Jefferson Parish Landfill
Site Evaluation with Respect to Odors

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1.0 BACKGROUND

Stearns, Conrad and Schmidt, Consulting Engineers, Inc. dba SCS Engineers (SCS) was contracted to conduct a preliminary site inspection of the Jefferson Parish Landfill (located in the vicinity of Highway 90, Live Oak Road, and S. Kenner Avenue in Jefferson Parish, LA). This inspection focused on gauging the:

- potential odor sources and odor concentrations at the landfill and in nearby regions; and
- status and condition of the landfill's gas collection and leachate systems with regard to producing fugitive odorous emissions.

This initial survey encompassed conducting odor observations via personal sensory perception and spot sampling for hydrogen sulfide (H_2S) concentrations using a calibrated hand-held Jerome 631-X H_2S sampler unit (serial number 2832 with sensor number 16-7-21-V2AS). Odor survey work was conducted in all significant subcomponent areas of the Landfill including, but not limited to, the following:

- borders of areas with final cover (Phases 1, 2, 3a, and 3b);
- working face and cell construction area (Phase 4a);
- leachate storage and processing area;
- truck lanes;
- storage area;
- intermediate and daily cover areas; and
- drainage ditches and canals.

Figure 1 outlines the sample points for the onsite odor survey.

The odor survey activities also conducted at or near off-site locations included:

- Other nearby industrial facilities and activities that are potentially a source of odor (the Cornerstone, Evonik, and Kemira facilities complex, ADM grain operations, numerous dredging and barge cleaning operations along the local Mississippi River banks, several waste water treatment facilities, inactive Kelven Sanitary Landfill, and other industrial facilities;

- River Birch Landfill operations (just west of the Jefferson Parish Landfill) and the Highway 90 Construction and Demolition (C&D) Landfill (just east of Jefferson Parish Landfill);

- Nearby areas that could be a natural source of odors (bogs, lakes, farmland, etc.);

- Some of the adjacent neighborhoods that record frequent complaints to obtain a snap-shot of potential odors experienced locally including sources in Elmwood, Harahan and River Ridge.

Figure 2 provides a view of the offsite regional survey path with points of sampling where odors were observed.

In addition to the odor survey work, SCS conducted a general, visual inspection of the landfill leachate management system and the landfill gas collection system as well as reviewed records regarding the performance of these systems during the recent past (last 12 months).

The preliminary survey included a two-day site visit to the region to collect data and perform the system inspections. This work provided the basis for our preliminary findings and impressions of the odor sources in the region (on-site and off-site), the status of the landfill gas collection and leachate systems with regard to odor management, and other potential significant sources of odor in the region.

The preliminary inspection was conducted by James Walsh, President and CEO of SCS Engineers who is an expert in landfill gas systems and landfill operations along with Thomas Rappolt who is SCS's national expert on odor assessment studies. CVs are provided in Appendix E.

