



State of Louisiana

Louisiana Department of Health
Office of Public Health

Terry Dedon
Louisiana Department of Environmental Quality
605 N. Fifth Street
Baton Rouge, LA 70821

November 1, 2017

Dear Mr. Dedon,

The purpose of this letter health consult is to update you on the current status of the BFI Colonial Landfill and Gator Landfill air monitoring data review and on the BFI Colonial Landfill groundwater data review. The Louisiana Department of Health/Office of Public Health/Section of Environmental Epidemiology and Toxicology (LDH/OPH/SEET) has reviewed air monitoring data collected by the Louisiana Department of Environmental Quality (LDEQ) in January 2017 and March 2017. In addition, the LDH has reviewed groundwater monitoring data collected by the Carel Corporation, a third party environmental consultant hired by the landfill, in March of 2017. This consult evaluates air data collected by LDEQ between January 3-6, 2017 and March 16-18, 2017; and groundwater data collected by the Carel Corporation on March 6-7, 2017.

1-Event Description and History

BFI Colonial Landfill, located at 5328 Hwy 70 in Sorrento, Louisiana, is a municipal solid waste disposal facility which receives a variety of non-hazardous solid waste materials including municipal, residential, commercial, and industrial solid waste. The BFI landfill is permitted to receive residential household waste, construction and demolition (C & D) debris, and non-hazardous industrial solid waste and applies covering daily. This facility, a Type I and Type II disposal facility, began operation in 1973 under the name Ascension Parish Landfill and was operated by Ascension Parish, Louisiana. Browning-Ferris Industries Inc. (BFI) purchased the site in 1984. There are approximately 100 people who reside 1 mile or less from the facility; although, there is an elementary school, Sorrento Primary School, located 1.73 miles away from the landfill facility (See map in Appendix A).

Beginning in January 2017, SEET began to notice an increase in Louisiana State Police (LSP)/National Response Center (NRC) reports from Sorrento residents regarding odors from the nearby landfill. Through the daily monitoring of LSP/NRC reports, SEET identified 26 complaints from 14 different households related to landfill odors in Sorrento between January 9 and March 20, 2017.

According to the LDEQ Surveillance Division staff, the LDEQ began receiving odor complaints in December 2015. Due to these community odor complaints, a full compliance inspection of the site was conducted by the LDEQ on December 18, 2015 and no areas of concern were noted at that time. From January 2016 through March 2016, the LDEQ continued to receive multiple odor complaints. In response to these odor complaints, on March 31, 2016, the LDEQ conducted a daily cover inspection of the working face of the landfill. At that time, it was noted that the daily cover was inadequate. The spray-on fiber hydromulch which was used for cover on the working face was not applied to the correct thickness and the waste was visible through the cover in certain areas. A follow up daily cover inspection plus a full compliance inspection was performed by the LDEQ on April 15, 2016 at the facility. At that time, the full compliance inspection did not note any areas of concern, however, it was noted that the hydromulch was still not applied thick enough to cover the waste in certain areas of the working face. Both inadequate daily cover inspections/findings were referred to the LDEQ Enforcement Division for enforcement action issuance. On July 1, 2016, November 29, 2016, and January 24, 2017, the LDEQ performed follow up daily cover inspections during which it was noted that the cover is now being applied adequately. Although it was confirmed by the LDEQ that cover is being applied adequately, the LDEQ continued to receive numerous odor complaints. Due to the rise of odor complaints in the community, a public meeting was held to discuss the BFI Colonial landfill on December 15, 2016. At this meeting, residents and environmental advocates expressed concern over a proposal to expand the landfill.¹ In January 2017, community members went before the parish council to voice opposition to the BFI Colonial Landfill's request to renew its permit and expand its operation.²

Since December 2015, the LDEQ has responded to approximately 607 odor complaints from Sorrento area residents with most implicating the BFI Colonial Landfill as the source of odor. The potential exists, however, that an adjacent landfill, Gator Environmental Waste Solutions (Gator Landfill), a Type III construction and debris (C&D) landfill may also contribute to the current odor issues due to the presence of sulfur in construction debris which emit hydrogen sulfide upon decomposition.

