John Bel Edwards
GOVERNOR

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SECRETARY

State of Louisiana

Louisiana Department of Health
Office of Public Health

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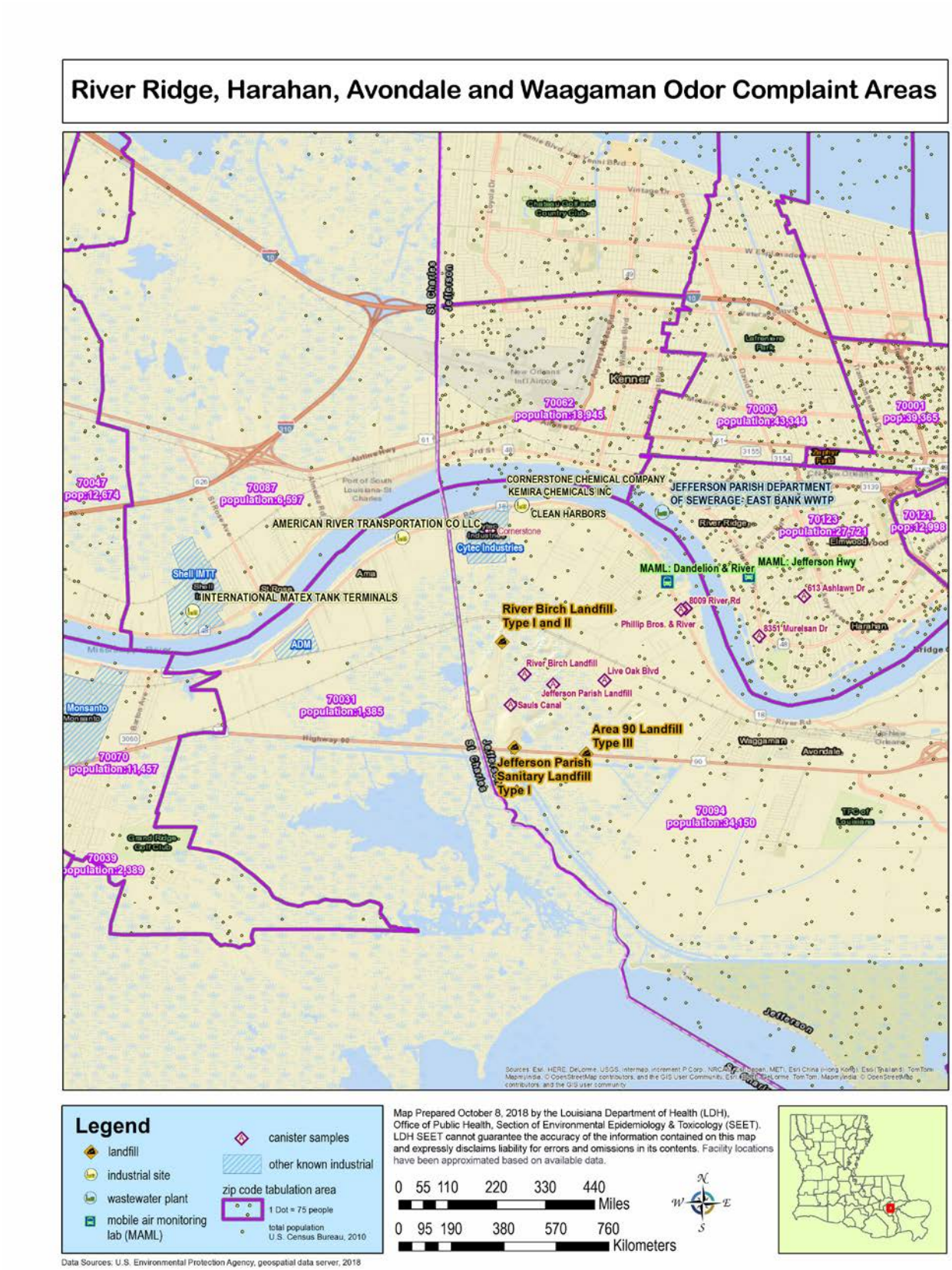
Contents

This report is an update on the status of the Louisiana Department of Health (LDH) review of air monitoring results from samples collected by the Louisiana Department of Environmental Quality (LDEQ) in River Ridge, Harahan, Waggaman, and Avondale between February 19, 2018 and August 31, 2018. The air samples were collected in response to the community's reported health effects due to the foul odors. Appendix A of this report details LDH's review of residential odor and health complaints documented in the Louisiana Department of Environmental Quality's (LDEQ) Electronic Data Management System (EDMS) and on the River Ridge/Harahan Air Quality Facebook page. LDH also evaluated Louisiana Early Event Detection System (LEEDS) data for select symptoms and syndromes that could have an association with exposure to noxious odors.

Sources of odors may involve the following:

- Jefferson Parish/ Harahan Waste Water Treatment located on the East Bank of Jefferson Parish
- Three landfills (River Birch, Hwy 90 and Jefferson Parish Landfill) which are located on the West Bank of the Mississippi River
    1. River Birch Landfill – Type I and II Landfill which accepts municipal, industrial, and commercial wastes; asbestos; treated lumber; solid and liquid wastes; and sludge
    2. Hwy 90 Landfill- Type III Landfill which accepts construction and demolition debris (C&D), metal, concrete, brick, asphalt, roofing materials, floor tiles and hurricane debris
    3. Jefferson Parish Landfill – Type I Landfill accepts municipal garbage and trash from residences and small businesses in Jefferson Parish. The landfill does not accept discarded appliances, tires, or liquid wastes.
- The Cornerstone Chemical plant located on the West Bank in Waggaman, La. which shares resources with three other companies: Evonik (manufactures methyl methacrylate), Kemira Water Solutions (manufactures acrylamide), and Dyno Nobel (manufactures ammonium nitrate). The products that are produced by the Cornerstone site include acrylonitrile, melamine, sulfuric acid, methyl methacrylate, ammonia, and urea.
- International –Matex Tank Terminals, a bulk liquids storage terminal facility, and several fleeting services located along the stretch of the Mississippi River on the West Bank.
- ARTCO, a mid-stream loader located in the Mississippi River and uses aluminum phosphide pellets to fumigate the grain.