Figure 1. Onsite Odor and H_2S Survey Sample Points

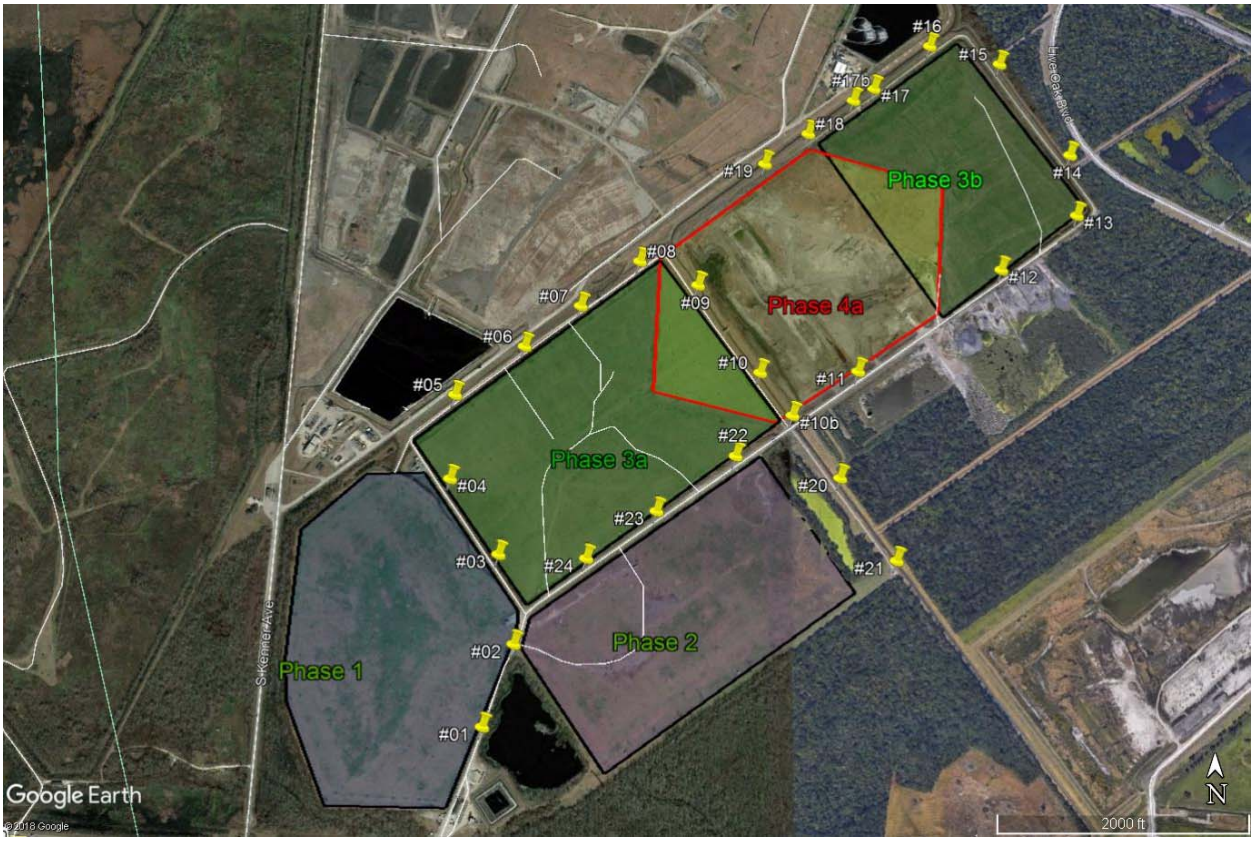

Figure 2. Offsite Regional Odor Survey Path and Sample Points (Not to Scale)

2.0 DATA AND DOCUMENTS REVIEWED

In the course of the evaluation, the following data and documents were reviewed and considered in forming opinions.

Court-filed Documents:

1. Class Action Petition for Damages in Bernard v. Progressive Waste Solutions of LA, Inc., (originally filed in the 24th Jud. Dist. Parish of Jefferson, No. 786-541, Aug. 10, 2018).

2. Class Action Petition for Damages in Ictech-Bendeck v. Progressive Waste Solutions of LA, Inc., (originally filed in the 24th Jud. Dist. Parish of Jefferson, No. 785-955, July 25, 2018).

3. Class Action Petition for Damages in Landry-Boudreaux v. Progressive Waste Solutions of LA, Inc., (originally filed in the 24th Jud. Dist. Parish of Jefferson, No. 787-081, Aug. 27, 2018).

4. Class Action petition for Damages and Injunctive Relief in Thompson v. Louisiana Regional Landfill Company f/k/a IESI LA Landfill Corporation, (originally filed in the 24th Jud. Dist. Parish of Jefferson, No. 786-137, July 30, 2018).

Waste Connections Provided Documents:

5. Jefferson Parish Dept. of Environmental Affairs, "Contract to Provide Services to Operate, Manage, and Maintain the Jefferson Parish Sanitary Landfill Site – additional Service Requested", Letter to Jeff Palutis (IESI) from Joseph Buller, Jr. PE (Jefferson Parish). Dec. 2, 2013.

6. Waste Connections, Inc. (WC), "May 8, 2018 Meeting", Letter to Mr. Keith Conley, COO Jefferson Parish from Mr. Rob Nielsen (WC), May 30, 2018.

7. Jefferson Parish Incident Report, June 2, 2018.

8. Louisiana Department of Environmental Quality, "Compliance Order, Enforcement Tracking No. SE-C-18-00372, Agency Interest No. 6961", Letter to Jefferson Parish Government (c/o Michael S. Yenni, Parish President) from Mr. Lourdes Iturralde, Assist. Sec, Office of Environmental Compliance. June 22, 2018.

