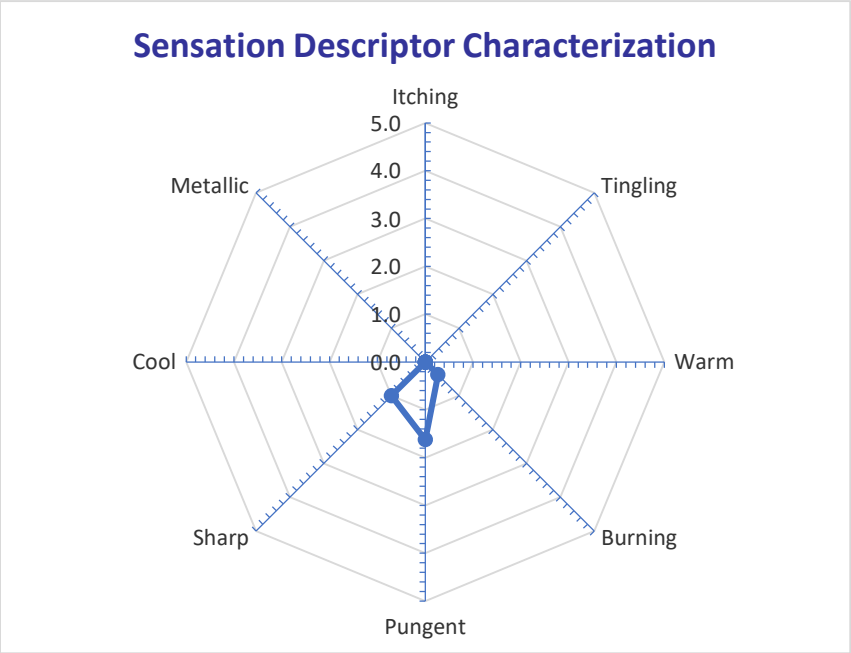
ODOR CHARACTERIZATION

Client: **MWRD** Date: **08/12/20**

Project: **Contract 19-101-11**

Sample ID: **Sludge Pile**

Sensation Descriptor	Sensation Descriptor Intensity
Itching	0.0
Tingling	0.0
Warm	0.0
Burning	0.4
Pungent	1.6
Sharp	1.0
Cool	0.0
Metallic	0.0



RK & Associates, Inc.

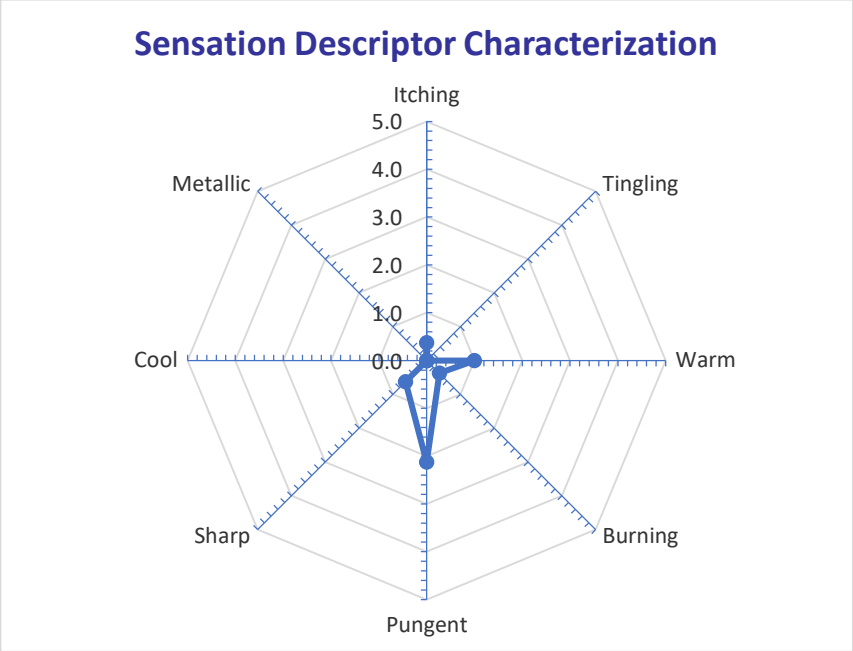
ODOR CHARACTERIZATION

Client: **MWRD** Date: **08/12/20**

Project: **Contract 19-101-11**

Sample ID: **Clarifier**

Sensation Descriptor	Sensation Descriptor Intensity
Itching	0.4
Tingling	0.0
Warm	1.0
Burning	0.4
Pungent	2.1
Sharp	0.6
Cool	0.0
Metallic	0.0



RK & Associates, Inc.

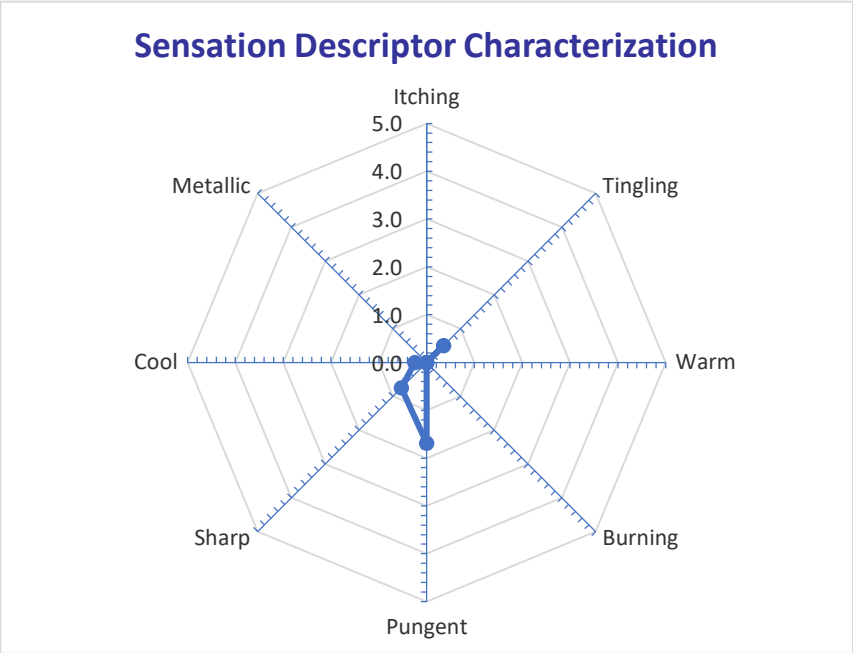
ODOR CHARACTERIZATION

Client: **MWRD** Date: **08/12/20**

Project: **Contract 19-101-11**

Sample ID: **K1 Operating Floor - Coating Kitchen**

Sensation Descriptor	Sensation Descriptor Intensity
Itching	0.0
Tingling	0.5
Warm	0.0
Burning	0.0
Pungent	1.7
Sharp	0.8
Cool	0.3
Metallic	0.0



RK & Associates, Inc.

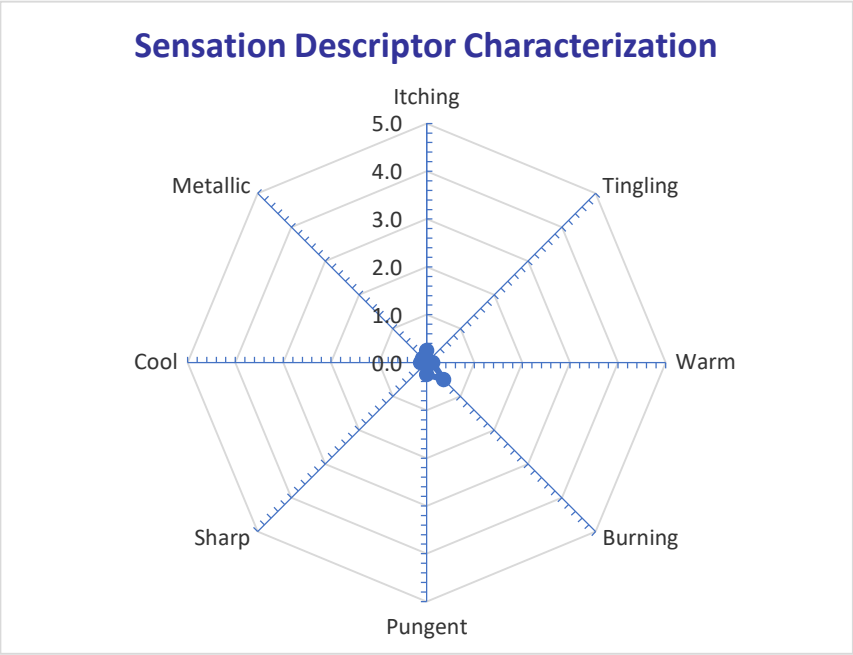
ODOR CHARACTERIZATION

Client: **MWRD** Date: **08/12/20**

Project: **Contract 19-101-11**

Sample ID: **K3 Drayer Mezzanine**

Sensation Descriptor	Sensation Descriptor Intensity
Itching	0.3
Tingling	0.0
Warm	0.1
Burning	0.5
Pungent	0.3
Sharp	0.0
Cool	0.1
Metallic	0.1



RK & Associates, Inc.