The Louisiana Department of Health/Office of Public Health/Section of Environmental Epidemiology and Toxicology (LDH/OPH/SEET) has reviewed the results of air monitoring conducted by the LDEQ from February 2018 through July 2018. This consult reviews air sampling results collected by LDEQ between February 19-23, 2018; on March 21, 2018; April 27- May1, 2018; June 10, 2018; July 20-27, 2018 and on August 31, 2018. [1,2,3]


River Ridge, Harahan, Avondale and Waagaman Odor Complaint Areas
St. Charles
Jefferson
Kenner
70062
population:18,945
70003
population:43,344
70001
pop:39,365
70047
pop:12,674
70087
population:6,597
CORNERSTONE CHEMICAL COMPANY
KEMIRA CHEMICALS INC
JEFFERSON PARISH DEPARTMENT
OF SEWERAGE- EAST BANK WWTP
CLEAN HARBORS
AMERICAN RIVER TRANSPORTATION CO LLC
Cytec Industries
70123
population:27,721
70121
pop:12,998
Elmwood
River Ridge
MAML: Dandelion & River
MAML: Jefferson Hwy
Shell IMTT
INTERNATIONAL MATEX TANK TERMINALS
Ama
River Birch Landfill
Type I and II
Phillip Bros. & River
8009 River Rd
613 Ashlawn Dr
8351 Mureisan Dr
Harahan
ADM
River Birch Landfill
Live Oak Blvd
Jefferson Parish Landfill
Sauls Canal
70031
population:1,385
Monsanto
Area 90 Landfill
Type III
Waggaman
Avondale
Jefferson Parish
Sanitary Landfill
Type I
70070
population:11,457
70094
population:34,150
TPC of Louisiana
70039
population:2,389
Legend
landfill
industrial site
wastewater plant
mobile air monitoring lab (MAML)
canister samples
other known industrial
zip code tabulation area
1 Dot = 75 people
total population
U.S. Census Bureau, 2010
Map Prepared October 8, 2018 by the Louisiana Department of Health (LDH), Office of Public Health, Section of Environmental Epidemiology & Toxicology (SEET). LDH SEET cannot guarantee the accuracy of the information contained on this map and expressly disclaims liability for errors and omissions in its contents. Facility locations have been approximated based on available data.
0 55 110 220 330 440 Miles
0 95 190 380 570 760 Kilometers
N
W
E
S
Data Sources: U.S. Environmental Protection Agency, geospatial data server, 2018

1-Event Description and History

According to LDEQ's Environmental Data Management System (EDMS), the agency began receiving odor complaints from residents living and working in the River Ridge and Harahan area in November 2008, however there has been a spike in odor complaints which began in August 2017. It was noted by the LDEQ that the odor incidents seemed to be more prevalent when the wind is from a westerly direction and during the night or early morning hours. In response to the odor complaints, LDEQ's Surveillance Division staff requested assistance from the Air Planning and Assessment Division (APAD) to conduct air monitoring using the Mobile Air Monitoring Laboratory (MAML).

1.1 - Odor Reports

A Jefferson Parish Council meeting was held on July 23, 2018 to address the odor complaints. It was reported that the Jefferson Parish Landfill located in Waggaman has a history of noxious odors. A recent review of LDEQ records show that complaints about noxious odors emanating from the Jefferson Parish landfill began in 2008. After the 2008 complaints, then Jefferson Parish President Aaron Broussard wrote a letter to the LDEQ notifying them that the parish landfill had problems getting the gas out of the landfill through its wells.

In 2013, the LDEQ issued a compliance order to the parish landfill for failing to cover up the waste and for dumping trash in standing water. This compliance order resulted in a consent agreement with LDEQ that fined the parish and forced the parish to make changes to their operations at the landfill.

In April 2018, the LDEQ issued another compliance order to the parish due to noxious odors. The residents are continuing to complain about the smell. Since April 2018, a group of residents in Harahan/River Ridge has gathered more than 1,800 complaints about the stench. The Jefferson Parish landfill is currently operated by a contractor, Louisiana Regional Landfill Company (LRLC), previously known as IESI Louisiana Landfill Corporation.

On June 22, 2018, after several violations were found by the LDEQ at the Jefferson Parish landfill, the LDEQ served the Jefferson Parish government a compliance order. [4] The violations noted that the landfill's waste filter system was not functioning correctly and the operators were not properly covering the waste known to cause the odor. The order stated that Jefferson Parish needs to respond with a written report to the state within 30 days or request a hearing on the issue; however, parish officials have not responded.

2-Types of Gasses emitted from Landfills

When organic matter breaks down or decays, a complex mixture composed of a wide variety of gasses are emitted, many of which have strong noxious odors and are often called landfill gas. Microorganisms digest organic matter and break it down into methane (40%-60%) with the remainder primarily CO_2. In addition, small amounts of other volatile organic compounds and sulfides may be present. Methane and CO_2 are odorless gases, but are classified as greenhouse gases that contribute to climate change. The gasses produced are dependent on the composition of the waste present in the landfill.

The odors from landfills are primarily caused by sulfur and ammonia-type compounds generated during decomposition. While these gases compose only a very small fraction of the emissions, they are very odiferous and are responsible for foul odors. Odors may result from hydrogen sulfide (H_2S) and other sulfur containing compounds, such as dimethyl sulfide, mercaptans, as well as non-methane organic compounds (NMOCs) (i.e., hydrocarbon and volatile organic hydrocarbons (VOCs))

The amount of sulfides and NMOCs varies from landfill to landfill and depends on the wastes in the landfill and whether the landfill receives materials containing sulfides and NMOCs and their breakdown products.

2.1-Methane gas

Methane gas is a colorless and odorless gas produced as a byproduct of landfill decomposition. Methane is explosive at certain concentrations in the air (between 5% and 15% of the total air volume). Construction & Demolition (C&D) debris landfills typically do not produce large volumes of methane gas since they may not have reached anaerobic conditions necessary for significant methane production, however, municipal landfills typically produce large amounts of methane. [5] Methane is explosive and is a constituent of greenhouse gases that may influence climate change.

2.2-Carbon dioxide

Carbon dioxide is an odorless, colorless gas that makes up 0.03% of the atmosphere. It does not pose any health risk in the general atmosphere.

2.3- Sulfides

Sulfides (e.g., H_2S, dimethyl sulfide, mercaptans) are produced in very small amounts, however, these odiferous compounds are largely responsible for odors from landfills, particularly, the rotten egg smell. H_2S is produced in the decay of organic matter containing sulfur; H_2S is responsible for the odors in "Swamp Gas" from decaying materials. The sulfur compounds (e.g., H_2S, mercaptans) have strong odors that are detected at extremely low concentrations by the human nose. People may smell these odors at concentrations well below detection limits of air sampling analytical methods and well below the thresholds for adverse health effects.