9. Waste Connections, Inc. (WC), "Contract to Provide Services to Operate, Manage, and Maintain the Jefferson Parish Sanitary Landfill Site, dated May 17, 2012 (the "Agreement"), by and between the Parish of Jefferson (the "Parish") and the Louisiana Regional Landfill Company, f/k/a IESI LA Landfill Corporation ("LRLC")", Letter to Mr. Keith Conley (Jefferson Parish) from Robert Nielson, III, July 20, 2018.

10. Jefferson Parish Resolution No. 131828, July 25, 2018.

11. Louisiana Department of Environmental Quality, "Approval of Minor Modification to Solid Waste Permit, IESI LA Corp – Jefferson Parish Sanitary Landfill, D-051-0090/P-0297R1M7, Jefferson Parish" Letter to Mr. Joseph (Rick) Buller, Jr. (Jefferson Parish) from Estuardo Silva, April 6, 2016.

12. Louisiana Department of Environmental Quality, Mobil Air Monitoring Lab (MAML), "April 27, 2018 River Ridge and Harahan, LA.", Surveillance and monitoring report for operation from April 27 to May 2, 2018.

13. Permit Modification No. 7 Application, Jefferson Parish Sanitary Landfill, Solid Waste Permit, Facility No. D-051-0090, Agency Interest No. 6961, Permit No. p-0297R1, Vol 1 of 1, March 2016. Sigma Engineers and Constructors, Inc.

14. Odor Complaint Data maintained by Waste Connections at the Jefferson Parish Landfill, January through December 2017.

15. Odor Complaint Data maintained by Waste Connections at the Jefferson Parish Landfill, January through September 7, 2018.

16. Weather Data collected at the Jefferson Parish Sanitary Landfill – 2017.

17. Weather Data collected at the Jefferson Parish Sanitary Landfill – January through September 14, 2018.

18. 30 CAD Drawings from 2011 RFP (Piping diagrams, well placements, well design cross sections, slope contours, etc.).

19. 8 Cad Files that include aerial views of the Jefferson Parish Landfill in 2018.

20. Excel spreadsheet of daily municipal solid waste and special waste tonnage deliveries from September 20, 2016 and through September 2, 2018.

21. 48 files of monthly, quarterly and annual wastewater discharge reports from September, 2017 to September, 2018.

SCS obtained data sources:

22. Weather Underground, historical meteorological data for New Orleans International Airport (MSY), April through September 2018, www.wunderground.com.

23. Davoli, E., Gangai, M. L., Morselli, L., and Tonelli, D., "Characterization of Odorants Emissions from Landfills by SPME and GC/MS", Chemosphere 51 (2003) 357-368, www.elsevier.com/locate/chemosphere.

24. Sue Lee, Qiyong Xu, Matthew Booth, Timothy G. Townsend, Paul Chadik, Gabriel Bitton, "Reduced Sulfur Compounds in Gas from Construction and Demolition Debris Landfills", Waste Management 26 (2006) 526–533, www.elsevier.com/locate/wasman.

25. Paola Pierucci, Elena Porazzi, Mercedes Pardo Martinez, Fabrizio Adani, Cesare Carati, Federico Maria Rubino, Antonio Colombi, Enrico Calcaterra, Emilio Benfenati, "Volatile Organic Compounds Produced During the Aerobic Biological Processing of Municipal Solid Waste in a Pilot Plant", Chemosphere 59 (2005) 423–430, www.elsevier.com/locate/chemosphere.

26. Carlson Environmental Consultants, PC (Carlson), "Landfill Gas System Assessment for the Jefferson Parish Landfill", Monroe, NC, August 15, 2018.

27. 3M Occupational Health and Environmental Safety Division, “2010 Respirator Selection Guide”, 3M Corporation, 2010.

Some of these documents are referenced or cited in the text contained in the following sections of this report. Citations are made according to the accompanying number listed by each of the above documents.