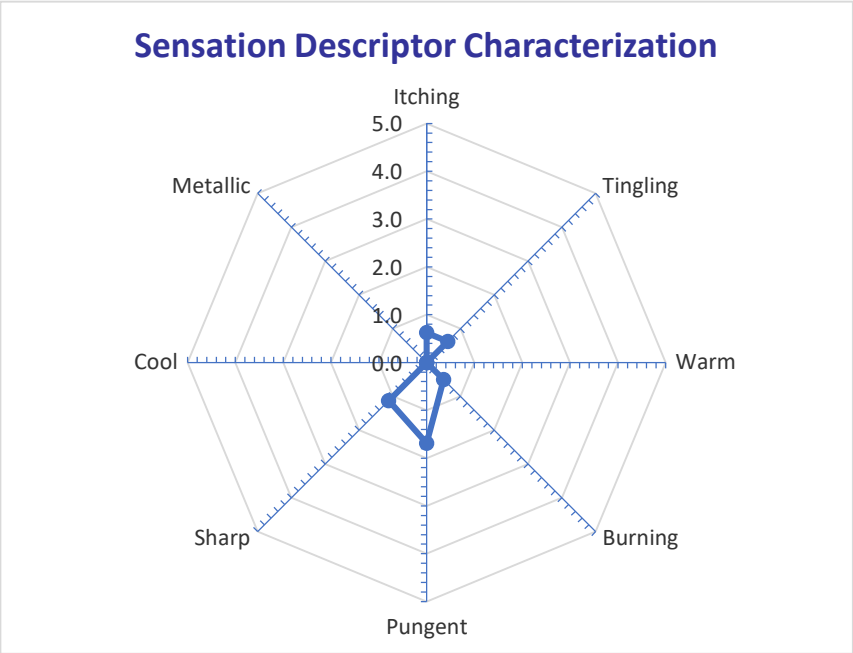
ODOR CHARACTERIZATION

Client: **MWRD** Date: **08/12/20**

Project: **Contract 19-101-11**

Sample ID: **AES Building Between Screens**

Sensation Descriptor	Sensation Descriptor Intensity
Itching	0.6
Tingling	0.6
Warm	0.0
Burning	0.5
Pungent	1.7
Sharp	1.1
Cool	0.0
Metallic	0.0



RK & Associates, Inc.

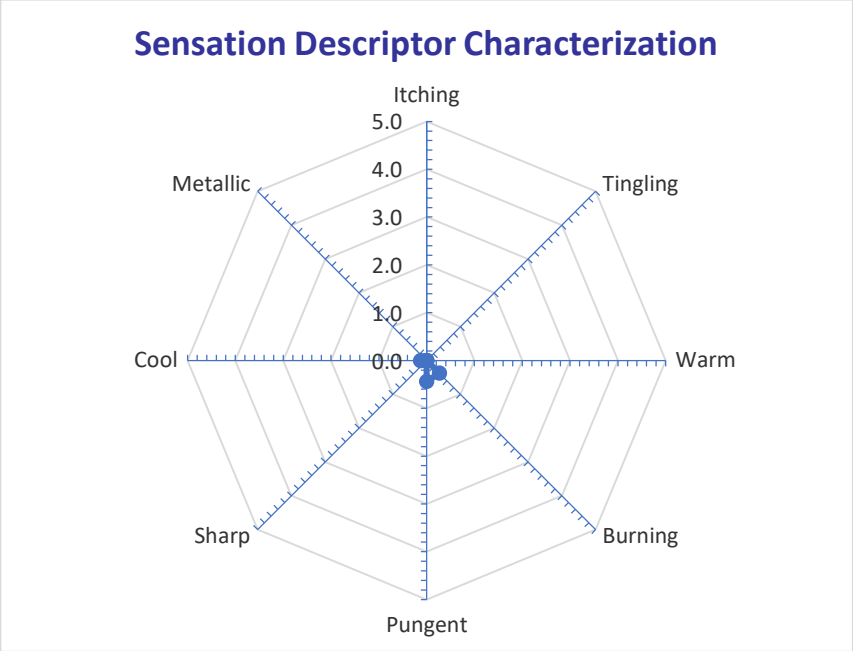
ODOR CHARACTERIZATION

Client: **MWRD** Date: **08/12/20**

Project: **Contract 19-101-11**

Sample ID: **Stock Prep Building at News Puler**

Sensation Descriptor	Sensation Descriptor Intensity
Itching	0.0
Tingling	0.0
Warm	0.0
Burning	0.4
Pungent	0.4
Sharp	0.0
Cool	0.1
Metallic	0.0



RK & Associates, Inc.

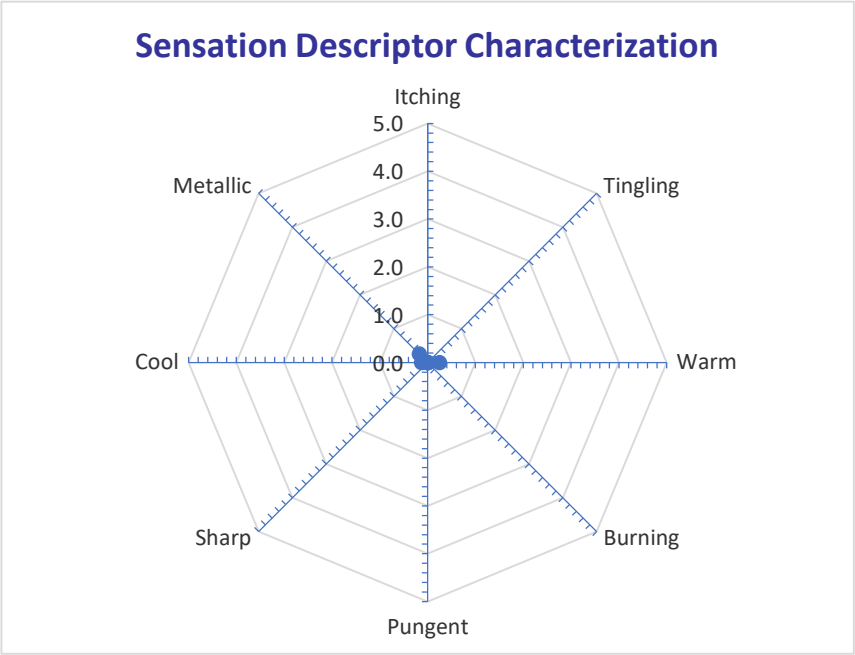
ODOR CHARACTERIZATION

Client: **MWRD** Date: **08/12/20**

Project: **Contract 19-101-11**

Sample ID: **Sludge Drum Filter Outlet**

Sensation Descriptor	Sensation Descriptor Intensity
Itching	0.0
Tingling	0.0
Warm	0.3
Burning	0.0
Pungent	0.0
Sharp	0.0
Cool	0.1
Metallic	0.3



Attachment B – December 11, 2020 Response to EGLE November 20, 2020 Notice of Violation

GPI Response Letter 12.11.20.pdf

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Phone: 770-240-7200 · FAX: 770-952-8751

Warner Norcross + Judd LLP

December 11, 2020

Via Email

Department of Environment, Great Lakes and Energy
Air Quality Division
Kalamazoo District Office
7953 Adobe Road
Kalamazoo, Michigan 49009

Re: **Violation Notice to Graphic Packaging International LLC**

On behalf of our client, Graphic Packaging International LLC ("GPI") we acknowledge receipt of the Air Quality Division's ("AQD") Violation Notice ("VN") dated November 20, 2020. At GPI's request, we are responding to the VN on its behalf.

The VN essentially asserts that as the result of a site investigation conducted on November 17, 2020 AQD determined that GPI had constructed foundations to accommodate two boilers without permit authorization in contravention of MAC R 324.1201 (Rule 201) and MAC R 336.2802(3) (Rule 1802, subrule 3). The VN then requests a response that addresses the following:

> "the dates the violation occurred; an explanation of the causes and duration of the violation; whether the violation is ongoing; a summary of the actions that have been taken and are proposed to be taken to correct the violation and the dates by which these actions will take place; and what steps are being taken to prevent a reoccurrence."

As the AQD is aware, four calendar days after the date of the VN, the AQD issued PTI 133-19A which authorizes the installation of two boilers at the facility. GPI therefore believes that no violation is ongoing, no additional action is necessary to come into compliance, and no action is

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necessary to prevent a reoccurrence. With the issuance of PTI 133-19A, the VN is now moot.[1] While the VN is now moot, we also believe there was not a violation for a number of reasons.

> The VN asserts a violation of Rule 201. Rule 201 provides:
>
> Rule 201. (1) Except as allowed in R 336.1202, R 336.1277 to R 336.1291, or R 336.2823(15) a person shall not install, construct, reconstruct, relocate, or modify ***any process or process equipment***, including control equipment pertaining thereto, which may emit any of the following, unless a permit to install that authorizes such action is issued by the department.
> (a) Any air pollutant regulated by title I of the clean air act and its associated rules, including 40 C.F.R. §51.165 and §51.166, adopted by reference in R 336.1902.
> (b) Any air contaminant.
> A person who plans to install, construct, reconstruct, relocate, or modify any such process or process equipment shall apply to the department for a permit to install on an application form approved by the department and shall provide the information required in R 336.1203. [Emphasis supplied]

Rule 201's language mirrors the provisions of MCL 324.5505(1) and (2). The rule and the statute prohibit the installation, etc. of a process or process equipment without a permit to install. The terms "process" and "process equipment" are defined terms with AQD's Part 1 Rules and those definitions mirror the definitions within MCL 324.5501(u) and (v):

> "Process" means an action, operation, or a series of actions or operations at a source that emits or has the potential to emit an air contaminant.
>
> "Process equipment" means all equipment, devices, and auxiliary components, including air pollution control equipment, stacks, and other emission points, used in a process.