Although the concentrations of these odiferous compounds may be below detection or below levels that may cause health effects, they do emit noxious odors that are unpleasant and may affect the quality of life in areas surrounding a landfill. A controlled study of asthmatics found that exposure to levels of H_2S above those typically found at landfills did not trigger an asthma attack or alter respiratory function. [5]

3.Environmental Data Collection Methods

3.1- MAML stationed downwind at Riverside Church -9220 Jefferson Hwy. (approximately 3 miles northeast of the 3 Landfills) and at the corner of Dandelion Rd. & River Road in Waggaman, La.(approximately 2 miles northeast of the 3 landfills

Sampling performed by the MAML was continuous analysis for hydrogen sulfide (H_2S), sulfur dioxide (SO_2), total hydrocarbons (methane/nonmethane organic carbons), nitrous oxide (NO), nitrogen dioxide (NO_2), carbon monoxide (CO), and $PM_{2.5}$ along with continuous monitoring of the meteorological parameters. The following are the instrumentation, methods, and detection limits for each parameter analyzed with the MAML. [1,2,3]

- An Advanced Pollution Instrumentation Model lOlA Fluorescent Analyzer, following EPA Equivalent method EQSA-0990-077 was used for H_2S. Detection limit: 0.4 ppb.
- An Advanced Pollution Instrumentation (API) Model 100A Fluorescent Analyzer following EPA Equivalent method EQSA-0990-077 was used for $S0_2$ analysis. Detection limit: 0.4 ppb.
- For THC (Methane/NMOC) analysis, a Thermo Electron model 55C analyzer was employed. There is no EPA reference method for this analysis. Detection limit: Methane 20 parts per billion carbon (ppbc), NMOC 150 ppbc.
- A Thermo Environmental Instruments 48C instrument was used for CO analysis using EPA reference method RFCA-0981-054 Detection limit: 0.04 ppm.
- A Thermo Electron model 42C instrument was employed for NO-$N0_2$-NOx monitoring using EPA reference method RFNA-1289-074. Detection limit: 0.4ppb.
- For PM2.5 analysis a Rupprecht & Patashnick Co., Inc. TEOM Series 1400a Continuous Ambient Particulate Monitor was used. This instrument follows EPA Automated Equivalent Method EQPM1090-079 for the monitoring of PM10 and has the EPA designation of Correlated Acceptable Continuous Monitor (CACM) when operated in the PM2.5 configuration. Detection limit: N/A.

Calibrations were within parameters specified within the Standard Operating Procedures (SOPs) for all parameters measured.

4-Environmental Data Collection

4.1-Mobile Air Monitoring Laboratory

The LDEQ's Mobile Air Monitoring Laboratory (MAML) is deployed throughout the state on special monitoring projects to provide instantaneous, onsite data that can be used to address air quality issues.

- From February 19 thru February 23, 2018, LDEQ collected a total of 96 continuous hourly air monitoring sample readings for NOx, NO_2, CO, SO_2, NMOC, methane, THC, H_2S, and $PM_{2.5}$ using the MAML stationed at the parking lot of Riverside Baptist Church in River Ridge (See Map in Appendix A). Continuous meteorological parameters such as wind speed, wind direction, temperature, barometric pressure, and relative humidity were also obtained during this time.

- From April 27 thru May 2, 2018, LDEQ collected a total of 119 continuous hourly air monitoring sample readings for NOx, NO_2, CO, SO_2, NMOC, methane, THC, H_2S, and $PM_{2.5}$ using the MAML stationed at the parking lot of Riverside Baptist Church in River Ridge (See Map in Appendix A). Continuous meteorological parameters such as wind speed, wind direction, temperature, barometric pressure, and relative humidity were also obtained during this time.

- From July 20 thru July 25, 2018, LDEQ collected a total of 120 continuous hourly air monitoring sample readings for NOx, NO_2, CO, SO_2, and H_2S using the MAML stationed at the parking lot of Riverside Baptist Church in River Ridge (See Map in Appendix A). Continuous meteorological parameters such as wind speed, wind direction, temperature, barometric pressure, and relative humidity were also obtained during this time.

- From July 25 thru July 27, 2018, LDEQ collected a total of 43 continuous hourly air monitoring sample readings for NOx, NO_2, CO, SO_2, and H_2S using the MAML stationed at the corner of Dandelion Drive and River Road in Waggaman, La. (See Map in Appendix A). Continuous meteorological parameters such as wind speed, wind direction, temperature, barometric pressure, and relative humidity were also obtained during this time.

Table 1: Hourly Mobile Air Monitoring Samples Collected by LDEQ (February 19- February 23, 2018 and April 27-May 2, 2018 and July 20- July 27, 2018)

Date Collected	Time Range Collected	Nitrogen Oxide range (ppb)	Nitrogen Dioxide range (ppb)	Carbon Monoxide(CO) range (ppm)	Hydrogen Sulfide(H2 S) range (ppb)	Sulfur Dioxide (SO2) range (ppb)	PM 2.5 Range (ug/m3)	Nonmethane organic carbon range (ppmc)	Methane Range (ppmc)	Total Hydrocarbon Range (ppmc)
LOCATION OF MAML: RIVERSIDE BAPTIST CHURCH 9220 JEFFERSON HWY										
2/19/2018	13 hours	3.0-20.0	3.0-17.0	0.3-3.6	0	0-1.0	9.8-14.6	0.19 – 0.32	1.94-2.14	2.13 – 2.41
2/20/2018	24 hours	16.0-26.0	3.0-17	0.2-3.8	0.0-2.0	0-1.0	9.9-16.5	0.19 – 1.07	1.84 –2.30	2.12-3.02
2/21/2018	24 hours	2.0-12.0	1.0-3.0	0.5-16.0	0.0-1.0	0.0-1.0	4.5-18.1	0.09-1.67	1.99-2.34	2.18-3.64
2/22/2018	24 hours	17.0-40.0	2.0-14	0.1-14.9	0.0-3.0	0.0-1.0	5.0-20.5	0.19-1.03	1.96-2.23	2.15-3.03
2/23/2018	9 hours	26.0-38.0	8.0-20	1.4-14.6	1.0-2.0	0.0-1.0	5.3-14.9	0.26-0.77	2.09-2.28	2.37-3.01
4/27/2018	10 hours	1.0-47.0	4.0-50.0	0.0-0.3	1.0-2.0	1.0-2.0	0.6—15.4	0.19-0.23	2.03-2.44	2.22-2.67
4/28/2018	24 hours	0.0 - 99.0	5.0-40.0	0-0.8	0-12.0	1.0-3.0	1.5-35.7	0.20-0.39	2.15-6.53	2.38-6.80
4/29/2018	24 hours	0.0-26.0	4.0-33.0	0.0-6.4	0.0-3.0	1.0-3.0	3.2-24.1	0.19-0.73	1.84-7.12	2.34-7.80
4/30/2018	24 hours	2.0-26.0	8.0-39.0	0.4-5.8	1.0-2.0	1.0-3.0	4.5-22.7	0.21-0.98	2.11-2.77	2.35-3.74
5/1/2018	24 hours	2.0-29.0	5.0-36.0	0.5-6.2	1.0-3.0	1.0-2.0	6.4-27.7	0.19-0.50	2.12-2.95	2.31-3.45
5/2/2018	13 hours	2.0-25.0	3.0-24.0	0.0-6.5	1.0-3.0	1.0-2.0	4.7-18.8	0.19-2.04	2.18-2.61	2.42-4.55
7/20/2018	10 hours	0.0 10.0	3.0 – 14	0.0-0.2	0.0-9.0	1.0-4.0	Not Collected	Not Collected	Not Collected	Not Collected
7/21/2018	24 hours	1.0-7.0	3.0- 6.0	0.0-1.1	0.0-14.0	0.0-3.0	Not Collected	Not Collected	Not Collected	Not Collected
7/22/2018	24 hours	5.0-15.0	2.0-3.0	0.1-0.5	0.0-8.0	0.0-2.0	Not Collected	Not Collected	Not Collected	Not Collected
7/23/2018	24 hours	3.0-12.0	5.0-52.0	0.1-3.3	0.0-4.0	1.0-3.0	Not Collected	Not Collected	Not Collected	Not Collected
7/24/2018	24 hours	0.0-42.0	5.0-91.0	0.3-6.7	0.0-9.0	1.0-2.0	Not Collected	Not Collected	Not Collected	Not Collected
7/25/2018	14 hours	0.0-16.0	5.0-11.0	0.8-3.3	0.0-2.0	1.0-2.0	Not Collected	Not Collected	Not Collected	Not Collected
LOCATION OF MAML: CORNER OF DANDELION DR. and RIVER RD.										
7/25/2018	7 hours	1.0-6.0	5.0-21.0	0.3-2.1	0.0-7.0	2.0-3.0	Not Collected	Not Collected	Not Collected	Not Collected
7/26/2018	24 hours	0.0-14.0	3.0-23.0	0.5-3.8	0.0-29.0	1.0-3.0	Not Collected	Not Collected	Not Collected	Not Collected
7/27/2018	13 hours	3.0-31.0	4.0-23.0	0.1-4.1	0.0-40.0	2.0-3.0	Not Collected	Not Collected	Not Collected	Not Collected