3.0 SITE OBSERVATIONS

3.1 GENERAL SITE SURVEY AND OBSERVATIONS

Upon arriving at the Jefferson Parish Landfill, and after an initial on-site meeting, the SCS team was escorted on a detailed site tour of the landfill operations. This tour was led by Mr. Brett O'Connor of Waste Connections. The entire waste site was viewed by the team initially by driving along all site access roads. At various locations, the team exited the vehicle and proceeded via foot to inspect specific aspects of the facility. This initial overview of Jefferson Parish Landfill provided the basis for a more methodical odor survey of the facility conducted later that day.

SCS's initial observations from this tour were that the Jefferson Parish Landfill was well maintained and organized, and certain sections were undergoing construction and modification. All final covered areas were planted and maintained; no debris was evident in the final covered areas. The storm water runoff and leachate pond was empty due to the effort to replace the liner and all leachate was legally being channeled to the local Publically Owned Treatment Works (POTW) in a completely contained system. Active construction was witnessed in the Phase 4a zone in preparation of a bottom liner for that cell. In addition, at the northern portions of Phase 4a, where it overlaps Phase 3b, the active working face was in progress. Extensive methods were in practice to minimize the exposed area of newly deposited solid waste and to rapidly cover the waste to minimize any odor or fugitive debris. An active odor control system was operational.

During the initial tour, minimal gaseous and/or sulfurous odors were briefly observed along a section of the western border of Phase 3a adjacent to a leachate pond situated on the River Birch Landfill. Slight trashy and sweet odors were detected near the working face (as expected), but not a sulfur or rotten egg-like smell that can be associated with landfill gas. The extent of the working face odors were observed as minimal and were not detectable at downwind locations near the facility border. Requested documents were provided by Waste Connections following the site visit.

3.2 LANDFILL GAS SYSTEM

The Jefferson Parish Landfill is owned by Jefferson Parish. It has been developed in each of 5 existing and separate waste disposal areas designated as Phases 1, 2, 3a, 3b, and 4a. Phase 4b is an area permitted for waste disposal but has not yet been developed or had any waste disposed to date. The entire landfill property is approximately 346 acres, of which 324 acres are designated and permitted for waste disposal [26]. The site began accepting waste in Phase 1 in 1982 [26]. To date, the site has received about 9.3 million tons of waste.

Waste disposal operations at this landfill are currently contracted by Jefferson Parish to Louisiana Regional Landfill Company (LRLC), a subsidiary of Waste Connections. The responsibilities of Waste Connections to date are primarily limited to current landfill operations in the only active phase, Phase 4a, including the leachate collection system in that area. The existing gas collection and control system (GCCS) throughout the site is operated by APTIM under contract with Jefferson Parish. The leachate management system for all phases other than Phase 4a, is operated by an internal workforce of Jefferson Parish and the Phase 4a system feeds into that existing system.

The GCCS system has been installed in Phases 1, 2, 3a, 3b, and in parts of 4a at the landfill. Gas collection in that GCCS is primarily through 220 vertical wells and a few horizontal collectors. Gas from those collection points is then conveyed through above ground laterals and underground headers to two central collection stations. The primary, and at present exclusive, active gas collection station now

is a facility owned and operated by a landfill gas developer who sells the gas to a third party for energy use. That developer is a subsidiary of the adjacent River Birch Landfill. That plant is located in the northeast part of the River Birch Landfill property. A blower/flare facility owned and operated by Jefferson Parish is located in the southern part of the Jefferson Parish Landfill. No flow is currently going to that location. It is meant as backup for collection and disposal of collected gas if the landfill gas developer cannot use all of the collected landfill gas.

Landfill gas at the site is subject to federal and state air regulations known as the New Source Performance Standards (NSPS) for municipal solid waste landfills. Those regulations require the installation and operation of a comprehensive GCCS to reduce and control fugitive emissions of landfill gas that could cause degradation of area-wide air quality or contribute to local off-site odor nuisance. These regulations have certain operating requirements for individual gas collection points, for controlling surface emissions, and either for the treatment and disposal of collected gas in an on-site combustion device or for transport off-site for third-party energy use as is the case here.

Although there have been a few Compliance Orders that addressed a need for adjusted and improved GCCS operation to fully comply with the NSPS regulations at this site, the site appears to be in substantial compliance with the NSPS regulations over the past few years and at this point in time. That by itself is an indication that the Jefferson Parish Landfill is adequately controlling fugitive emissions at the landfill from landfill gas sources.