In response to odor complaints from Sorrento area residents, the LDEQ placed air monitoring equipment on both the BFI Colonial Landfill property and the Gator Landfill property from January 3-6, 2017. No exceedances of air quality standards were measured at either of the sites during this time period. The Gator landfill is in compliance and operating within their acceptable permit level and the facility's working face is covered monthly as required by their permit.

A follow up inspection was performed by the LDEQ at the BFI landfill on January 24, 2017, and 2 summa canisters were collected on-site down wind of the working face and tested for the presence of VOCs and Sulphur compounds. As previously stated, it was noted during the inspection that the daily landfill cover problem had been addressed and that the cover was found to be adequate - the spray cover was being applied in sufficient amounts to cover the waste as required.

2-Types of Chemicals contained in Landfill Gas

The most significant source of emissions at the BFI Colonial Landfill and the Gator Landfill is landfill gas. Landfill gas is produced when bacteria break down organic waste. The gas typically consists of approximately 50% methane and 50% carbon dioxide, and may trace levels of sulfides. Sulfides present in landfill gas may include dimethyl sulfide, mercaptans, hydrogen sulfide (H₂S) and 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 whether the landfill receives materials containing these chemicals and whether chemical reactions are occurring which create or remove them.³

2.1-Methane gas, is colorless and odorless gas produced as a byproduct of landfill decomposition and which is a primary constituent in landfill gas. Methane is explosive at certain concentrations in the air (between 5% and 15% of the total air volume). 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.⁴

2.2-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., H₂S 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.³ Strong odors may be present at concentrations well below detection limits of air sampling analytical methods and well below the thresholds for adverse health effects. However, the odors are unpleasant and may affect the quality of life in areas surrounding the landfill. A controlled study of asthmatics found that exposure to levels of H₂S above those typically found at landfills did not trigger an asthma attack or alter respiratory function.³

3-Health Concerns Associated with Construction and Demolition (C&D) Landfills

Landfill gas frequently creates nuisance odors rather than generating gases at a level of a community health hazard. Some people may experience slight nausea or headache when they smell the unpleasant odors for long periods of time. These effects usually subside once the odor dissipates; and, typically, medical attention is not required.

4-Environmental Data Collection

AreaRae Air Monitoring Equipment

- AreaRae air monitoring equipment was placed on the Gator Landfill property from January 3-6, 2017 by the LDEQ for approximately a 67 hour period and analyzed the air for the presence of SO₂, H₂S, VOCs and the LEL.
- AreaRae air monitoring equipment was placed on the BFI Colonial Landfill property from January 4-6, 2017 by the LDEQ for approximately a 44 hour period and analyzed the air for the presence of SO₂, VOCs, and the LEL.

Mobile Air Monitoring Laboratory

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

- From March 16 thru March 18, 2017, LDEQ collected a total of 48 continuous hourly air monitoring sample readings for NO_x, NO₂, CO, SO₂, NMOC, methane, THC, H₂S, SO₂, and PM_{2.5} using the MAML stationed at Dolly's Lane (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 March 16 thru March 18, 2017, LDEQ collected a total of 40 eight hour average air monitoring sample readings for CO, H₂S, and PM_{2.5} using the MAML stationed at Dolly's Lane. Continuous meteorological parameters such as wind speed, wind direction, temperature, barometric pressure, and relative humidity were also obtained during this time.
- On March 16 and March 17, 2017, individual samples of speciated volatile sulfur compounds, amines, carboxylic acids, aldehydes, ammonia, and other VOCs were collected at the Sorrento Primary School (See Map in Appendix A) by LDEQ's MAML and then sent to a contract laboratory for analysis.

Grab Canister Samples

- LDEQ collected a total of 3 grab summa canister (1 minute collection) air samples (includes 1 background air sample) for VOC analysis on March 16 and March 17, 2017 from locations near the landfill (See Map in Appendix A).