Detection Limits:

Nitrogen Oxide and Nitrogen Dioxide = 0.4 ppb; Carbon Monoxide = 0.04 ppm; Hydrogen Sulfide = 0.4 ppb; Sulfur Dioxide = 0.4 ppb; Methane = 20 ppbc; Nonmethane = 150 ppbc; Total Hydrocarbons = 70 ppbc; $PM_{2.5}$= Not applicable

Table 2: Mobile Air Monitoring Samples Collected by LDEQ (February 19-February 23, 2018 and April 27-May 2, 2018 and July 21 – July 25, 2018) – 8 Hour Averages

Date Collected	Carbon Monoxide (CO) 8 hour average range (ppm)	Hydrogen Sulfide H2S) 8 hour range (ppb)	PM 2.5 24 hour average Range (ug/m3)
LOCATION OF MAML: RIVERSIDE BAPTIST CHURCH 9220 JEFFERSON HWY			
2/19/2018	1.2-1.7	0	Not collected
2/20/2018	0.5-2.6	0.0-2.0	11.30-12.10
2/21/2018	0.7-5.1	0.0-1.0	11.38-12.05
2/22/2018	0.5-4.5	0.0-3.0	10.18-11.81
2/23/2018	1.9-7.2	1.0-2.0	9.98-10.76
4/27/2018	0.0-0.1	1.5-1.6	0.6-15.4
4/28/2018	0.1-0.6	0.8-3.9	12.4-14.8
4/29/2018	0.0-6.4	0.5-7.5	11.9-16.5
4/30/2018	1.4-4.0	1.0-1.8	8.9-12.6
5/1/2018	1.2-5.7	1.8-3.0	10.3-15.8
5/2/2018	1.4-3.9	1.6-2.6	8.5-12.6
7/21/2018	0.0-0.3	1.0-4.0	Not collected
7/22/2018	0.1-0.3	0.0-2.0	Not collected
7/23/201	0.2-2.1	0.0-3.0	Not collected
7/24/2018	0.3-4.2	0.0-5.0	Not collected
7/25/2018	0.7-2.2	0.0-1.0	Not collected
LOCATION OF MAML: CORNER OF DANDELION DR. and RIVER RD.			
7/26/2018	0.7-2.0	0.0-9.0	Not collected
7/27/2018	0.8-2.0	5.0-14.0	Not collected

Detection Limits:
Carbon Monoxide = 0.04 ppm; Hydrogen Sulfide = 0.4 ppb; $PM_{2.5}$= Not applicable

4.2-Grab Samples

A total of fourteen individual grab samples were collected by the LDEQ and analyzed by the contract lab, ALS Environmental Laboratory for VOCs by EPA method TO-15 and speciated sulfur compounds by method ASTMD-5504-12.

- On March 21, 2018, 1 individual grab sample was collected at 613 Ashlawn Drive in Harahan and then sent to a contract laboratory for the analysis of speciated volatile sulfur compounds and other VOCs.

- On April 28, 2018, a total of 2 individual grab samples were collected – 1 grab sample collected at 9220 Jefferson Highway in River Ridge and 1 grab sample collected at 8009 River Road in Westwego- and then sent to a contract laboratory for the analysis of speciated volatile sulfur compounds and other VOCs.

- On April 29, 2018, 1 individual grab sample was collected at 9220 Jefferson Highway in River Ridge and then sent to a contract laboratory for the analysis of speciated volatile sulfur compounds and other VOCs.

- On May 1, 2018, 1 individual grab sample was collected at the Cornerstone site in Waggaman, La. and then sent to a contract laboratory for the analysis of speciated volatile sulfur compounds and other VOCs.

- On June 10, 2018, 1 individual grab sample was collected at the yard of a Harahan resident on 8351 Murelsan Avenue and then sent to a contract laboratory for the analysis of speciated volatile sulfur compounds and other VOCs.

- On July 20, 2018, 1 individual grab sample was collected at the corner of Phillip Bros and River Road in Waggamann, La. and then sent to a contract laboratory for the analysis of speciated volatile sulfur compounds and other VOCs.

- On July 21, 2018, 3 individual grab samples were collected from 3 different locations: Sauls Canal in Avondale, La; Inside the Jefferson Parish Landfill; and River Birch Landfill in Avondale, La.

- On July 22, 2018, 2 individual grab samples were collected from 2 different locations: 9220 Jefferson Hwy in River Ridge, La and Live Oak Blvd. in Waggaman, La.

- On August 31, 2018, 2 individual grab samples were collected from 2 different locations at the Jefferson Parish Landfill: Base of the Phase 4A Mound- South side and the Slope of the Phase 4A Mound on the south side.