NSPS regulation compliance is based on monthly monitoring of wellheads and quarterly surface emission monitoring (SEM) done for NSPS compliance by APTIM. In addition, Carlson Environmental Consultants, PC (CEC) did extensive field monitoring and analysis work on the GCCS in May 2018, as part of its analysis under contract assignment to Jefferson Parish. The CEC study was conducted to evaluate the potential to increase landfill gas production for beneficial energy use. CEC found liquid accumulations in many gas wells and overall determined that the gas system was not optimized for collecting the maximum possible quantity of gas. But their wellhead monitoring and SEM monitoring at the site demonstrated substantial compliance with NSPS requirements. Where exceedances were found in wellhead readings or SEM results, the results were deemed to be correctable, by APTIM adjusting the GCCS in a manner that gets wellhead or surface emission readings back to target, and thus achieves overall NSPS compliance.[23, 26]

As described previously, the authors of this report inspected the site on September 13 and 14, 2018. Among other tasks, they observed on-site and off-site odors and their likely sources. Only slight odors of landfill gas fugitive emissions were detected on-site at the Jefferson Parish Landfill. Those slight odors were likely traceable to fugitive emissions from the landfill surface, which in turn are either uncollected or uncollectable by the site's GCCS. This odor level was observed to be average to better than average for most landfills, and consistent with an adequately operated GCCS. Even an optimized and perfectly designed and operated GCCS cannot collect all fugitive emissions, as is recognized by U.S. EPA and their NSPS-related guidance publication known as AP-42 (Section 2.4 Municipal Solid Waste Landfills, November 1998). The GCCS at this site meets its design criteria under the NSPS-required GCCS design Plan for the site, which is consistent with control efficiencies stated in AP-42. Although odor potential can vary day to day depending upon weather conditions, it is unlikely that fugitive emissions from Jefferson Parish Landfill could ever rise to a level of odor nuisance off-site under the current conditions of GCCS operation at this site.

3.3 LEACHATE HANDLING SYSTEM

Leachate collection systems have been installed in all phases of the Jefferson Parish Landfill. Phases 1 and 2 are pre-Subtitle D with no plastic liners. Phase 1 has a French drain perimeter system that

has a vertical riser. Phase 2 has sideslope risers. Phases 3a, 3b, and 4a have Subtitle D liner systems with leachate collection underdrains and sideslope liners. Pumps are installed down-hole in all the side-slop risers to pump collected leachate toward the surface. Previously, the collected leachate had been conveyed through underground lateral piping to an existing leachate pond in the southwest corner of the landfill property. After aeration and settling of solids in that pond, the leachate was conveyed to a nearby sewer connector and then through conventional existing sewer lines to the POTW several miles away.

At the time of our site visit on September 13 and 14, 2018, however, the leachate pond was being re-constructed and was not in use. During the re-construction, collected leachate is being conveyed through subsurface piping direct to the sewer and thence to the POTW. The leachate does not come above ground and is not otherwise exposed to atmosphere at all. With the leachate totally contained, there is no opportunity for release of leachate odors from its collection system into the air.

Although liquid content in the landfill does contribute to the liquid levels in the gas extraction wells, another contributing factor is the soil type and thickness of daily cover applied. The Landfill is placing upwards of 1 foot of daily cover and not stripping it back at the start of each working day as is done at many sites. This approach minimizes the potential for odor release. The daily cover application is left fully in place. Owing to the soil's clayey nature, this daily cover usage creates the opportunity for perched liquid zones that do not flow easily downward to the leachate collection system on the landfill bottom. As a result, the liquid can accumulate into gas extraction wells. As described previously, these liquids are accumulating in many gas wells, reducing the open and unsaturated slotted length available for gas inflow in gas extraction wells, or in some cases covering them completely. Many of the gas wells have pumps installed down-hole to remove those liquids, however, many were found to be disabled or under-performing at the time of the CEC field monitoring of May 2018. Moreover, not all gas wells have such pumps. These issues have reduced the opportunity for optimum gas collection for the energy plant and revenue for the developer. However environmental compliance and odor control are still achieved under the NSPS regulations, as cited previously.