Jerome H₂S meters

- Patrols were established in nearby neighborhoods in which staff visited every three hours checking for odors. These patrols were armed with a hand held H₂S analyzer (Jerome H₂S Meter).

Groundwater Monitoring On-Site Samples

- During the site's semi-annual groundwater monitoring event held on March 6-7, 2017, the Carel Corporation collected groundwater samples from a total of 21 groundwater monitor wells. Groundwater monitoring was conducted in accordance with LAC 33:VII.805 and the Groundwater Sampling Analysis Plan (GWSAP). Samples were analyzed for volatile organic compounds (VOCs), total metals, chloride and sulfate. In addition, leachate samples were collected on March 7, 2017 and analyzed for barium, chloride, sulfate, bicarbonate alkalinity, and total alkalinity.

5 -Environmental Data Evaluation

5.1 Area Rae Air Monitoring Equipment stationed on the BFI Colonial Landfill and on the adjacent Gator Landfill

Air sampling performed at the Gator Landfill site was continuous analysis of hydrogen sulfide (H₂S), sulfur dioxide (SO₂), volatile organic compounds (VOCs) and the LEL from January 3-6, 2017. At the BFI Colonial Landfill site, air sampling was continuous analysis of SO₂, VOCs, and the LEL from January 4-6, 2017. No data was logged for January 3, 2017 at the BFI Landfill site since the monitor was not set up properly on that day. No detections of LEL were noted in the data at each of the sites. All parameters measured at the BFI Colonial Landfill site were non-detects. There were very low detections of H₂S, SO₂, and VOCs at different times throughout the monitoring time frame at the Gator Landfill site, but no exceedances of air quality standards were measured (See Table C-1). In addition, on January 24, 2017, the LDEQ collected 2 grab canister samples downwind of the BFI Colonial Landfill's working face and analyzed for the presence of VOCs and Sulphur compounds. Very low levels of VOCs were detected. The sample collected for Sulphur compounds was not analyzed as the holding time was exceeded.

5.2- MAML stationed downwind of the landfill at Dolly Lane (1/2 mile northwest of the Colonial Landfill)

Sampling performed by the MAML was continuous analysis for hydrogen sulfide (H₂S), sulfur dioxide (SO₂), total hydrocarbons (methane/nonmethane organic carbons), nitrous oxide (NO), nitrogen dioxide (NO₂), 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.⁵

- An Advanced Pollution Instrumentation Model IO1A Fluorescent Analyzer, following EPA Equivalent method EQSA-0990-077 was used for H₂S. Detection limit: 0.4 ppb.
- An Advanced Pollution Instrumentation (API) Model 100A Fluorescent Analyzer following EPA Equivalent method EQSA-0990-077 was used for SO₂ 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 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-N02-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.

Hydrogen Sulfide (H₂S) does not have a National Ambient Air Quality Standard (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 ug/m³.⁶ Also, ATSDR's acute EMEG comparison value for H₂S is 70 ppb. The NAAQS sets a primary 1 hour average of 75 ppb for sulfur dioxide (SO₂) averaged over three years⁷ (See Table C-4). ATSDR's acute EMEG comparison value for SO₂ is 10 ppb (See Table C-4). For carbon monoxide, the NAAQS sets a primary 1 hour average of 35 ppm averaged over three years.⁷ The NAAQS sets primary standards for PM_{2.5} particle pollution at 12 ug/m³ for an annual mean of 12 ug/m³ and 35 ug/m³ for a 24 hour sample averaged over 3 years⁷. There are no screening values for contaminants analyzed as methane, nonmethane organic carbon, total hydrocarbon, or carbon monoxide in air. Methane 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.

5.3 –Nearby neighborhoods surrounding the BFI Colonial Landfill collected with the Handheld Jerome H2S meter

Air samples collected by LDEQ were analyzed for H₂S by the LDEQ's handheld Jerome meter (See Table C-5). While useful for general environmental screening, sampling with this instrument has limited usefulness for assessing health related effects.