Table 3: Grab Samples Collected by LDEQ and sent to the Lab for Testing

Date Collected	LOCATION SAMPLED	PARAMETERS ANALYZED		Hydrogen Sulfide Detected (ppb)	COMPARISON VALUES For VOCs (SOURCES)
3/21/2018	613 Ashlawn Dr, in Harahan	VOCs	Sulfides	Not Detected	ATSDR's Air Comparison values or TCEQ's ESLs
4/28/2018	9220 Jefferson Hwy in River Ridge	VOCs	Sulfides	160	ATSDR's Air Comparison values or TCEQ's ESLs
4/28/2018	8009 River Road in Westwego	VOCs	Sulfides	140	ATSDR's Air Comparison values or TCEQ's ESLs

4/29/2018	9220 Jefferson Hwy in River Ridge	VOCs	Sulfides	170	ATSDR's Air Comparison values or TCEQ's ESLs
5/1/2018	Cornerstone, Waggaman, La	VOCs	Sulfides	Not Detected	ATSDR's Air Comparison values or TCEQ's ESLs
6/10/2018	8351 Murelsan Ave. Harahan , La	VOCs	Sulfides	Not Detected	ATSDR's Air Comparison values or TCEQ's ESLs
7/20/2018	Corner of Phillip Bros and River Rd. in Waggaman , La	VOCs	Sulfides	8.9	ATSDR's Air Comparison values or TCEQ's ESLs
7/21/2018	Sauls Canal in Avondale, La	VOCs	Sulfides	12.0	ATSDR's Air Comparison values or TCEQ's ESLs
7/21/2018	Jefferson Parish Landfill in Waggaman, La.	VOCs	Sulfides	8.9	ATSDR's Air Comparison values or TCEQ's ESLs
7/21/2018	River Birch Landfill in Avondale	VOCs	Sulfides	Not Detected	ATSDR's Air Comparison values or TCEQ's ESLs
7/22/2018	9220 Jefferson Hwy in River Ridge	VOCs	Sulfides	Not Detected	ATSDR's Air Comparison values or TCEQ's ESLs
7/22/2018	Live Oak Blvd. in Waggaman, La	VOCs	Sulfides	Not Detected	ATSDR's Air Comparison values or TCEQ's ESLs
8/31/2018	Base of Phase 4A Mound of the Jefferson Parish Landfill in Waggaman, La.	VOCs	Sulfides	10.0	ATSDR's Air Comparison values or TCEQ's ESLs
8/31/2018	Slope of Phase 4A Mound of the Jefferson Parish Landfill in Waggaman, La.	VOCs	Sulfides (carbon disulfide = 7.1 ppb)	Not Detected	ATSDR's Air Comparison values or TCEQ's ESLs

Texas Commission on Environmental Quality - TCEQ
Effects Screening Levels- ESLs
Detection Limit of VOCs = <0.2 ppb

VOC chemicals detected in most of the 14 grab samples:
Propene, dichlorodifluoromethane, trichlorofluoromethane, trichlorotrifluoroethane, trichloroethene, ethanol, ethylbenzene, naphthalene, Freon-12, chloromethane, Freon-11, carbon disulfide, Freon-113, methylene chloride, acetone, acetonitrile, acrolein, cyclohexane, d-limonene, 2-butanone, carbon tetrachloride, chloromethane, benzene, alpha-pinene, toluene, n-propylbenzene, tetrachloroethylene, , m,p-xylene, 1-ethyl-4-methylbenzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, 1,3-butadiene, 2-propanol, n-hexane, n-heptane, , tetrahydrofuran, propene, o-xylene, n-octane, t, n-nonane, 4-ethyltoluene, 2-butanone, trans-1,3 dichloropropene, trans-1,2-dichloroethene, 1,2-dichloroethane, vinyl chloride, 2- hexanone,4-methyl-2-pentanone, n-butyl acetate, 1,4-dichlorobenzene, chloroform, methylmethacrylate, and 1,2-dichloro-1,1,2,2-tetrafluoroethane.

Sulfides detected: hydrogen sulfide, carbon disulfide

Sulfides Not Detected: carbonyl sulfide, methyl mercaptan, ethyl mercaptan, dimethyl sulfide, isopropyl mercaptan, tert-butyl mercaptan, n-propyl mercaptan, ethyl methyl sulfide, thiophene, isobutyl mercaptan, diethyl sulfide, n-butyl mercaptan, dimethyl disulfide, 3-methythiophene, tetrahydrothiophene, 2,5-dimethylthiophene, 2-ethylthiophene, and diethyl disulfide

5- Comparison Standards

There are no national or state screening values for VOCs; so, the VOC parameters that were detected in air were compared to the Texas Commission of Environmental Quality's (TCEQ) effects screening levels (ESLs). The TCEQ short term effects screening levels (ESLs)(one hour averaging period) were used to assess the potential for effects from exposure to concentrations of constituents in the air by the residents.[6] ESLs are used to evaluate the potential for effects to occur as a result of exposure to concentrations of constituents in the air. ESLs are based on data concerning health effects, the potential for odors to be a nuisance, effects on vegetation, and corrosive effects. If predicted or measured airborne levels of a constituent **do not exceed** the screening level, adverse health or welfare effects are not expected. If ambient levels of constituents in air **exceed** the screening levels, it does not necessarily indicate a problem but rather triggers a review in more depth. "Short-term" generally indicates a one-hour averaging period. "Long term" indicates an annual averaging period. [7]

The National Ambient Air Quality Standard (NAAQS) sets primary and secondary standards for air pollutants considered harmful to public health and the environment. ***Primary standards*** provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. ***Secondary standards*** provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. These standards are used for ongoing monitoring of air pollutants over time. EPA has set NAAQS for six principal pollutants, which are called "criteria" pollutants. [6]

The standards are based on time interval sampling (e.g., 24-hr, annual) averaged over 3 years. [6] However, the air monitoring in River Ridge, Harahan, Waggaman, and Avondale

were discrete samples and not collected over long periods of time. The results of the sampling cannot be compared to these standards. There are no standards with which to assess health effects for many of the agents.

Environmental media evaluation guides (EMEGs) are estimated contaminant concentrations at which noncarcinogenic health effects are unlikely. They are calculated from the Agency for Toxic Substances and Disease Registry's (ATSDR) minimal risk levels (MRLs). EMEGs apply to acute (14 days or less), intermediate (15–365 days) and chronic (365 days or more) exposures.

The NAAQS sets a primary 1 hour average of 75 ppb for sulfur dioxide (SO_2) averaged over three years. [6] ATSDR's acute EMEG comparison value for SO_2 is 10 ppb. For carbon monoxide, the NAAQS sets a primary 1 hour average of 35 ppm averaged over three years. [6] The NAAQS sets primary standards for $PM_{2.5}$ particle pollution at 12 ppb for an annual mean and 35 ug/m^3 for a 24 hour sample averaged over 3 years.[6]

There are no screening values for methane, nonmethane organic carbon, total hydrocarbon, or in air. Methane, an explosive hazard, is not an air toxic compound and normal concentrations of methane in the air is 2.0 ppm. Nonmethane organic carbon equals total hydrocarbon minus methane.

Hydrogen Sulfide (H_2S) does not have a NAAQS, but is regulated by the Louisiana Toxic Air Pollutant Ambient Air Standard (LAC33:Part III Table 51.2), 8 hour average, which is 330 ppb. [8] Also, ATSDR's acute EMEG comparison value for H_2S is 70 ppb, although this is based on 24 hour exposure.