The leachate collection system has similar issues. Although pumps have been installed in all leachate risers, many were found to be disabled or under-performing in the CEC monitoring round of May 2018. Any and all liquid that accumulates above 1-foot of depth in the leachate collection system should be continuously pumped out. However, like the gas system, work is backlogged to pump liquids out in order to get the leachate system operating better, ideally to optimum conditions. The areas where pumps were inoperable were in the closed sections of the landfill (Phases 1, 2, 3a, and 3b). Pumps may or may not be required in the pre-Subtitle D unlined Phases 1 and 2. Leachate generation in the closed sections should be minimal. Fortunately, down-hole pumps in Phase 4a are reported to be fully operational.

Despite the above, leachate is not believed to be contributing any detectable odor on or off site. At many sites with excess liquid buildup in the waste mass, the excess liquids create leachate springs known as "break-outs" on the side slopes of the landfill. There is no evidence of such breakouts on any of the phases of the Jefferson Parish Landfill.

Leachate conveyance system including on-site-treatment and collection ponds exposed to the atmosphere can also be a source of landfill odor. But the leachate system at Jefferson Parish Landfill is totally enclosed and the leachate treatment pond is not being used at this time. Instead, leachate is directly conveyed in the subsurface and in enclosed piping from the bottom of each landfill phase into the local sewer system.

3.4 LANDFILL WORKING FACE

The working face of the landfill was active in receiving and placing municipal solid waste during the entire two-day visit. Deliveries were consistent with stated historical waste handling on a daily basis, which averages about 1,000 to 1,200 tons per day (40 to 80 truck trips per day) [20]. As previously stated, the working face was kept at a minimum area and aggressively covered with at least one foot of soil to minimize odors and fugitive debris. An active misting and odor neutralizing system was operational at all times waste was being received. The misting system was not a masking agent but a true odor neutralizing agent. The odor neutralizing agent was delivered via an elevated hose system with periodic mister valves positioned about one per 5-8 feet at an elevation of about 10 feet above ground and crosswind to the incident wind direction. It appeared to be effective as the working face odors were minimal and no raw material odors were detected at downwind border locations. The odor neutralizing agent is called SL-4000 and consists of essential oils, botanicals, emulsifiers, stabilizers, proprietary neutralizer, fragrance, and propylene glycol for winter. The odor neutralizing agent is provided by NCM Odor Control.

In addition, it was noted that industrial liquid wastes had been but are no longer being accepted at the landfill. For the past liquid waste that was accepted, bulking agents were used to absorb excess liquids, which had the further benefit of reducing odor potential. Although the CEC report cited a SCS white paper that fly ash is a utilized bulking agent and a known cause of hydrogen sulfide (H2S) generation with its resulting high odor potential [26], it is understood from Waste Connections personnel that only five loads of fly ash over a very limited time period (approximately two weeks) were used as a bulking agent at Jefferson Parish Landfill, and that most of the time other bulking agents were used. Presently, only biosolids are received.

3.5 CELL CONSTRUCTION FOR PHASE 4A

As can be seen in Figure 1, the Phase 4a placement cell 23 was under construction during the site visit. Significant challenges to this cell construction were cited during the tour. The soil removal process is slow due to the wet and spongy characteristic of the bottom soil needed to be removed and stockpiled to make way for a liner to support future waste placement activities. Other than a slight wet soil odor, no significant odors were detected in this area of the Jefferson Parish Landfill, including the adjacent area where excavated soils were being stockpiled. No H_2S was detected in this area.

4.0 ODOR AND H_2S SURVEY

4.1 ON-SITE LANDFILL ODOR AND H_2S SURVEY

As outlined in the Background section of this report, a methodical survey of onsite odor sources was conducted on the Jefferson Parish Landfill. As shown in Figure 1, odors were surveyed at all border and access road locations and sampled for H_2S at 25 discrete locations throughout the landfill facility. Along the path of this survey, SCS personnel scanned for any detectable odors and measured for the ambient H_2S concentration using a calibrated Jerome 631-X H_2S analyzer. The complete log of this sampling and survey work is found in Appendix A (9-13-2018). Record of calibration for this analyzer is provided in Appendix B. As noted, odors having a sulfur (H_2S) component were detected at locations 3, 17b, 18, and 19. Concentration measurements of H_2S at these locations were 3 ppb, 8 ppb, 14 ppb, and 11 ppb respectively. Slight odors having a wet soil or sewage character were detected near locations 17, 10b, and 21 with no H_2S detected. The most significant was at site 18 near the gas separation plant in operation on the River Birch Landfill just adjacent to the Jefferson Parish Landfill's western border (see Figure 1) near Phase 3b. Wind observations associated with the detection of odors at sampling site 18 were variable and primarily from the north (the general direction of the River Birch gas plant from the sampling point). No odors were detected off site from the Jefferson Parish Landfill. Table 1 provides a summary of the data collected during this site survey.