A boiler's operation is a "process" within the meaning of the AQD's rules as it emits or has the potential to emit an air contaminant. A boiler is "process equipment" as it is the equipment, etc. used in a process. However, static concrete or metal structures that can be used to ultimately support a boiler do not have any potential to emit air contaminants and cannot be considered "process" or "process equipment". Hence, GPI believes the terms within Part 55 and Rule 201 as defined by Part 1 rules or as commonly understood cannot be read to prohibit the construction of infrastructure that might ultimately be used to house or support a "process" or "process equipment". [2]

[1]While not relevant, construction of the foundations to accommodate the boilers commenced on or about October 16, 2020 for the first boiler, and October 23, 2020 for the second boiler.

[2]While courts in some jurisdictions will afford deference to an agency's interpretation of the statues or rules that it administers, Michigan courts historically have not. Even if AQD wishes to broadly construe the provisions of Rule 201 and Part 55, it is clear that AQD would not be allowed to go beyond the plain meaning of the language. See *In re Rovas*, 482 Mich 90 (2008); *Romulus v MDEQ*, 260 Mich App 54 (2003)

As AQD is aware, US EPA has published draft guidance modifying the scope of the prohibitions under the NSR program relative to beginning actual construction of an emission unit without pre-construction permit authorization.[3] The draft guidance reflects that US EPA no longer believes that the construction prohibitions of the NSR program should extend to "include any installations necessary to accommodate (an emission unit)." US EPA explains that prior guidance that prohibited construction of foundations or other infrastructure necessary to accommodate an emission unit was not consistent with the regulatory text and not justified for policy reasons.

Effectively, Rule 201's use of the terms "process" or "process equipment" equate fully with US EPA's use of the term "emission unit". Like the term "emission unit", extending the terms "process" or "process equipment" to include installations necessary to accommodate a "process" or "process equipment" is not well-grounded in the regulatory text of the AQD's rules or the statutory text of Part 55. Further, from a policy perspective, allowing the installation of a foundation needed to accommodate a process or process equipment in no way weakens or undermines the prohibition of installing or operating new processes or process equipment without permit authorization.

Accordingly, GPI does not believe it could have violated Rule 201 by installing foundations or any other infrastructure that might be ultimately necessary to accommodate boilers that were pending permit authorization. The regulatory and statutory texts do not support this interpretation and there is no legitimate policy reason for AQD to advance such an expansive reading.[4]

The VN also asserts that Rule 1802(3) was violated. Rule 1802(3) provides:

> (3) No new major stationary source or major modification to which R. 336.2810 to R. 336.2818(2) apply shall begin actual construction without a permit to install

[3] *Interpretation of "Begin Actual Construction" Under the New Source Review Preconstruction Permitting Regulations*, Anne L. Idal, March 25, 2020. In pertinent part, the draft guidance states: "Under EPA's revised interpretation, a source owner or operator may, prior to obtaining an NSR permit, undertake physical on-site activities – including activities that may be costly, that may significantly alter the site, and/or are permanent in nature – provided that those activities do not constitute physical construction on an emissions unit, as the term is defined in 40 CFR § 52.21(b)(7). Further, under this revised interpretation, an "installation necessary to accommodate" the emissions unit at issue is not considered part of that emissions unit, and those construction activities that may involve such "accommodating installations" may be undertaken in advance of the source owner or operator obtaining a major NSR permit."

[4] It is also important to note that the construction of the building and foundations was conducted pursuant to PTI 133-19, which was issued on March 4, 2020. That permit authorized construction of this project, which under that permit included one additional boiler. As AQD is aware, it is common for permittees, such as GPI, to construct additional space, including foundations, for future expansions. That is allowed under the permit previously issued. This is an additional reason why GPI was not in violation of Rule 201 or 802.

> issued under R. 336.1201(1)(a) that states that the major stationary source or major modification will meet those requirements.

As AQD is aware, the Part 18 Rules were adopted in 2006 to implement the Prevention of Significant Deterioration ("PSD") requirements of the federal Clean Air Act. As a consequence, Rule 1802(3) includes terms defined within Part 18 that mirror definitions within federal PSD rules at 40 CFR Part 51 and Part 52. Such terms should be construed and applied consistent with federal guidance and federal court decisions addressing PSD.

Under both Part 18 and the federal PSD rules, "major stationary source" and "major modification" have the same meaning. Also, both Part 18 and the federal PSD rules operate to apply PSD requirements to a "project" (a physical change in or change in method of operation of an existing major source) that will result in a major modification. As the Sixth Circuit recognized in *United States v DTE Energy*, Case No. 14-2274/2275 (January 10, 2017), under PSD provisions it is the obligation of a source to make a pre-construction determination of whether the project, as defined by the source, will be a major modification. If it is not, PSD does not preclude initiating construction without a PSD permit. Subsequent EPA guidance makes clear that project emission accounting is a calculation that an owner/operator of a source conducts prior to beginning construction to determine the applicability of PSD requirements to the project that the owner/operator is proposing to undertake[5].

Under GPI's application for PTI 133-19 and its application for PTI 133-19A, GPI defined the project as a minor NSR project, not subject to PSD pre-construction permitting requirements. AQD also recognized that GPI was only proposing a minor NSR project in the public participation materials made available during the comment periods for both PTI 133-19 and 133-19A on December 17, 2019 and September 10, 2020. AQD has no basis to assert that GPI transgressed the prohibitions of Rule 1802(3) where GPI defined the project as minor and AQD also recognized the project as minor.

The State of Michigan and the greater Kalamazoo community will benefit greatly from the modifications that GPI has elected to make at its Kalamazoo facility. As EGLE is aware, the modifications are part of a project to expand the capacity of GPI's operations, making it the largest paperboard facility in North America using recycled paperboard as feed stock. GPI could have made other states and communities the beneficiaries of a capital investment that will assure continued employment and other economic benefits within the host community.

From the outset of engagement with AQD on permitting this project in a June 2019 pre-application meeting, GPI was candid with the time sensitivity of the project. As should be obvious, projects of this magnitude have complex construction schedules and materials and equipment lead times that must be coordinated. GPI, and any other similarly situated companies, must make assumptions regarding how long the permitting process will take and predicate

[5] *Project Emissions Accounting Under the New Source Review Preconstruction Permitting Program*, E. Scott Pruitt, March 13, 2018.

construction schedules and equipment delivery dates on these assumptions. The alternative is to delay beginning any construction activity until a permit is in hand even where the installation or operation of identified emission units may be months to more than a year after construction initiated. Such delays can be fatal to a project[6].

AQD should recognize that attempting to apply the prohibitions of Rule 201 or Rule 1802(3) now to the context of GPI's project in Kalamazoo sends a chilling message to companies that consider undertaking reinvestment in Michigan's manufacturing base. The message GPI believes is being communicated is that the State of Michigan will seek to expansively apply its minor NSR construction permitting requirements so as to assert violations for any construction activity without a permit that is arguably related to an eventual emission unit even where there is no reason to believe the source is attempting to circumvent the permitting process and there is no material concern that an actual emission unit will be installed and made operational without a valid permit in hand. This is simply bad policy that can negatively affect investment decision-making and unnecessarily delay beneficial capital projects.

Sincerely,

John V. Byl
Partner

Steven C. Kohl

Steven C. Kohl
Partner

SCK/sck
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[6]AQD should recognize that the regulated community's desire to avoid PSD requirements is in part due to the delay required in initiating much of the project until a permit is issued authorizing construction of a major source or major modification.

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Appendix A

interoffice memo

Date: 10-9-2020

To: Jim Cornell, Wastewater Division Manager

From: Mike Buzzo, Treatment Control Supervisor

RE: Notes from the October 8, 2020 Odor Task Force Meeting at 3:30 PM.

Introductions. Attendees: **John Curan**, from Senator Sean McCann's Office; **Monica Brothers**, Michigan EGLE; Graphics Packaging: **Rich Townley, Donald Krug, and Gregg Lanternier**; Environmental Concerns Committee: **Aaron Wright**; City of Kalamazoo: **Jim Cornell, Ryan Stoughton, Ron Janssen, and Mike Buzzo**. (10 total attendees). My apologies if I missed anyone.

The WebEx meeting began promptly at 3:30 PM. Our last meeting was September 28, 2020, at 3:30 PM. Our next meeting will be at 3:30 PM on November 18, 2020. Another meeting is scheduled for 3:30 PM on December 16, 2020.

Graphics Packaging International- Mr. Rich Townley indicated that their environmental consultant, RK and Associates, is wrapping up a study it's doing in conjunction with EGLE. The data collection is finished and being sent to EGLE now. That final report should be submitted by November 3, 2020. After that, a Nuisance Minimization Plan will also be submitted to EGLE.

He also gave an update of recent activities at GPI relating to their new Envirosuite odor monitoring system. They have completed the installation of their first 10 sensors. Rich showed us a map/overhead photo of the Envirosuite sensor locations currently on their property as of 10/8/2020. GPI has also ordered 6 more sensors to add and expand to the system in the future. They are also still exploring the possibilities of tying other sensors of different manufacture into the system.

GPI is using hydrogen peroxide (H_2O_2) for odor control in their plant. They are currently actively experimenting with finding the most effective locations for the H_2O_2 feed points.

City of Kalamazoo- Biofilter- Mr. Ryan Stoughton discussed the Biofilter Project status. Approval was received from the Tree Committee to remove a few trees in the area of the parking lot where the biofilter will be located, in order to facilitate full access to the biofilter. New trees will be planted to replace those few trees removed. Application paperwork is underway regarding the Natural Features Protection Zone. That will be completed and submitted by October 31, 2020. The Site Plan Review process should be completed by early to mid-November. We will be working with the State on the Wetlands Delineation process, as well. Starting next week, there will be a survey crew on-site to do a property boundary survey. Also, soil boring will be done as a part of the Site Survey starting next Monday. Mr. Wright asked how many trees will be removed, how many planted, and where will they be planted. Mr. Stoughton said it won't be many, just a few to allow proper access to all sides of the

filter to allow proper maintenance and operation of the biofilter. The biofilter structure will be located in the East parking lot of the Kalamazoo Water Reclamation Plant. New trees will be planted at the ratio of 2 new trees for every 1 tree removed. So, for example, if 8 trees are removed, 16 new ones will be planted. Location of the planting will be up to the tree committee, but would be somewhere in the local area.