(Detection limit: 3 ppb)

Standards available for the H₂S parameters measured by the handheld Jerome include:

- Hydrogen sulfide (H₂S): The Louisiana Toxic Air Pollutant Ambient Air Standard, 8 hour average is 330 ug/m³ and is applicable to offsite locations. There is no National Ambient Air Quality Standard (NAAQS) for H₂S.

5. 4- Perimeter of BFI Colonial Landfill site with Grab Summa canister samples

The three summa grab canister samples collected by the LDEQ on March 16 and March 17, 2017 were collected from 3 different locations (See Table C-6). For analysis of the

samples, the MAML used an Agilent 7890A gas chromatograph equipped with an Agilent 5975C mass spectrometer and followed a modified EPA method TO-15. Detection Limit: Non-Applicable

- Intersection of Highway 70 and Highway 22
- Intersection of Highway 22 and Main St.
- Brady St. (upwind/background)

The VOCs detected in most of the 3 grab samples are the following: Freon-12, chloroethane, Freon-11, carbon disulfide, Freon-113, methylene chloride, acetone, cyclohexane, 2-butanone, carbon tetrachloride, 4-methyl-2-pentanone, benzene, toluene, tetrachloroethylene, dibromochloromethane, cis-1,2-dichloroethene, 1,2-dibromoethane, chlorobenzene, ethylbenzene, m/p-xylene, styrene, o-xylene, 1,1,2,2-tetrachloroethane, 1-ethyl-4methylbenzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, m-dichlorobenzene, benzyl chloride, p-dichlorobenzene, o-dichlorobenzene, and 1,2,4-trichlorobenzene.

There are no National or local screening values for VOCs so the VOC parameters that had levels detected in the air were compared to the Texas Commission of Environmental Quality's (TCEQ) effects screening levels (ESLs). The TCEQ has assigned short term (one hour averaging period) ESLs which are used to evaluate the potential for health effects to occur as a result of short-term exposure to concentration of constituents in the air.⁸

5.5-Sorrento Primary School at 42211 North Park Dr

Two individual 24 hr. samples of speciated volatile sulfur compounds, amines, carboxylic acids, aldehydes, ammonia, and other VOCs were collected by LDEQ's MAML stationed at the Sorrento Primary School using a modified EPA method TO-15 and then sent to ALS contract laboratory for analysis. The following are the laboratory methods used for the analysis:

- Speciated volatile sulfur compounds following ASTM D5504
- Amines using ALS Method 101 (laboratory developed method)
- Carboxylic acids using ALS Method 102 (laboratory developed method)
- Aldehydes following EPA 11
- Ammonia following OSHA ID 188

5.6 Groundwater Well Sampling near and at the perimeter of the BFI Landfill

All twenty- one groundwater monitoring wells are located on the property owned by the Colonial BFI landfill owners, and the water from these wells are not used by the community for drinking water purposes. These 21 groundwater monitoring wells, located near and at the perimeter of the landfill, were sampled by the Carel Corporation using Grundfos Rediflo II submersible pumps except for wells W-8A and W-12R which were sampled via disposable bailers. Samples were discharged into bottles provided by the laboratory, labeled, and placed in insulated containers. These groundwater bottle

samples were sent to Gulf Coast Analytical Laboratories, Inc. for analysis of VOCs, total metals, chloride and sulfate (See Table C-7). A leachate sample was collected and analyzed for the presence of barium, chloride, sulfates, bicarbonate alkalinity, and total alkalinity (See Table C-8).

6-Exposure Pathways

The potentially exposed population includes Ascension Parish residents who reside both downwind and in the surrounding areas of the BFI Colonial landfill site and adjacent Gator Landfill. Ambient air is air that is in places accessible by the general public in the community. Although emissions within a facility's fence line are measured, this does not directly correlate to the concentration the public is exposed to. Many atmospheric factors influence the way air pollution is dispersed, including wind direction and wind speed, type of terrain and heating effects.

Drinking water is not a source of exposure to the community. The 21 groundwater monitoring wells located at and near the landfill site are used strictly for groundwater monitoring purposes.