Table 1. Jefferson Parish Landfill Site Odor Survey Data (9-13-2018)

Location	Time	Estimated WS (m/s)	Estimated WD (Compass)	H_2S (ppb) *	Comment
1	1328	0	SSE	0	No Odor – light winds
2	1330	0	SSE	0	No Odor – light winds
3	1333	1-2	S	3	Slight Odor – sulfur
4	1335	1-2	S	0	No Odor
5	1338	1.2	S	0	No Odor
6	1340	1-2	S	0	No Odor
7	1343	1-2	S	0	No Odor
8	1345	1-2	S	0	No Odor
9	1347	1	S	0	No Odor
10	1350	1	S	1	No Odor
11	1450	0	NA	0	No Odor
12	1455	0	NA	0	No Odor
13	1500	0	NA	0	No Odor
14	1502	0	NA	0	No Odor
15	1504	0-1	S	0	No Odor
16	1506	0-1	S	0	No Odor
17	1507	0-1	NA	0	Intermittent Odors
17b	1508	0	N (DRIFTING)	8	Sulfur Gas Odor
18	1510	0	N (DRIFTING)	14	Distinct LFG
19	1512	0	NA	11	LFG Odor
10b	1518	0	NA	0	Wet Soil Odor

Location	Time	Estimated WS (m/s)	Estimated WD (Compass)	H_2S (ppb) *	Comment
20	1520	0	NA	0	No Odor
21	1523	0	NA	0	Light Sewage Odor
22	1528	0	NA	0	No Odor
23	1530	0	NA	0	No Odor
24	1534	2	S	0	No Odor

NA No discernable wind direction.
* H_2S readings are ± 3 ppb.

4.2 OFF-SITE LANDFILL ODOR AND H2S SURVEY

As depicted in Figure 2 on September 14, 2018, SCS conducted a regional odor survey of potential sources in the vicinity of the Jefferson Parish Landfill. Table 2 provides a summary of these observations. Significant odors were detected in the morning hours along Highway 90. The location of these odorous plumes were situated just west of the Highway 90 entrance driveway to the Highway 90 C&D Landfill, depicted as sample locations 1 and 2 on Figure 2. Significant sulfur (rotten egg) odors were experienced and H_2S readings of 58 and 72 ppb were recorded at these locations respectively. Light winds from the northeast and east-northeast were prevalent during this observation which suggests a plume trajectory originating from the Highway 90 C&D Landfill. Almost an hour later, odors were still present at this location, though at lower levels associated with higher wind speeds.

Table 2. Regional Odor Survey of Jefferson Parish (9-14-2018 – see Figure 2)

Location	Time	Estimated WS (m/s)	Estimated WD (Compass)	H_2S (ppb) *	Comment
1	0850	1-2	NE	58	LFG Rotten Eggs
1	0945	2-3	NNE	2	Light LFG Odor
2	0852	1-2	ENE	72	LFG Sulfur
2	0947	2-3	NNE	2	Light Sulfur
3	1020	2-3	NNE	0	Corn Flake – Grain Odor
4	1030	2-3	ENE	2	Sulfur and Ammonia
5	1033	2-3	ENE	2	Sulfur and Ammonia
6	1045	2-3	ENE	0	Light Diesel Odor
7	1050	2-3	ENE	0	Wet Soil and Garbage
8	1052	2-3	N	0	Light Odor – Green Waste
9	1055	1-2	N	NA	Stale Hard Odor
10	1115	1-2	N	NA	NA
11	1120	2-3	N	NA	Sour Sewage Smell – Distinct
12	1135	2-3	N	NA	Wet Soil Odor
13	1140	2-3	NE	NA	Wet Soil Odor
14	1150	2-3	NE	NA	No Odor

NA No reading taken because odors were not characteristic of H_2S.
* H_2S readings are ± 3 ppb.