City of Kalamazoo- Air sampling study- A study is planned to do sampling at 6 sewer locations that will be supplying the air to the biofilter. This will be for roughly a 4-week period. Hydrogen sulfide sensors will be used to continuously log H_2S levels at each site. In addition, for a one-week period, VOC sensors will be used to take composite samples to analyze multiple volatile organic compounds 24 hours a day. Thirdly, there will be instantaneous grab samples taken on Monday, Wednesday, and Friday of the same one week period, also for VOCs, reduced sulfur compounds, and other odiferous compounds. This exact same sampling plan will also be performed at our 6 community sampling sites that are out in the neighborhoods near the site. This sampling plan is being developed by the engineering firm of Jones and Henry, in conjunction with the City of Kalamazoo. In addition, the sampling plan has been sent to the MDHHS (Michigan Department of Health and Human Services), and will be modified and adapted based on their recommendations. Jones and Henry Engineering is also designing the biofilter.

The meeting ended at approximately 4:15 PM.

Thank you,
Mike Buzzo.

Appendix B

interoffice memo

Date: 11-20-2020

To: Jim Cornell, Wastewater Division Manager

From: Mike Buzzo, Treatment Control Supervisor

RE: **Revised** notes from the November 18, 2020 Odor Task Force Meeting at 3:30 PM.

Introductions/Attendees: **Senator Sean McCann**; **Monica Brothers**, from Michigan EGLE; **Rich Townley, Donald Krug, Tom Olstad, and Gregg Lanternier,** from Graphics Packaging; **Aaron Wright,** of the Environmental Concerns Committee; **Jim Cornell, Ryan Stoughton, Ron Janssen, Steve Rochow, and Mike Buzzo,** from the City of Kalamazoo. (12 total attendees). My apologies if I missed anyone.

The WebEx meeting began promptly at 3:30 PM. Our last meeting was October 8, 2020, at 3:30 PM. Our next meeting is scheduled for 3:30 PM on December 16, 2020.

Graphics Packaging International- Mr. Rich Townley indicated that their environmental consultant, RK and Associates, has finished their odor study, and the results have been submitted to EGLE, and that a copy of that is available online at:
https://www.michigan.gov/documents/egle/egle-aqd-gpi-odor_iInvestigation_plan_2020-07-06_701085_7.pdf

He also gave an update of continuing activities at GPI to evaluate plant process areas where odor mitigation activities can be, and are currently being done. Their new construction is progressing smoothly, and they should soon have the new buildings enclosed and heated for the continued construction over the winter.

They are on track to give the City Council a scheduled quarterly update before the end of December.

They continue to operate the EnviroSuite system, and are refining and fine tuning it. They have had a few more issues with a couple of sensors, and will probably be installing another weather station to help with accuracy and reliability.

City of Kalamazoo- Biofilter Progress Status- Mr. Ryan Stoughton discussed the Biofilter Project. The City has air sampled the 6 interceptor sewers involved, and is currently awaiting test results from a contract lab on those. The Pre-Site Plan has been completed. Progressing with a design to fulfill the Site Plan Requirements. The sampling data, when received from the contract lab, will be supplied to the vendor companies of biofilter systems for their use.

City of Kalamazoo- Community air sampling study- The field sampling is complete and have been submitted to a contract lab for analysis. However, we are still awaiting the final laboratory results. There was a delay in the original completion schedule, due to a change at the contract lab, but we expect a report draft in the next few weeks.

City of Kalamazoo- EnviroSuite System- Mr. Jim Cornell gave an update on the City's EnviroSuite odor monitoring system. A purchase order has been issued for another year of leasing the Envirosuite equipment. A pre-installation meeting was held. We are adding 3 new sensors out in the community to expand the system. Within the next couple of weeks, we will be receiving those new sensors, and all of the other sensors will be changed out for new models, as well.

City of Kalamazoo- Odor treatment chemical trial- The City will be conducting a pilot trial project with the KML company, using some of their products in order to, hopefully, break down grease, scum, and other tough to treat odiferous substances in certain areas of the treatment plant. May have to repeat this trial again in the spring, since the weather will be getting much colder very soon.

City of Kalamazoo- Carbon scrubber units update- The new carbon scrubber unit located at the Solids Handling Facility (SHF) Building was completed and put into service. The ductwork on the other units will have to wait until warmer weather in the spring to allow for the proper curing of the resin used to glue the fiberglass duct pipes together. The smaller scrubber unit that was replaced at the SHF location will be repurposed and used to control odors from the recycle wetwell area, again, probably not until the spring due to low temperatures.

The meeting ended at approximately 4:20 PM.

Our next meeting is scheduled for December 16, 2020, at 3:30 PM.

Thank you,
Mike Buzzo.

Appendix C

Interoffice Memo

Meeting Date: December 16th, 2020

To: Jim Cornell, Wastewater Division Manager

From: Brian Stygar, **Wastewater** Operator

RE: Meeting Minutes for the December 16th, 2020 Odor Task Force Meeting at 3:30 PM

Introductions/Attendees: **John Curran**, from Senator Sean McCann's Office; **Monica Brothers**, from Michigan EGLE; **Tom Olstad**, **Rich Townley, Donald Krug, and Gregg Lanternier,** from Graphic Packaging International, LLC; **Aaron Wright, and Scott Schmidt,** of the Environmental Concerns Committee; **Aaron Davenport, and Alexis Kontorousis,** from Jones and Henry, Ltd; **Jim Cornell, Ryan Stoughton, Ron Janssen, and Brian Stygar,** from the City of Kalamazoo. (13 total attendees). My apologies if I missed anyone.

The WebEx meeting began promptly at 3:30 PM. The last meeting was November 18th, 2020, at 3:30 PM. The next meeting is planned to be scheduled after the new year in January. Anticipate an email to find a time for the next meeting that will best accommodate everyone.

Graphic Packaging International

- Construction is on schedule for startup of the recycle plant late in the first quarter of 2021. The paper machine is also on track for completion by the end of 2021. Mr. Rich Townley informed that the building is enclosed and heated for where the paper machine is being built. The stock recycle building off Harrison Street is to be fully enclosed by end of January, 2021.
- The permit to install, application No. 133-19A was approved by EGLE on November 24th, 2020.
- Graphic Packaging International, LLC (GPI) is still working on optimizing their odor management process. The original oxidizer in use at their wastewater treatment plant has since been replaced with different oxidizer, peroxide is being used as the current oxidizer.
- GPI has moved on to using an industrial grade (34%) peroxide system inside the mill to help with odors. They have also done work on microbiological treatment to improve what is sent to the wastewater treatment plant. The peroxide system has been online since late September of this year. The peroxide system is being fed to the wet well prior to the clarifier at a modulating rate of one-half to one gallon per minute.

- Hope to know soon how the peroxide system will affect the hydrogen sulfide production and reduce the odors around the plant. The Envirosuite system will be used to monitor and detect any odors.
- GPI has ordered and expects delivery of an oxygen injection system within the next few weeks. This will be used in an effort to find the best oxidizing system for their wastewater treatment plant. The system is expected to be commissioned for use by the end of the first quarter of 2021.
- The hydrogen peroxide system will continue to be used and GPI will evaluate the oxygen injection system and determine which is the better choice.
- GPI will submit EGLE with the Nuisance Minimization Plan for Odors no later than January 1st, 2021.
- The Envirosuite system is being used to do cross correlations between analyzers and the system itself to monitor the accuracy of these sensors. In order to continue monitoring odors GPI has ordered six new Envirosuite sensors to add to the existing odor detection system. This will increase the total sensor count to 16. Sensors are expected to be delivered mid January 2021. GPI is continuing to gather raw Envirosuite data and will be prepared to share that information as the mill builds confidence in the reliability of the Envirosuite system.
- In order to monitor the impact the peroxide system is having as an oxidizer and on hydrogen sulfide production two parameters are being closely monitored by GPI. These two parameters are oxidation reduction potential and dissolved oxygen. These same parameters will be used to monitor the new oxygen injection system.
- GPI is looking into buying a more sensitive handheld unit to accurately measure hydrogen sulfide and use it to verify Envirosuite sensors that may require or warrant verification.
- Envirosuite sensors monitor several gasses in addition to hydrogen sulfide. The output value from the sensors is the combined total of these gasses.

City of Kalamazoo - Biofilter Progress Status

- Ryan Stoughton of the City of Kalamazoo is working with industry experts on the Biofilter Project. Work is continuing to be done with their expertise and background in this field. The project is on track with PO(s) anticipated shortly in the coming weeks and the finalized design in the coming quarter.
- Groundbreaking is expected to begin once construction season allows again.

City of Kalamazoo – Point Source Odor Treatment

- One (1) of the four (4) installed point source odor treatment carbon scrubbers has been commissioned. The commissioned unit is the upgraded replacement to a previously installed undersized unit.
- The remaining three (3) carbon scrubbers are to be commissioned once weather allows in the late Q1 / early Q2 2021.
- The remaining three (3) point source generators are currently using existing means and methods of odor treatment.