7-Discussion:

The NAAQS sets primary and secondary standards for air pollutants considered harmful to public health and the environment. These are used for ongoing monitoring of air pollutants over time. The standards are based on time interval sampling (e.g., 24-hr, annual) averaged over 3 years. The air monitoring at the BFI Colonial Landfill was not conducted in this way, therefore, these standards are not directly applicable. There are no standards with which to assess health effects for many of the agents.

Particulates ($PM_{2.5}$) were detected with the LDEQ's MAML (March 16--18, 2017). From March 16- March 18, 2017, $PM_{2.5}$ point measures ranged from 0.0-36.8 $\mu\text{g}/\text{m}^3$. (See Tables C-1 and C-2). 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. Although fine particulates ($PM_{2.5}$) were detected in the air, it is not possible to attribute the level of the particulates to the BFI landfill site since other sources of air pollutants in the area such as car, truck, bus and off-road vehicle (e.g., construction equipment) exhausts may contribute to the presence of $PM_{2.5}$ in the ambient air.

The highest amount of sulfur dioxide detected with LDEQ's MAML (March 16-18, 2017) was 2.0 ppb and the highest amount of carbon monoxide detected with LDEQ's MAML (March 16-18, 2017) was 3.9 ppm. In addition, the highest amount of sulfur dioxide detected (2.0ppb) was well below ATSDR's acute EMEG comparison value of 10ppb (See Tables C-1, C-2, and C-3).

Exposure to the hourly hydrogen sulfide concentrations detected by LDEQ's MAML located approximately 1.5 miles downwind from the BFI Colonial Landfill on March 16-March 18, 2017 were well below ATSDR's acute EMEG health based comparison value

of 70 ppb and therefore, did not pose a risk for non-cancer health effects (See Tables C-1, C-2, and C-3).

All VOCs measured revealed typical background levels (which match upwind sample results) and do not pose a public health concern.

No volatile sulfur compounds, amines, carboxylic acids or ammonia were detected in the speciated samples collected at the Sorrento Primary School. Three aldehydes were detected in the speciated sample collected (formaldehyde, acetaldehyde, n-hexaldehyde); these are found in the air naturally and are commonly produced in municipal landfills.⁵ These 3 detected aldehydes could not be compared to regulatory or health based standards since the short-term monitored values of speciated compounds cannot be compared to regulatory or health-based standards.⁵

Barium, selenium, chloride and sulfate were detected in the groundwater, however, this groundwater is not a drinking water source. The levels of these agents tested from the leachate were detected at concentrations within typical ranges of municipal waste with the exception of chloride. Exposure to chloride is not a concern, however, since this is not used as a drinking water source and, because between the landfill monitoring wells and the drinking water aquifer, there is a stiff thick unit (about 50 feet thick) that exists and prevents any potential water exposure to the residents.

11-Conclusion

The BFI Colonial Landfill and the adjacent Gator Landfill are likely generating gases that result in unpleasant and strong nuisance odors. The air monitoring results from locations around the BFI Colonial Landfill and the Gator 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. The presence of strong odors for long periods of time may cause some to experience slight nausea or headaches; these usually subside once the odor dissipates and no medical attention is required.