Table 4: Comparison Values for Hydrogen Sulfide, Sulfur Dioxide, and CO

Chemicals of Concern	Comparison Value	Comparison Value Source
Hydrogen Sulfide	70 ppb	ATSDR's Acute EMEG
Sulfur Dioxide	10 ppb	ATSDR's Acute EMEG
Carbon Monoxide	35 ppm	NAAQS (hourly value)

6-Exposure Pathways

The exposure pathway to the gas emissions is through the air and potentially exposed population which includes Jefferson Parish residents who reside in the surrounding areas of the landfills and nearby facilities. Gases emitted from the landfill are dispersed in the air and the direction and concentration are influenced by atmospheric factors including wind direction and wind speed, type of terrain and heat. Dispersion of the emission in air dilutes the concentration in the air with the levels of pollutants rapidly decreasing with distance from the source. Although some of the emissions are measured within a facility's fenceline, these levels are rapidly diluted with time and distance from the site; possible exposures will be less than the fenceline measurements.

7-Results of Monitoring

7.1 Particulates (PM2.5)

Particulates ($PM_{2.5}$) were detected with the LDEQ's MAML (February 19 – 23, 2018 and April 27- May 2, 2018). From February 19-23 2018, $PM_{2.5}$ point measures ranged from 4.5-20.5 ug/m^3. From April 27- May 2, 2018, PM $_{2.5}$ point measures ranged from 0.6-35.7 ug/m3 . Also, the $PM_{2.5}$ hourly readings were higher during the night time hours than during the day time hours. $PM_{2.5}$ was tested at this site since the permit lists particulate matter as one of the parameters for the site. While it is not possible to correlate the level of the particulates monitored and health effects, it is known that young children and people with chronic respiratory disease, such as asthma, emphysema or bronchitis and cardiovascular disease are more sensitive to particulates in air. Although fine particulates ($PM_{2.5}$) were detected in the air, they were detected at levels below the health -based standards and do not pose a health concern. It is not possible to attribute the level of the particulates to the landfill sites or industrial facilities in the area since car, truck, bus and off-road vehicle (e.g., construction equipment) exhausts are major contributors to $PM_{2.5}$ levels in ambient air.

7.2 Sulfur dioxide

The highest amount of sulfur dioxide detected with LDEQ's MAML (February 19 – 23, 2018; April 27- May 2, 2018 and July 20-July 27, 2018) was 4.0 ppb which was well below ATSDR's acute EMEG comparison value of 10ppb. The levels of sulfur dioxide detected were below health-based standards and do not pose a health concern.

7.3 Hydrogen Sulfide

The human nose can detect hydrogen sulfide at concentrations 1,000 times lower than a chemical detector. The human detection limit varies from 5 ppb to 10 ppb and the detection limit of the MAML's fluorescent analyzer is 0.4 ppb. Exposure to the hourly hydrogen sulfide concentrations detected by LDEQ's MAML on February 19 – 23, 2018; April 27- May 2, 2018; July 20-27, 2018 and August 31, 2018 were well below ATSDR's acute EMEG health based comparison value of 70 ppb, however, this comparison value is based on acute exposure (14 days or less). The highest H_2S reading during those time periods was 40.0 ppb and, therefore, did not pose a health concern.

Analysis of the grab samples detected hydrogen sulfide at 100 ppb (8009 River Road, Westwego), 115 ppb (9220 Jefferson Hwy), 122 ppb (9220 Jefferson Hwy), 6.0 ppb (Corner of Philip Bros and River Road in Waggaman), 6.4 ppb (Jefferson Parish Landfill in Waggaman), and 8.6 ppb (Sauls Canal in Avondale). Grab samples are measures at a point in time. When tested with the MAML continuously over time at the same location, the highest 8 hour average reading was 14.0 ppb. Other sulfides were not detected, but may have contributed to the odors. This is consistent with the fact that they may have foul odors at levels below the limits of detection and below health standards. Also, a vast array of sulfur containing compounds may be produced during the decomposition process of household waste and it is not possible to identify them by air sampling.

In addition to hydrogen sulfide, the breakdown of products in landfills release a wide variety of other sulfide containing compounds (e.g., mercaptans and variety of other sulfides) that may be very odiferous. It is not possible to measure these other compounds because their unique composition is based on the type of wastes and the conditions for the decomposition. The concentrations are at extremely low levels, but may contribute to odors because of their odiferous properties.

7.4 Carbon Monoxide

The highest amount of carbon monoxide detected with LDEQ's MAML during those same time periods was 16.0 ppm, which is below the NAAQS hourly value of 35 ppm.

7.5- Volatile Organic Compounds (VOCs)

All VOCs measured revealed typical background levels (which match upwind sample results) and are all below their respective comparison values. The VOCs do not pose a public health concern.

8- Odors and Health Effects

Odor complaints surrounding landfills are very common because of the decomposition of organic matter may generate noxious smells. Odors are not a reliable way to determine the risk of health effects. Noxious odors from landfills are detected by the human nose at level in air at levels well below those that would cause health effects. The odor threshold of many sulfur containing compounds is well below the level that would cause toxic effects. However, the presence of persistent odors is an indication of a problem that needs to be addressed.

The detection of odors differs greatly among individuals; some may smell odors at levels not noticed by others. Factors that affect the sense of smell include age, sex and whether or not a person smokes. The interpretation/response to noxious odors varies by individual; some individuals are more sensitive to odors than others. The odors from the decomposition of wastes are generally considered to be unpleasant to most people. Numerous factors such as exposure history, personality, beliefs, social factors, information acquired about the odor can influence an individual's perception of odor.

Landfill odors are noticeable at low concentrations below the levels that cause toxic effects from the chemical. For example, hydrogen sulfide is smelled at air concentration of 0.5 to 10 ppb, but the first objective signs of eye irritation are experienced at 10,038 ppb, a thousand times higher.

The presence of persistent noxious odors themselves may result in discomfort, nausea and headache. Strong odors are reported to be associated with irritation of the eyes, nose or throat and coughing, shortness of breath, and nasal congestion, particularly for those with allergies, asthma or respiratory problems. Long term exposure to noxious odors may affect mood, anxiety and stress levels. Health symptoms of odors go away when the odors stop. Prolonged or repeated contact with an airborne malodorous substance may lead to irritation of the respiratory tract.

In summary, the presence of noxious odors is present in the area surrounding the landfills and industries. It is difficult to assess health effects related to odors because the symptoms are very general and associated with many other causes and are difficult to document; in addition, the symptoms associated with bad odors vary widely among individuals and are influenced by perceptions of odor. However, it is well established that malodorous odors have a negative impact on quality of life.

Table 5: Odor and Toxicological Thresholds for Irritation

CHEMICAL	ODOR THRESHOLD RANGE (ppb)	IRRITATING CONCENTRATION (ppb)
Hydrogen Sulfide	0.5-10	10,038
Sulfur Dioxide	100-4700	5,000

9-Conclusion

The limited air monitoring results from industries and activities around the landfill sites do not show elevated levels of hazardous compounds that might contribute to health effects.