City of Kalamazoo - Air Sampling Report

- KWRP Biofiltration Odor Control and Mitigation report has just recently been completed with the help of Jones and Henry. This report is still in draft form and is to be completed for commission in January 2021.
- Odors were logged from six locations in the sewer system and six locations throughout the local community using odor loggers, vacuum canisters, and Envirosuite sensors.
- Data has yet to be compared from the Envirosuite sensors and odor loggers. This data has just been released and there is a lot to process and review.
- Three of the odor loggers within the local community were placed next to Envirosuite sensors. This will allow for a comparison of the two systems.
- Vacuum canisters were used as samplers to provide additional minimum detection values. The sensitivity of this equipment is ideal to test for reduced sulfur compounds.
- The canisters allowed for testing of multiple reduced sulfur compounds, volatile organic compounds and ammonia over a 24-hour sampling period.
- The data collected is specifically used by the manufacturers of the biofiltration systems and is requested in order to help design and size the equipment.

Odor Task Force - City of Kalamazoo / GPI Quarterly City Commission Report, Q4 2020

- Report is currently being drafted to include all information GPI has supplied, meeting minutes, Envirosuite data and a previous Jones and Henry report from the fall of 2019.
- GPI will wait one more quarter to provide Envirosuite sensor logs till sufficient data has been collected to share.

The meeting ended at 4:35 PM.

Happy holidays to everyone.

The next meeting is set to be planned after the new year sometime in late January or early February 2021. Expect an email to find a date and time that can best accommodate everyone.

Appendix Q

City of Kalamazoo
TREE COMMITTEE
Minutes
October 6, 2020

Zoom Webinar

Members Present:	Anthony Ladd, Public Works Division Manager, COK Brian LaBelle, Forester, COK Deborah Nichols, Forester, Consumers Energy Steve Skalski, Asst City Engineer, Water Dept., COK Brian Vogl, Forester, Consumers Energy
City Staff:	Karen Rutherford, Recording Secretary
Guests:	Aaron Davenport, Jones & Henry Engineers Dave Engerer, Resident Tom Koporetz, Process Control Engineer, COK Alexis Kontorousis, Jones & Henry Engineers Ryan Stoughton, Assistant City Engineer, COK

A. ALL TO ORDER

Committee Chair Ladd called the Zoom Webinar meeting to order at 2:00 p.m.

B. ROLL CALL

Committee Chair Ladd completed roll call and determined the aforementioned members were present.

C. INTRODUCTION OF GUESTS

Committee Chair Ladd introduced guest:

- Aaron Davenport, Jones & Henry Engineers
- Dave Engerer, Resident
- Tom Koporetz, Process Control Engineer, COK
- Alexis Kontorousis, Jones & Henry Engineers
- Ryan Stoughton, Assistant City Engineer, COK

D. APPROVAL OF AGENDA

By unanimous consent the Committee adopted its meeting agenda as presented.

E. APPROVAL OF MINUTES (September 8 , 2020)

Committee Member Skalski supported by Committee Member LaBelle moved approval of the September 8, 2020 Tree Committee Minutes. With a voice vote, the motion carried unanimously.

F. NEW BUSINESS

Blakeslee Tank – Tree Removals

Committee Chair Ladd opened discussion for the Blakeslee Tank tree removals.

Committee Member Skalski stated they need to remove two trees. Pictures of the trees that need removed were screen shared for the Committee to see. Both trees interfere with the radio communication for water pumping and storage facility. They use high speed radio to communicate from their site. The radio is mounted on a pole at the site.

Mr. Tom Koporetz explained the shed that sets between the two trees goes down two stories below grade. The grass area is the soil covering for a seven and a half million-gallon tank of water. The antenna on the shed is a temporary unit that talks to a tank about a quarter of a mile away. That tank will be de-commissions as far as communication goes. There's temporary pole to the right of the shed that needs to be raised about fifteen feet to be able to talk to another water tank that is near Drake Road and Rt. 131. The pole would be in the branches of the tree after being raised fifteen feet. The second tree to the west is in the direct communication path to the other tank as well. The trees need to be removed so they can effectively communicate to the SCADA system and water distribution.

Committee Member Skalski stated the trees are setting on top of the tanks that are about two feet below the surface. They have had cracks develop on top of the tanks which had to be repaired not far from this location. The trees are probably contributing to the cracks.

Mr. Koporetz explained the Blakeslee tank is a major part of the water infrastructure. They need to know what level of liquid is in the tank. The communication infrastructure is needed to be able to talk to the tank at Drake Road and Rt. 131. With Dartmouth tank being eliminated, they have to communicate to a different tank.

Committee Chair Ladd stated replanting at Blakeslee Tank is not feasible but there are other areas in which to plant replacement trees.

Committee Member Skalski supported by Committee Member LaBelle, made a motion to approve the removals of the trees with replanting of eight trees at a nearby water station site. With a voice vote, the motion carried unanimously.

1415 N. Harrison St. – KWRP Biofilter – Tree Removals

Committee Chair Ladd opened discussion for the tree removals at 1415 N. Harrison St. – KWRP Biofilter.

Mr. Ryan Stoughton stated 1415 N. Harrison St. is the City owned Wastewater Treatment Plant. They are constructing an odor and gas withdraw biofilter system. Any gases and orders that are generated within their sewer network that are connected to their plant can be treated before being exhausted. The location where they are building the infrastructure has

trees on it that need to be removed.

Committee Chair Ladd asked how many trees needed to be removed and their size and condition. There are six or seven 14"-18" diameter sycamore trees and three to four 14"-18" silver maples. The rest are 6" brush. There is a white pine that is dying that needs to be removed.

Mr. Stoughton stated the time frame for clearing and sitework needs done before snowfall comes. He noted given the nature of the underground sewer system, this is the best area to build the infrastructure on.

Committee Member LaBelle suggest replanting be two for one. Committee Member Skalski agreed with Committee Member LaBelle. A discussion followed.

Mr. Stoughton stated they are looking to remove 10 trees for the benefit of improving air quality.

Committee Member Skalski supported by Committee Member LaBelle, made a motion to remove the 10 trees and replace with 20 trees at a location to be determined at a later time, with the approval of Wastewater and Arborist. With a voice vote, the motion carried unanimously.

Winchell Citizen Planting Project

Committee Chair Ladd opened discussion for the Winchell Citizen Planting Project.

Committee Member LaBelle stated Rebeca Dale is going to pay for trees to be planted, with gater bags, in the Winchell Neighborhood. A document indicating location and species was screen shared for the Committee to see. Committee Member LaBelle stated he is working with Ben from Mulders Nursery. Mulders will be planting the trees. Brian walked the sites with Ms. Dale to help her pick the right tree for the right space.

Committee Member LaBelle stated they want to start planting right of way, before winter.

Committee Chair Ladd asked Committee Chair LaBelle if he was able to provide the necessary documents on procedures, references, City policies, MDOT specifications, etc. in our tree planting project for bid. Committee Member LaBelle responded yes. Committee Member LaBelle stated Mulders Nursery will be doing initial maintenance and Ms. Dale will be watering the trees.

Committee Member LaBelle supported by Committee Member Nichols, made a motion to allow the plantings. With a voice vote, the motion carried unanimously.

G. OLD BUSINESS

418 Stuart Ave. – Tree Removal

Committee Chair Ladd opened discussion for the tree removal at 418 Stuart Ave.

Committee Chair Ladd stated at last month's meeting there was presented a large tree in the curb lawn causing issues with Mr. Dave Engerer's home and his neighbor's home. A motion was made for an on-site visit to see if there was enough space for two new plantings in the curb lawn between his property and his neighbor's property. Committee Chair Ladd stated Committee Member LaBelle and himself made several visits to the site over the last few weeks. They came to an agreement for two large species planting locations in the curb lawn.

Committee Member LaBelle stated he is not in favor of removing the tree. The existing tree is probably over 130 years old and two new trees do not equal the value of the existing tree. He stated this is not an equal replacement.

Mr. Dave Engerer stated they have had many issues with the tree. He noted several branches have fallen that are both live and dead causing damage to the home. There is potential for a limb to fall on a person. Moss is growing on the roof and on his neighbor's roof. They have significant damage to the porch. The front of the home does not get sun causing a lot of rot. It's an historical home and the cost to maintain the home is significant. When it rains it stays wet for days and the gutters stay clogged.

Committee Chair Ladd screen shared photos of the tree given to the Committee last month noting the curb lawn space in front of the Mr. Engerer's home and his neighbor's home. He also noted some of the concern is how far the tree leans over the house. Committee Member LaBelle stated the City completed work orders for trimming and they did corrective pruning due to some illegal pruning done previously. A discussion followed.

Committee Member Nichols asked why an historic tree is valued less than an historic house. As trees age they drop branches. It's an historic tree and the size and amount of the coverage it provides for the City is critical. Two smaller trees do not equal the value of this tree to the City. Mrs. Engerer stated the tree is a liability to their home. The tree is a threat to their home and the neighbors.

Committee Member LaBelle stated they have removed branches to mitigate a hazard to the community, but any tree has a risk and hazard to it. As a tree grows and gets bigger, they pose a greater risk. He stated there is little risk with this tree, there is no dead wood in the crown, he saw now rot or ant/termite damage, and it does not have black tar fungus. The tree is doing well considering its age and species.

Committee Member Committee Nichols stated there are no power lines above the tree and it is nice that we have this area where we can have a large tree.

Committee Member Vogl stated he understands the homeowners concern but also realizes the value of protecting an historical tree.

Committee Member Nichols suggested they hire a third-party Arborist, who has gone through the evaluation training through ASM, to do an evaluation of the tree to determine

the value of the tree in its current condition. This is something the homeowner would need if he were to go to court. The evaluation would include age and size of the tree, location, health of the tree, species, and measuring the benefit of what the tree is to the City.