Sincerely,



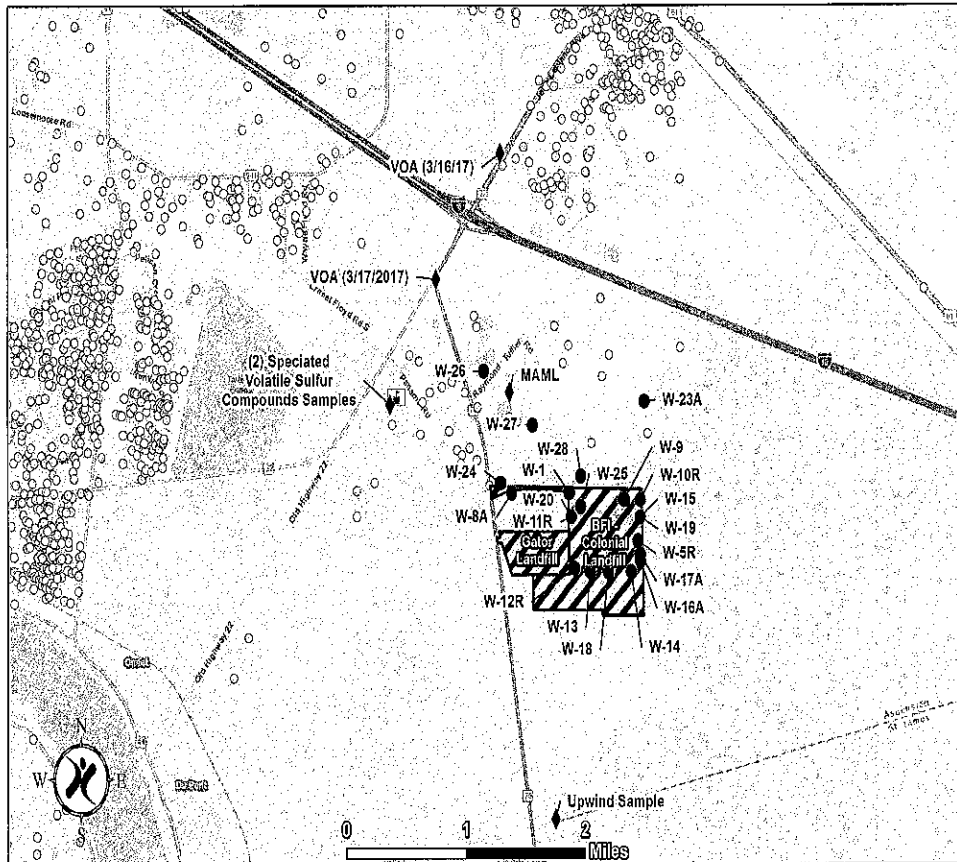
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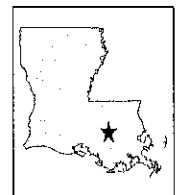
APPENDIX A

A-1: BFI Colonial Landfill Map showing LDEQ's Air Monitors and Population Density



LDEQ Sampling Locations and Monitoring Wells Near Sorrento, LA

- ◆ Sampling Location
- Monitoring Well
- ▨ Landfill*
- Facilities of Concern**
- 🏥 Hospital with ER (as of July 1, 2016)
- 🏥 Hospital without ER (as of July 1, 2016)
- 🏥 Medical Care Type Facility (as of July 1, 2016)
- 🏥 Clinic Type Facility (as of July 1, 2016)
- 🏥 Child Care Type Facility (as of June 4, 2014)
- 🏥 Child Care Type Facility (as of July 11, 2016)
- 🏥 School (as of June 8, 2014)
- Population Density****
- 1 Dot = 5 People



Map produced October 13, 2017 by the Louisiana Department of Health / Office of Public Health / Section of Environmental Epidemiology and Toxicology (SEET) using data provided by the Louisiana Department of Health and the Louisiana Department of Environmental Quality.
 * Boundaries are approximate ** 2010 population density randomly distributed by census block
 Disclaimer: SEET cannot guarantee the accuracy of the information contained on these maps and expressly disclaims liability for errors and omissions in their contents.

APPENDIX B: EVALUATION PROCESS

Screening Process

Comparison values (CVs) are media-specific concentrations of chemicals that are used by health assessors to screen environmental contaminants for further evaluation. These values are not used as predictors of adverse health effects. The comparison value used in the evaluation of the BFI Colonial landfill air monitoring are listed below:

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 Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (40 CFR part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act identifies two types of national ambient air quality standards. *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. EPA has set National Ambient Air Quality Standards for six principal pollutants, which are called "criteria" pollutants.⁷

The Texas Commission on Environmental Quality 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.⁸ 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.⁸

APPENDIX C: SAMPLE RESULTS

Table C-1: Ranges/Comparison Values (CVs) of contaminants detected using the AreaRAE Monitor collected by LDEQ at the BFI Colonial Landfill and the Gator Landfill January 3 through January 6, 2017