The air pollutants detected are at levels below health- based comparison values for health effects. Residents living near these landfills and facilities consistently report a variety of symptoms that they associate with the strong odors from the nearby landfills and industries. Noxious odors decrease the quality of life for those living in the area and can have irritant health effects.

The strong odors in the area surrounding the landfills and facilities are indicative of a problem with the conditions at the landfills that give rise to persistent noxious odors. This is not unexpected because it is known that the odors may be detected by humans at levels far below those that are measured though air sampling. It is also likely that an array of odoriferous sulfur-containing compounds is generated at low levels during the decomposition of the organic wastes that cannot be measured by routine air monitoring, but which contribute to the odors. One means to address the odors is through engineering controls at the landfill sites to mitigate the odors. In addition, continued air sampling by the LDEQ near and at the landfill/industrial sites are recommended to monitor that hydrogen sulfide levels do not increase.

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APPENDIX A: Summary of Odor/Health Complaints and an Evaluation of Louisiana Early Event Detection System (LEEDS)
Louisiana Department of Environmental Quality's (LDEQ) Electronic Data Management System (EDMS) LDH/SEET reviewed complaint forms logged under agency interest #6961 (Jefferson Parish Landfill) from January 18, 2017 – July 31, 2018. Odor complaints were from residents living in zip code areas 70094, 70123, 70001, 70065, 70003, 70005, and 70058, and, in some cases were accompanied by health complaints.

As shown in Tables 1 and 2 below, there were a total of 207 odor complaints reported by a total of 83 residents from the zip code areas 70094, 70123, 70065, 70001, 70003, 70005, and 70058. The majority of these odor complaints (86%) were reported by residents in zip code area 70123. There were a total of 27 symptom complaints reported by 12 of the individuals which accompanied these odor complaints (See Table 1). Eighty-six percent (86%) of the 83 individuals who reported symptoms at the time of the reporting of the odor complaints were from the zip code area 70123. Of the symptoms reported, the most common reported symptom (33%) associated with the odors was headaches. As seen in Figure 1 below, the majority of odor complaints (30) reported occurred on April 25, 2018. A smaller number of odor complaints (14) were reported on March 15, 2018 and twelve odor complaints were reported on April 17, 2018.

Table 1: Symptom Log Reported by Residents through LDEQ EDMS Odor Complaints
January 18, 2017 – July 31, 2018

	70094	70123	70001	All Zip codes
Total Residents Reported	2	9	1	12
Headaches	1	8		9
Burning or Dry Eyes		3		3
Nausea	2	2		4
Sore throat		3	1	4
Difficulty Breathing		2		2
Coughing				
Nose Bleed				
Sinus Infection				
Nose Irritation		5		5
TOTAL SYMPTOMS	3	23	1	27

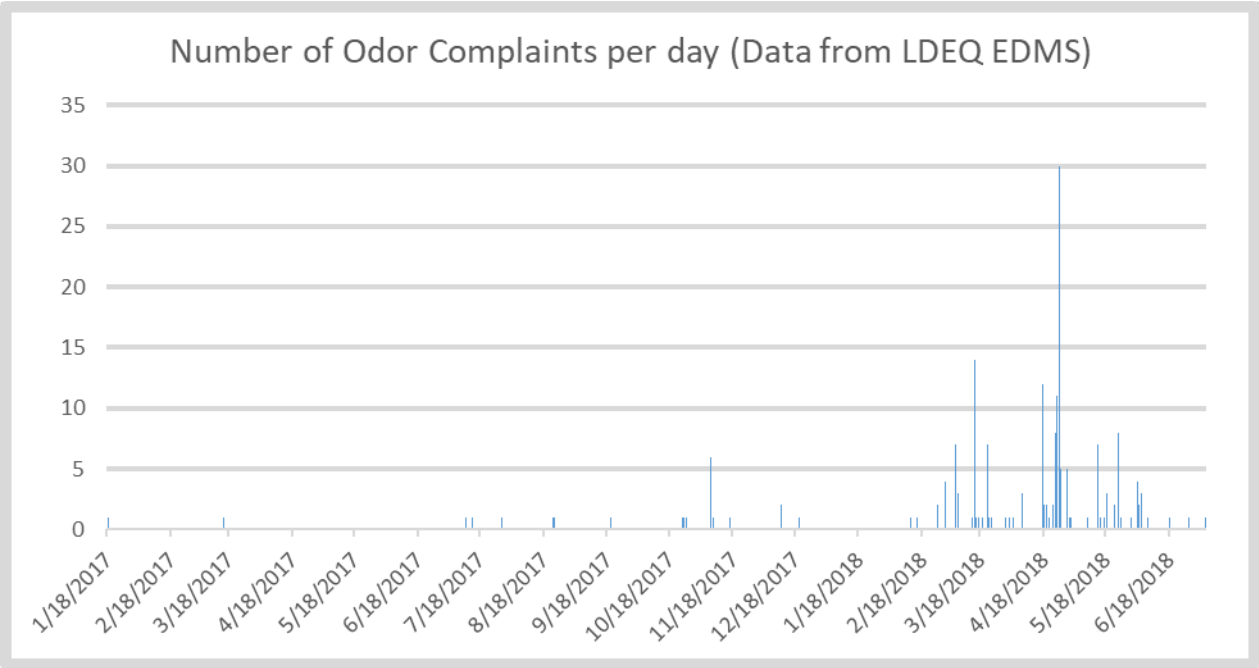
Table 2: LDEQ's EDMS Odor Complaints (time period)								
	70094	70123	70065	70001	70003	70005	70058	All zip codes
Total Complaints Reported	21	177	4	1	2	1	1	207*

* 83 different Individuals reported a total of 207 odor complaints through LDEQ's EDMS

Zipcode	*Population
70094	31,669
70123	26,475
70065	51,116

*Census 2010 Population

Figure 1: LDEQ's EDMS Odor Complaint by Day (January 18, 2017 – June 18, 2018)



Louisiana Early Event Detection System (LEEDS) Louisiana Early Event Detection System (LEEDS) is a web-based reporting system that automatically processes hospital Emergency Department and Urgent Care data to identify visits indicative of specific syndromes tracked by LDH. LEEDS receives data from 70 emergency departments throughout the state in near real-time. A syndrome is assigned to each LEEDS record based on the text contents of the chief complaint, admit reason, and discharge diagnosis fields. The LEEDS was queried using the pre-defined syndrome for upper respiratory irritation (URIs) which includes such symptoms as sore throat, congestion, sinusitis, tonsillitis and pharyngitis, etc. In addition, the LEEDS was queried for the symptom "nose bleed" for the zip code areas 70123 and 70094 for the years 2017-2018. The results yielded only 9 Emergency Room visits with nosebleeds as a chief complaint for the years 2017 (2 ER visits) 2018 (9 ER visits) for the zip code areas 70123 and 70094.

The resulting number of total Emergency room or hospital visits with URIs as a chief complaint for the years 2017 and 2018 for the zip code areas 70123 and 70094 are demonstrated graphically in Figures 2 and 3 below.