Committee Member Nichols supported by Committee Member LaBelle, made a motion for the home owner to hire a certified Arborist to get an evaluation of the tree to determine the value of the tree. The homeowner would pay for the cost of hiring an Arborist, pay to the City the determined value of the tree, and for the removal of the tree. With a voice vote, the motion carried unanimously.

Committee Chair Ladd stated once Mr. Engerer has obtained this information, he can contact Brian LaBelle or himself to bring it before the Committee again.

Bank Street Realignment Project – Tree Species

Committee Chair Ladd stated this is still in the design phase and he does not have an update at this time. They are still committed to picking the appropriate tree species and planting as many tree species for this site.

H. PUBLIC COMMENT

None.

I. COMMITTEE COMMENTS

Committee Chair Ladd stated he and Committee Member LaBelle are planning a meeting in November to discuss policy and procedures of the Tree Committee.

J. ADJOURNMENT

Committee Member LaBelle supported by Committee Member Ladd, made a motion to adjourn the Tree Committee meeting. With a voice vote, the motion carried unanimously. The meeting was adjourned at 3:22 p.m.

Submitted by: Karen Rutherford Date: 12-3-2020
Recording Secretary

Approved by: _____ Date: 12/3/2020
Staff Liaison

Appendix R

Minutes
Natural Features Protection Review Board
October 27, 2020
Regular Meeting

Held virtually via Zoom Video Conference 4:00 p.m.

A. Called to Order at 4:01 p.m.

B. Roll Call and Excuse Absent Members

Directors present: Ashley Cole-Wick, Erin Fuller, Mitch Lettow, Paul MacNellis, Kyle Martin, Alan Sylvester

Directors absent: Bobby Glasser

Director Fuller made a motion to excuse absent members, supported by Director MacNellis. Motion approved unanimously by voice vote.

C. Adoption of Agenda

Director Fuller made a motion to approve the agenda as presented, supported by Director MacNellis. Motion approved unanimously by voice vote.

D. Approval of Meeting Minutes from September 29, 2020

Director MacNellis made a motion to approve the meeting minutes from the September 29 meeting, supported by Director Sylvester. Motion approved unanimously by voice vote.

E. New Business

1. Public hearing for a variance request at 500 Golden Drive for relief from the NFP native plant standard.

Staff and applicant presentation:

Jamie McCarthy, staff liaison introduced the project and provided background, stating the project is part of the IL center at Heritage Community of Kalamazoo and is breaking ground this fall. According to Jay Prince, Executive Director, the gardens are considered essential to the project for healthy living of the residents. Mark Robinson, landscape architect for the project explained the project is looking for a variety of plants more than native-only plants can offer. He explained the rationale for selection of a limited number of non-native plants, including species most tolerant of salt around the drives. Several plants were selected for ground cover or shading, and other vegetation and ground cover was selected to ensure most robust plants.

Director MacNellis asked Mr. Robinson about the *Thuja* request, which was selected to provide screening to the neighborhood to the south. Director Lettow asked Mr. Robinson why cultivars

are selected and whether it was for practical purposes, aesthetics, or supply chain issues. Mr. Robinson said it was a practical matter and due to supply chain issues.

Director Fuller asked if the percentage of native versus non-native plants in the request is based on area coverage or species number. Mr. Robinson explained that it is the individual plant numbers.

Director Martin asked about pachysandra and mentioned it's listed by USDA as invasive. He stated that he has noticed this same tendency here locally. He asked if there's an alternative. Mr. Robinson noted this landscape bed has well defined borders of turf grass and should limit the risk of unwanted spread.

Director Lettow told the board he checked the MISIN website and none of the non-native plants were listed as invasive. He was pleased with the diversity of the planting. Director MacNellis said he's pleased with extend of plantings and wanted to know if they have professional landscaping services to be sure to it is well maintained over time. Mr. Prince stating the organization employs full-time grounds staff to maintain landscaping.

Public comments: None

Discussion: Director MacNellis stated that he was in support of the request for relief due to the consideration and planning that went into the landscape plan. He indicated his vote was not meant to set a precedence for granting variances, as he would consider each on a case-by-case basis in the future.

Director MacNellis made a motion to approve a recommendation to the Zoning Board of Appeals to grant a variance request at 500 Golden Drive for relief from the NFP native plant standard for a portion of a garden project planned in connection with the new construction of an independent living center. The motion was supported by Director Martin. The motion was approved unanimously by roll call vote.

2. Approval of the Natural Features Protection Site Plan for a bio-scrubber construction project located at 1415 Harrison Street.

Ms. McCarthy introduced the project and applicant, which is the City of Kalamazoo. The project involves building a bioscrubber and associated infrastructure to abate odor concerns at the Kalamazoo Water Reclamation Plant. Ryan Stoughton, manager and engineer on the project explained the purpose of the bio-scrubber, proposed location, and work to be performed.

Director Cole-Wick asked about whether work would be done at the Kalamazoo River bank or within the river channel. Mr. Stoughton said work would be setback from the river's edge by at least 25 feet or more. Director Cole-Wick noted the concern over rare species would likely only be aquatic species in the river, so she was not concerned about impacts.

Mr. Stoughton stated that the City has been working with EGLE to determine if wetlands are present in or along the Kalamazoo River in this location. EGLE indicated a wetland determination was not required as no wetlands were evident during a recent site visit. Ms. McCarthy recommended this documentation be shared with staff for the file.

Director Fuller asked about the tree removal that was noted on the NFP application. Mr. Stoughton stated he is working with the City Forestry Supervisor and will provide an exact species list with DBH for each. Director Fuller requested staff work with Mr. Stoughton to confirm the replacement plantings meet the NFP requirements. Mr. Stoughton has been working with the City's Tree Committee since the City's tree ordinance also applies to this site.

Director Fuller made a motion to approve the Natural Features Protection Site Plan for a bio-scrubber construction project located at 1415 Harrison Street, conditional on receipt of the MNFI letter and trees species replanting list. The motion was supported by Director Lettow. The motion was approved unanimously by roll call vote.

3. Approval of the Natural Features Protection Site Plan for an accessible trail construction project located at 3401 Nazareth Drive.

Ms. McCarthy introduced Mitch Lettow as representing the Southwest Michigan Land Conservancy (SWMLC) as project manager of the *Bow in the Clouds* project. Mr. Lettow states his conflict of interest and will abstain from voting on the approval. Mr. Lettow discussed the project in terms of the natural features present on the site. He explained that the project is construction pervious trails which are allowable within wetland setback areas per the code. Mr. Lettow described how the woodland standard was applied and that it is being met by removing only 17 trees, mostly Syberian Elm and Box Elder. In lieu of an MNFI rare species review, SMWLC has an agreement with USFWS to perform rare and endangered species review for their work. Mr. Lettow explained how the Project will manage for Massasauga Rattlesnake in their inactive season.

Director Fuller made a motion to approve the Natural Features Protection Site Plan for an accessible trail construction project located at 3401 Nazareth Drive (Bow in the Clouds Preserve). Motion was supported by Director MacNellis. Director Lettow abstained from voting and the motion was approved unanimously by roll call vote.

F. Old Business

Ms. McCarthy gave an update on the progress of NFP Phase 2. The City mailed notice letters to 6,200 addresses/taxpayers. The City has received many inquiries, mostly requesting more information. There are a few property owners who are objecting to the re-zoning on their properties. At this time staff would not recommend these parcels be removed since they have natural features located on the property or are located within setbacks. Director Fuller asked about a factsheet, and Ms. McCarthy noted that one exists on the website. Director Fuller and other members suggested adding a link from Phase 1 website to the Phase 2 website and make the FAQ sheet more visible. Map and text amendments will go to the PC on 11/5 and then two meetings of the CC; if approved board will have new map in effect early 2021.

G. Board Comments

Lettow asked about how a resident would be impacted by NFP standards. McCarthy explained that all property owners are beholden to following the rules, regardless if a permit or other special permission is necessary. She explained what type of projects

require site plan and board approval and which are done administratively. She suggested the board consider this list of project types again in early 2021 if the board is faced with many more applications with expansion of the map. The board might consider creating a project flowchart to help determine the appropriate level of review.

Mr. Lettow also asked the board about their comfort level with cultivar native species and whether it met the intent of NFP. McCarthy mentioned that in the proposed text amendments the use of nativars by right was being removed and that the board would have the authority to approve such uses during regular NFP project review and approval.

H. Citizen Comments

Mr. Richard Stewart of the Southtown Neighborhood called in to confirm that parcels between Stockbridge and Lake Streets have been added to the proposed expansion of the NFP Overlay District. Ms. McCarthy said these parcels have been added. Director Sylvester mentioned he's familiar with the project at that location and the concerns the neighbors have about development. Ms. McCarthy will be sure to communicate what NFP can and cannot do for protection since the ordinance does not prohibit development. She also mentioned that a site plan was already approved for the project before being added to the NFP Overlay District.

L. Adjourned meeting at 5:51 p.m.

Signature, Board Chair

Signature, Recording Secretary

Appendix S

MICHIGAN STATE UNIVERSITY | Extension

Mr. Tyler Kindle, P.E. – Project Engineer
Jones & Henry Engineers, Inc.
4791 Campus Drive
Kalamazoo, MI 49008
(269) 353-9650

October 20, 2020

Re: Rare Species Review #2743 – City of Kalamazoo Water Reclamation Plant Project, Kalamazoo County, MI (T02S R11W S10)

Mr. Kindle:

The location for the proposed project was checked against known localities for rare species and unique natural features, which are recorded in the Michigan Natural Features Inventory (MNFI) natural heritage database. This continuously updated database is a comprehensive source of existing data on Michigan's endangered, threatened, or otherwise significant plant and animal species, natural plant communities, and other natural features. Records in the database indicate that a qualified observer has documented the presence of special natural features. The absence of records in the database for a particular site may mean that the site has not been surveyed. The only way to obtain a definitive statement on the status of natural features is to have a competent biologist perform a complete field survey.