Location	Date Collected	Time Interval Collected	LEL	SO2 Range (ppm)/ Mean	SO2 CV (ppm)	VOC Range (ppm)	H2S Range (ppm)/ Mean	H2S CV (ppm)	CV Reference (ppm)
BFI Colonial	1/4/17	10 hours	0.0	0.0	N/A	0.0	Not analyzed	N/A	N/A
	1/5/17	24 hours	0.0	0.0	0.01	0.0	Not analyzed	N/A	Acute EMEG
	1/6/17	10 hours	0.0	0.0	N/A	0.0	Not analyzed	N/A	N/A
Gator Landfill	1/3/17	10 hours	0.0	0.0-0.3	N/A	0.0 – 0.8	0.0 -0.3	N/A	N/A
	1/4/17	24 hours	0.0	0.0-0.2/ 0.001	0.01	0.0 – 0.4	0.0 - 0.2/ 0.001	0.07	Acute EMEG
	1/5/17	24 hours	0.0	0.0-0.1/ 0.0001	0.01	0.0-1.1	0.0-3.0/ 0.001	0.07	Acute EMEG
	1/6/17	9 hours	0.0	0.0- 0.1	N/A	0.0 – 1.6	0.0-0.1	N/A	N/A

Detection limits: SO2 = 1.0 ppm VOC = 0.1 ppm H2S = 1.0 ppm

Table C-2: Hourly Mobile Air Monitoring Samples Collected by LDEQ (March 16- March 18, 2017)

Date Collected	Time Range Collected	Nitrogen Oxide range (ppb)	Nitrogen Dioxide range (ppb)	Carbon Monoxide (CO) range (ppm)	Hydrogen Sulfide(H2S) 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)
3/16/2014	16 hours	3.0-7.0	3.0-8.0	0.4-1.8	0-8.0	0-2.0	3.1-36.8	0.09 – 0.44	1.93-3.01	2.12 – 3.15
3/17/2014	24 hours	4.0-7.0	2.0-18.0	0.1-3.9	0-30.0	0-2.0	6.2-15.3	0.06 – 0.35	1.84 – 4.29	1.90-4.67
3/18/2014	7 hours	2.0-12.0	1.0-3.0	0.2-1.9	0-16.0	0	0-16.0	0.09-0.33	2.31-3.77	2.40-3.91

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 C-3: Mobile Air Monitoring Samples Collected by LDEQ (March 16- March 18, 2017) – 8 Hour Averages

Date Collected	Carbon Monoxide (CO) 8 hour average range (ppm)	Hydrogen Sulfide H ₂ S) 8 hour range (ppb)	PM 2.5 8 hour average Range (ug/m ³)
3/16/2014	1.0-1.1	0.4-2.1	None collected
3/17/2014	0.2-1.8	0.3-13.4	9.1-12.2
3/18/2014	0.2-0.6	5.4-8.6	8.5-9.5

Detection Limits:Carbon Monoxide = 0.04 ppm; Hydrogen Sulfide = 0.4 ppb; PM_{2.5} = Not applicable**C-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)

Table C-5: Hydrogen Sulfide (H₂S) Sample Results Collected with Handheld Jerome Meter in Nearby Neighborhoods Surrounding the BFI Colonial Landfill

Date Collected	Hydrogen Sulfide Range (ppb)	Odor Remarks
3/17/2017	0.014-0.027	Slight odor
3/18/2017	0.049	No odor detected

H₂S Comparison Value: Louisiana Toxic Air Pollutant Ambient Air Standard, 8 hour average = 330 ug/m³ applicable to offsite locations).**Detection Limit** = 3.0 ppb

Table C-6: Air Monitoring VOC Summa Canister Grab Samples Collected by LDEQ on March 16 and March 17, 2017 and analyzed by Gas Chromatography/Mass Spec