There were more hospital/emergency room visits due to URI as chief complaints in 2018 than in 2017 for the zip code areas 70123 and 70094. In addition, there were more reported odor complaints to the LDEQ from these 2 zip code areas in 2018 when compared to those reported in 2017.

Figure 2: 2017-2018 Emergency Room Visits due to Upper Respiratory Irritation (2017-2018) for Zip code areas 70123 and 70094

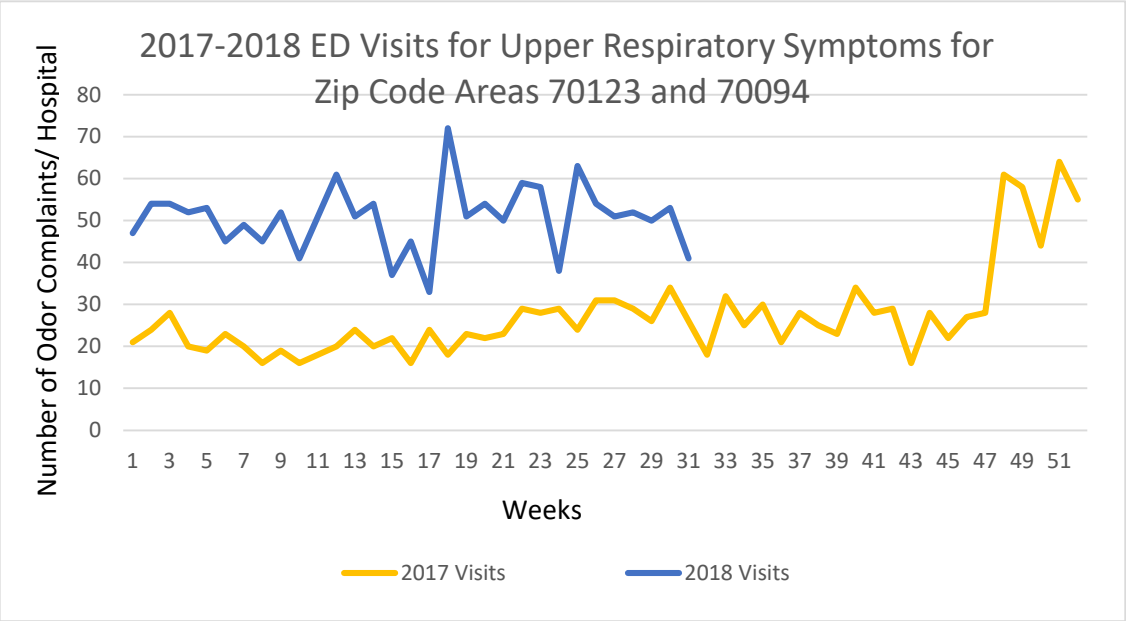
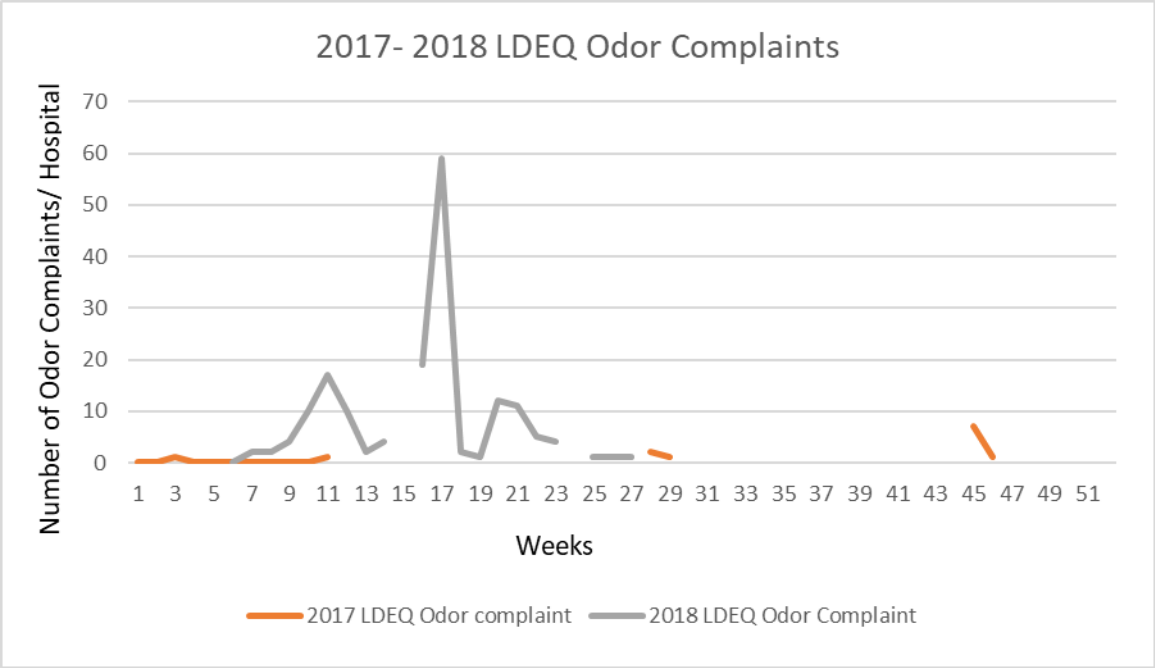


Figure 3: Odor Complaints Reported to the LDEQ (2017-2018)



River Ridge/Harahan Air Quality Facebook page This page was created by the community in 2018 to document odor and health complaints. Residents from the zip code areas 70094, 70123, 70065, 70006, and 70003 have entered their symptoms beginning July 11, 2018, and entries have been made through September 18, 2018 as summarized in table 3 below. A total of 612 symptom complaints have been entered from 208 different residents in the zip code area 70094, 70123, 70062, 70006, and 70003. The majority (83%) of the reported symptoms are from the zip code area 70123. In addition, the most frequently reported symptom (27%) are headaches followed by burning or dry eyes (20%).

Table 3: Symptom Log as Reported by Residents (July 11, 2018- September 18, 2018)

	70094	70123	70062	70006	70003	All Zip Codes
Total Residents Reported	28	175	3	1	1	208
Headaches	24	135	3	1	0	163
Burning or Dry Eyes	17	99	3	1	1	121
Nausea	14	60	0	0	0	74
Sore throat	14	90	1	0	0	105
Difficulty Breathing	11	52	2	0	1	66
Coughing	3	28	0	0	0	31
Nose Bleed	3	13	1	0	0	17
Sinus Infection	4	7	0	0	0	11
Nose Irritation	0	11	0	0	0	11
Skin irritation/dermatitis	0	2	0	0	0	2
Vomiting	0	2	0	0	0	2
Fatigue	0	4	1	0	0	5
Chest tightness	0	2	0	0	0	2
Ear ache/Ear Infection	2	0	0	0	0	2
TOTAL REPORTED SYMPTOMS	92	505	11	2	2	612