Under Act 451 of 1994, the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection, "a person shall not take, possess, transport, …fish, plants, and wildlife indigenous to the state and determined to be endangered or threatened," unless first receiving an Endangered Species Permit from the Michigan Department of Natural Resources (MDNR), Wildlife Division. Responsibility to protect endangered and threatened species is not limited to the lists below. Other species may be present that have not been recorded in the database.

Several at-risk species have been documented within 1.5-miles of the project location and **it is possible that negative impacts will occur**. Keep in mind that MNFI cannot fully evaluate this project without visiting the project site. MNFI offers several levels of Rare Species Reviews, including field surveys which I would be happy to discuss with you.

Sincerely,

Michael A. Sanders

Michael A. Sanders
Environmental Review Specialist/Zoologist
Michigan Natural Features Inventory

MSU EXTENSION

Michigan Natural Features Inventory

PO Box 13036
Lansing MI 48901

(517) 284-6200
Fax (517) 373-9566

mnfi.anr.msu.edu

Comments for Rare Species Review #2743: It is important to note that it is the applicant's responsibility to comply with both state and federal threatened and endangered species legislation. Therefore, if a state listed species occurs at a project site, and you think you need an endangered species permit please contact: Casey Reitz, Michigan DNR Wildlife Division, 517-284-6210, or ReitzC@michigan.gov. If a federally listed species is involved and, you think a permit is needed, please contact Carrie Tansy, Endangered Species Program, U.S. Fish and Wildlife Service, East Lansing office, 517-351-8375, or Carrie_Tansy@fws.gov.

NOTE: Michigan rivers and streams have been grouped according to existing information of mussel distribution and individual species conservation status. This section of the Kalamazoo River is a Group 1 mussel stream which means that state special concern species are expected to occur here and that certain surveys and possibly relocation procedures apply. I encourage you to read the ***Michigan Freshwater Mussel Survey Protocols and Relocation Procedures*** publication if in-stream work and/or land clearing activities occur that result in streambed disturbance and erosion and sedimentation into the river. A copy of the publication can be accessed at: https://mnfi.anr.msu.edu/resources/michigan-mussels

Table 1: Occurrences of threatened & endangered species within 1.5 miles of RSR #2743

ELCAT	SNAME	SCOMNAME	USESA	SPROT	G_RANK	S_RANK	FIRSTOBS	LASTOBS
Animal	*Clonophis kirtlandii*	Kirtland's snake		E	G2	S1	1879	1879-07-11
Animal	*Falco peregrinus*	Peregrine falcon		E	G4	S3	2010	2018

Comments for Table 1:

No concerns. Occurrences are Historic and/or far removed from project location.

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Table 2: Occurrences of special concern species & other natural features within 1.5 miles of RSR #2743

ELCAT	SNAME	SCOMNAME	USESA	SPROT	G_RANK	S_RANK	FIRSTOBS	LASTOBS
Animal	*Lasmigona costata*	Flutedshell		SC	G5	SNR	2000-08-01	2000-08-01
Animal	*Pleurobema sintoxia*	Round pigtoe		SC	G4G5	S3	2018-08-14	2018-08-14
Animal	*Utterbackia imbecillis*	Paper pondshell		SC	G5	S2S3	2018-08-14	2018-08-14
Animal	*Villosa iris*	Rainbow		SC	G5	S3		
Animal	*Sphaerium fabale*	River fingernail clam		SC	G5	SNR		
Animal	*Bombus pensylvanicus*	American bumble bee		SC	G3G4	S1	1963-09-04	1963-09-04
Animal	*Bombus affinis*	Rusty-patched bumble bee	LE	SC	G2	SH	1963-07-25	1975-07-12
Animal	*Bombus pensylvanicus*	American bumble bee		SC	G3G4	S1	1963-05-30	1965-08-09
Animal	*Lithobates palustris*	Pickerel frog		SC	G5	S3S4	1911-08-30	1911-08-30
Animal	*Bombus auricomus*	Black and gold bumble bee		SC	G4G5	S2	1963-08-02	1963-08-02
Animal	*Alasmidonta marginata*	Elktoe		SC	G4	S3?	2000-07	2018-07-19
Plant	*Collinsia verna*	Blue-eyed Mary		SC	G5	SNR	1838-08-27	1877-05-06

Comments for Table 2:

NOTE: Several rare freshwater mussels have been documented throughout the project area. Freshwater mussels (*Unionida*) require a fish host to complete their life cycle. Eggs are fertilized and develop into larvae within the gills of the female mussel. These larvae, called glochidia, are released into the water and must attach to a

suitable fish host to survive and transform into the adult mussel. As zebra mussel (*Dreissena polymorpha*) infestation has led to the extirpation of many native mussel communities, boat hulls and trailers, fishing gear and scuba equipment should be thoroughly cleaned before moving between waterbodies, to prevent the spread of zebra mussel larvae and adults.

Please consult MNFI's Rare Species Explorer for additional information regarding the occurrences in Table 2.

Special concern species and natural communities are not protected under endangered species legislation, but efforts should be taken to minimize any or all impacts. Species classified as special concern are species whose numbers are getting smaller in the state. If these species continue to decline, they would be recommended for reclassification to threatened or endangered status.

Flutedshell – the state special concern flutedshell mussel (*Lasmigona costata*) has been known to occur in the Kalamazoo River. Fluted-shell mussels inhabit medium to large rivers in sand, mud, or fine gravel in areas with slow to moderate flow.

Management and Conservation – threats to the species include water pollution, industrial and residential discharge, siltation, increased water temperatures and non-native species. All projects should implement proper upland managements such as contour farming and other soil erosion control methods.

Round pigtoe - the special concern round pigtoe mussel (*Pleurobema sintoxia*) has been known to occur in the Kalamazoo River. Round pigtoe mussels inhabit medium sized to large rivers. They are found on sand or mud in sparsely vegetated areas with a moderate current. Bluegill (*Lepomis macrochirus*) are believed to be the host fish for round pigtoe.

Management and Conservation - like other mussels, threats include natural flow alterations, siltation, channel disturbance, point and non-point source pollution, and exotic species. Maintenance or establishment of vegetated riparian buffers can help protect mussel habitats from many of their threats. Control of zebra mussels is critical to preserving native mussels. And as with all mussels, protection of their hosts habitat is also crucial.

Paper pondshell – the state special concern paper pondshell mussel (*Utterbackia imbecillis*) has been known to occur in the Kalamazoo River. Paper pondshell is most often observed in lakes, ponds and impoundments with soft mud or sand substrates.

Management and Conservation: as with all species of this group, paper pondshell has been found to be highly vulnerable to chemical pollutants and heavy metals found in many herbicides and pesticides, and in other forms of point and non-point source pollution.

Elktoe - the special concern elktoe mussel (*Alasmidonta marginata*) has been known to occur in the Kalamazoo River. This species is found in clean, clear rivers with gravel or rocky bottoms and swift currents. It is a riffle species, preferring swifter currents over packed sand and gravel substrates. Although fertilization generally occurs in July, the developing glochidia (larval mussels) are held in the gills until the following June, at which time the parasitic glochidia are released and adhere to a fish host. Known host fish include the white sucker (*Catostomus commersoni*), northern hog sucker (*Hypentelium nigricans*), shorthead redhorse (*Moxostoma macrolepidotum*), rockbass (*Ambloplites rupestris*) and warmouth (*Lepomis gulosus*).

Management and Conservation: the elktoe needs clean, fast-flowing water to survive. Therefore, changes to its habitat, such as river impoundment, siltation, and channel disturbances, including dredging, negatively affect this species.

Codes to accompany Tables:

State Protection Status Code Definitions (SPROT)
E: Endangered
T: Threatened
SC: Special concern

Federal Protection Status Code Definitions (USESA)
LE = listed endangered
LT = listed threatened
LELT = partly listed endangered and partly listed threatened
PDL = proposed delist
E(S/A) = endangered based on similarities/appearance
PS = partial status (federally listed in only part of its range)
C = species being considered for federal status

Global Heritage Status Rank Definitions (GRANK)
The priority assigned by NatureServe's national office for data collection and protection based upon the element's status throughout its entire world-wide range. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.
G1 = critically imperiled globally because of extreme rarity (5 or fewer occurrences range-wide or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
G2 = imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3: Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single western state, a physiographic region in the East) or because of other factor(s) making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.
G4: Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.
G5: Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
Q: Taxonomy uncertain

State Heritage Status Rank Definitions (SRANK)
The priority assigned by the Michigan Natural Features Inventory for data collection and protection based upon the element's status within the state. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.
S1: Critically imperiled in the state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation in the state.
S2: Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.
S3: Rare or uncommon in state (on the order of 21 to 100 occurrences).
S4 = apparently secure in state, with many occurrences.
S5 = demonstrably secure in state and essentially ineradicable under present conditions.
SX = apparently extirpated from state.

Section 7 Comments
Rare Species Review #2743
Jones & Henry Engineers, Inc.
Kalamazoo Water Reclamation Plant
City of Kalamazoo
Kalamazoo County, MI
October 20, 2020

For projects involving Federal funding or a Federal agency authorization

The following information is provided to assist you with Section 7 compliance of the Federal Endangered Species Act (ESA). The ESA directs all Federal agencies "to work to conserve endangered and threatened species. Section 7 of the ESA, called "Interagency Cooperation, is the means by which Federal agencies ensure their actions, including those they authorize or fund, do not jeopardize the existence of any listed species."