Date Collected	LOCATION SAMPLED	PARAMETERS ANALYZED	DETECTION LIMITS/TEST METHOD	COMPARISON VALUES (SOURCES)
3/16/2017	Background Sample collected on Brady St.	VOCs	<0.2 ppb (GC\MS)	ATSDR's Air Comparison values or TCEQ's ESLs
3/16/2017	Hwy 70	VOCs	<0.2 ppb (GC\MS)	ATSDR's Air Comparison values or TCEQ's ESLs
3/17/2017	Hwy 22	VOCs	<0.2 ppb (GC\MS)	ATSDR's Air Comparison values or TCEQ's ESLs

Chemicals detected in most of the 3 grab samples: Freon-12, chloroethane, Freon-11, carbon disulfide, Freon-113, methylene chloride, acetone, cyclohexane, 2-butanone, carbon tetrachloride, 4-methyl-2-pentanone, benzene, toluene, tetrachloroethylene, dibromochloromethane, cis-1,2-dichloroethene, 1,2-dibromoethane, chlorobenzene, ethylbenzene, m/p-xylene, styrene, o-xylene, 1,1,2,2-tetrachloroethane, 1-ethyl-4methylbenzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, m-dichlorobenzene, benzyl chloride, p-dichlorobenzene, o-dichlorobenzene, and 1,2,4-trichlorobenzene.

Those chemicals not detected in any of the 3 grab samples: n-heptane, chloroethane, chloromethane, Freon-114, 1,3-butadiene, ethyl acetate, chloroform, tetrahydrofuran, 1,1,2-trichloroethane, vinyl chloride, bromomethane, 1,1-dichloroethene, trans-1,2-dichloroethene, MTBE, 1,1-dichloroethane, 1,1,1-trichloroethane, 1,2-dichloroethane, trichloroethylene, 1,2-dichloropropane, bromodichloromethane, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 2-hexanone, bromoform, and 1,3-hexachlorobutadiene.

Table C-7: Groundwater Monitoring Wells Sample Detected Results

Well Name	Barium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Selenium (mg/L)
W-1	0.0707	70.6	73.4	ND (<0.01)
W-5R	0.524	123	14.4	ND (<0.01)
W-8A	0.356	744	19.4	ND (<0.01)
W-9	0.549	230	34.4	ND (<0.01)
W-10R	0.098	152	83.6	ND (<0.01)
W-11R	0.322	202	45.6	ND (<0.01)
W-12R	0.369	150	1.51	ND (<0.01)
W-13	0.408	111	10.6	ND (<0.01)
W-14	0.114	31.6	45.6	0.0248
W-15	0.106	60.8	74.6	ND (<0.01)

W-16A	0.596	120	2.59	ND (<0.01)
W-17A	0.331	103	59.6	ND (<0.01)
W-18	0.336	139	1.48	ND (<0.01)
W-19	0.318	65.9	34.3	ND (<0.01)
W-20	0.336	63.1	14.1	ND (<0.01)
W-23A	0.555	95.6	18.4	ND (<0.01)
W-24	0.586	333	35.3	ND (<0.01)
W-25	0.258	75.9	44.7	ND (<0.01)
W-26	0.384	135	4.65	ND (<0.01)
W-27	0.0803	222	63.3	ND (<0.01)
W-28	0.0786	163	48.1	ND (<0.01)

Barium EPA's MCL = 2.0 mg/L; Detection limit = 0.020 mg/L

Chloride EPA's MCL = 250 mg/L ; Detection Limit = 0.040 mg/L

Sulfate EPA's MCL = 250 mg/L; Detection Limit = 0.040 mg/L

Selenium EPA's MCL = 0.05 mg/L; Detection Limit = 0.01 mg/L

Table C-8: Leachate Sample (collected 03/07/2017) Results

Parameter	Results (mg/L) / Detection Limits	Typical Range for Municipal Landfill (mg/L)
Barium	4.84 / 1.0	0.11-9.22
Chloride	13,100 / 1000.0	47-2400
Sulfate	49.5/ 10.0	20-730
Bicarbonate Alkalinity	5740/ 1.0	730-15,050
Total Alkalinity	5740/1.0	730-15,050