This activity falls within the range of five (5) federally listed/proposed species which have been identified by the U.S. Fish and Wildlife Service (USFWS) to occur in Kalamazoo County, Michigan:

Federally Endangered

Indiana bat - there appears to be suitable habitat within the 1.5-mile search buffer. The state and federally endangered Indiana bats (*Myotis sodalis*) are found only in the eastern United States and are typically confined to the southern three tiers of counties in Michigan. Indiana bats that summer in Michigan winter in caves in Indiana and Kentucky. This species forms colonies and forages in riparian and mature floodplain habitats. Nursery roost sites are usually located under loose bark or in hollows of trees near riparian habitat. Indiana bats typically avoid houses or other artificial structures and typically roost underneath loose bark of dead elm, maple and ash trees. Other dead trees used include oak, hickory and cottonwood.

Foraging typically occurs over slow-moving, wooded streams and rivers as well as in the canopy of mature trees. Movements may also extend into the outer edge of the floodplain and to nearby solitary trees. A summer colony's foraging area usually encompasses a stretch of stream over a half-mile in length. Upland areas isolated from floodplains and non-wooded streams are generally avoided.

Management and Conservation: the suggested seasonal tree cutting range for Indiana bat is between October 1 and March 31 (i.e., no cutting April 1-September 30). This applies throughout the Indiana bat range in Michigan.

Mitchell's satyr butterfly – there does not appear to be suitable habitat within the 1.5-mile search buffer. The federally endangered and state endangered Mitchell's satyr butterfly *(Neonympha mitchellii mitchellii)* is restricted to calcareous wetlands known as prairie fens. In Michigan, this habitat is characterized by scattered tamaracks, poison sumac, and dogwood with a ground cover of sedges, shrubby cinquefoil, and a variety of herbaceous species with prairie affinities. Adult Mitchell's satyr butterflies are active two to three weeks each summer, with males emerging before females. Adult flight dates are from mid-June to mid-July. Larvae hibernate near the bottom of a sedge. The larval food plant is thought to be several species of sedge. The caterpillar is green with white stripes.

Management and Conservation: the primary threat to the continued survival of this species is habitat loss and modification. Many of the wetland complexes occupied currently have been altered or drained for agriculture or development. Wetland alteration is responsible for extirpating the single known satyr population in Ohio. Wetland alteration also can lead to invasion by exotic plant species such as glossy buckthorn (*Rhamnus frangula*), purple loosestrife (*Lythrum salicaria*), common buckthorn (*Rhamnus cathartica*), and the common reed (*Phragmites australis*). In addition, landscape-scale processes that may be important for maintaining suitable satyr habitat and/or creating new habitat, such as wildfires, fluctuations in hydrologic regimes, and flooding from beaver (*Castor canadensis*) activity, have been virtually eliminated or altered throughout the species' range.

Snuffbox – there appears to be suitable habitat within 1.5-miles of the project site. The state and federally endangered snuffbox mussel (*Epioblasma triquetra*) inhabits rivers and streams with cobble, gravel, or sand bottoms in swift currents and usually is deeply buried in the substrate. Glochidia, the parasitic larval stage of the mussel, are released from May to mid-July. In Michigan, the only host fish known for snuffbox is the log perch (*Percina caprodes*). In other parts of their range the banded sculpin (*Cottus carolinae*) is also a known host. After completing the parasitic stage and reaching adulthood, snuffbox remain relatively sessile on the river bottom, living between 8-10 years. The best time to survey for snuffbox is April through September.

Conservation and Management: the snuffbox mussel is sensitive to river impoundment, siltation and disturbance, due to its requirement for clean, swift current and relative immobility as an adult. To maintain the current populations in Michigan, rivers need to be protected to reduce silt loading and run-off. Maintaining or establishing vegetated riparian buffers can aid in controlling many of the threats to mussels. Control of zebra mussels is critical to preserving native mussels. And as with all mussels, protection of their hosts habitat is also crucial. Because the life cycle of the snuffbox is inherently linked with that of the logperch in Michigan, conservation and management of this fish species is needed to ensure that of the snuffbox.

Federally Threatened

Northern long-eared bat - Northern long-eared bat (*M. septentrionalis*) numbers in the northeast US have declined up to 99 percent. Loss or degradation of summer habitat, wind turbines, disturbance to hibernacula, predation, and pesticides have contributed to declines in Northern long-eared bat populations. However, no other threat has been as severe to the decline as White-nose Syndrome (WNS). WNS is a fungus that thrives in the cold, damp conditions in caves and mines where bats hibernate. The disease is believed to disrupt the hibernation cycle by causing bats to repeatedly awake thereby depleting vital energy reserves. This species was federally listed in May 2015 primarily due to the threat from WNS.

Although no known hibernacula or roost trees have been documented within 1.5 miles of the project area, this activity occurs within the designated WNS zone (i.e., within 150 miles of positive counties/districts impacted by WNS. In addition, there appears to be suitable habitat within the buffer. The USFWS has prepared a dichotomous key to help determine if this action may cause prohibited take of this bat. Please consult the USFWS Endangered Species Page for more information.

Also called northern bat or northern myotis, this bat is distinguished from other *Myotis* species by its long ears. In Michigan, northern long-eared bats hibernate in abandoned mines and caves in the Upper Peninsula; they also commonly hibernate in the Tippy Dam spillway in Manistee County. This species is a regional migrant with migratory distance largely determined by locations of suitable hibernacula sites.

Northern long-eared bats typically roost and forage in forested areas. During the summer, these bats roost singly or in colonies underneath bark, in cavities or in crevices of both living and dead trees. Roost trees are selected based on the suitability to retain bark or provide cavities or crevices. Common roost trees in southern Lower Michigan include species of ash, elm and maple. Foraging occurs primarily in areas along woodland edges, woodland clearings and over small woodland ponds. Moths, beetles and small flies are common food items. Like all temperate bats this species typically produces only 1-2 young per year.

Management and Conservation: when there are no known roost trees or hibernacula in the project area, we encourage you to conduct tree-cutting activities and prescribed burns in forested areas during October 1 through March 31 when possible, but you are not required by the ESA to do so. When that is not possible, we encourage you to remove trees prior to June 1 or after July 31, as that will help to protect young bats that may be in forested areas but are not yet able to fly.

Eastern massasauga rattlesnake (EMR) – this project falls within Tier 2 EMR habitat as designated by the US Fish & Wildlife Service, which means that there is suitable habitat in the area and the species may occur here. The federally threatened and state special concern eastern massasauga *(Sistrurus catenatus)* is Michigan's only venomous snake and

occurs in a variety of wetland habitats including swamps, wet meadows, marshes, moist grasslands, wet prairies, and floodplain forests. Eastern massasaugas occur throughout the Lower Peninsula but are not found in the Upper Peninsula. Populations in southern Michigan are typically associated with open wetlands, particularly prairie fens, while those in northern Michigan are better known from lowland coniferous forests, such as cedar swamps. These snakes normally overwinter in crayfish or small mammal burrows often close to the groundwater level and emerge in spring as water levels rise. During late spring, these snakes move into adjacent uplands they spend the warmer months foraging in shrubby fields and grasslands in search of mice and voles, their favorite food.

Often described as “shy and sluggish”, these snakes avoid human confrontation and are not prone to strike, preferring to leave the area when they are threatened. However, like any wild animal, they will protect themselves from anything they see as a potential predator. Their short fangs can easily puncture skin and they do possess potent venom. Like many snakes, the first human reaction may be to kill the snake, but it is important to remember that all snakes play vital roles in the ecosystem. Some may eat harmful insects. Others like the massasauga consider rodents a delicacy and help control their population. Snakes are also a part of a larger food web and can provide food to eagles, herons, and several mammals.

Management and Conservation: any sightings of these snakes should be reported to the Michigan Department of Natural Resources, Wildlife Division. If possible, a photo of the live snake is also recommended.

USFWS Section 7 Consultation Technical Assistance can be found at:

https://www.fws.gov/midwest/endangered/section7/s7process/index.html

The website offers step-by-step instructions to guide you through the Section 7 consultation process with prepared templates for documenting “no effect.” as well as requesting concurrence on "may affect, but not likely to adversely affect" determinations.

Please let us know if you have questions.

Michael Sanders
Environmental Review Specialist/Zoologist
Sander75@msu.edu
Cell: 517-980-5632

Appendix T

Interoffice Memo

Date: January 5, 2021

To: Natural Features Protection Committee

From: Ryan Stoughton, PE, Assistant City Engineer - Wastewater

RE: Biofilter Project – Potential Construction Area Tree Inventory

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To whom it may concern,

Below is a listing, in no specific order, of trees which reside within the potential construction impact region for the City of Kalamazoo Water Reclamation Plant's Biofilter construction project. For this task, tree's were measured and recorded per MDOT standard specifications.

Sycamore
(1) 17" diameter
(2) 18" diameter
(1) 32" diameter
(1) 11" diameter
(1) 18" diameter
(1) 22" diameter

Black Walnut
(2) 12" diameter
(1) 8" diameter
(2) 7" diameter
(1) 12" diameter
(2) 9" diameter
(1) 11" diameter

Locus
(1) 22" diameter

Cherry
(1) 8" diameter
(1) 7" diameter

Red Pine
(1) 14" diameter

If you have any questions, please feel free to contact me at 269-337-8736 or stoughtonr@kalamazoocity.org.