Other sources of odor were observed along the observation route through the region. The readings of H_2S ranged from 0 to 2 ppb, with a variety of odors being sensed. There are a wide variety of sources of industrial odors in the region that can be detected during generally prevalent weather conditions, not to mention under extremely light and stable air flow when odors are more common. Table 3 provides the potential source where odor observations were made downwind of those potential sources during this survey. These 14 sources are not the only additional sources in the region in addition to the landfills, but are just a sampling of potential sources that noted a positive odors response.

See Figures 3 through 9 for detailed sampling locations downwind of various sources in the region.

Figure 3. Sites 1 and 2

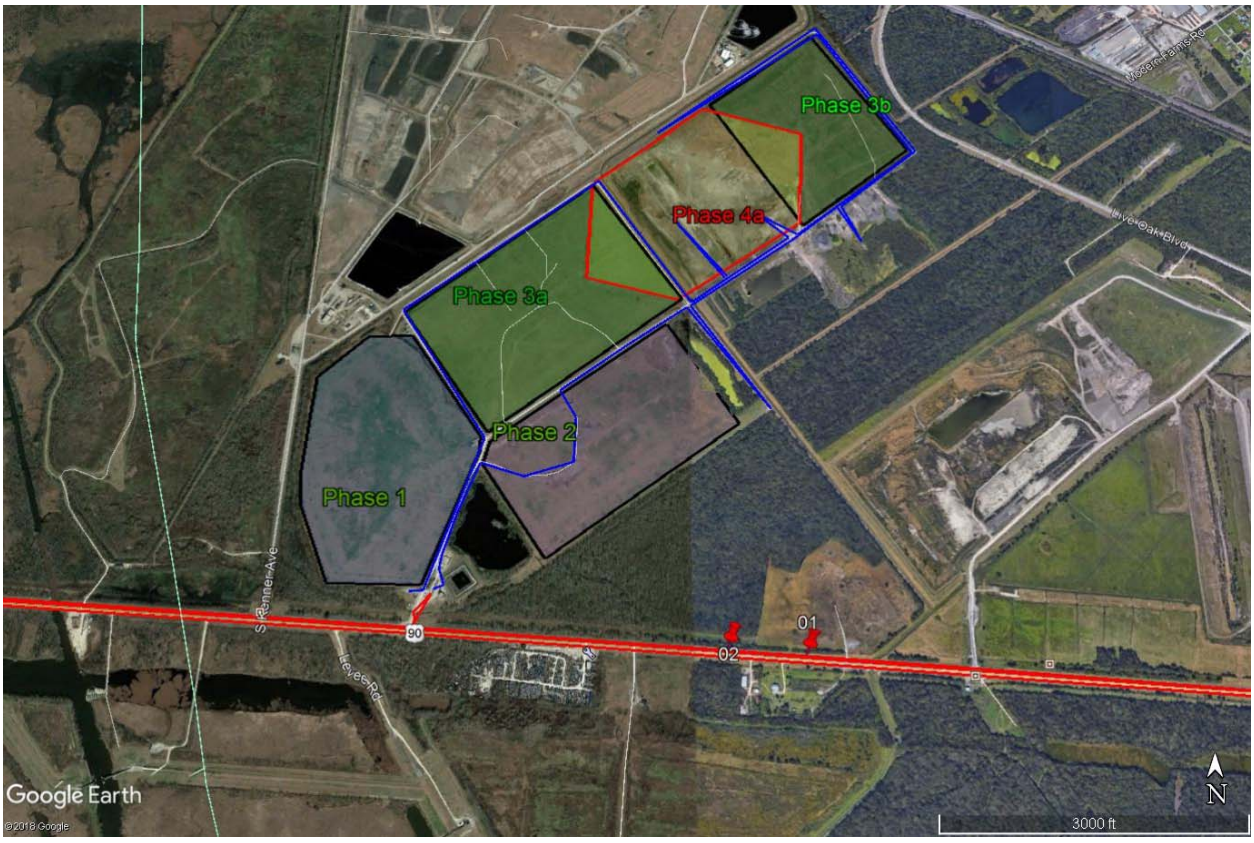

Figure 4. Site 3

Figure 5. Sites 4 and 5

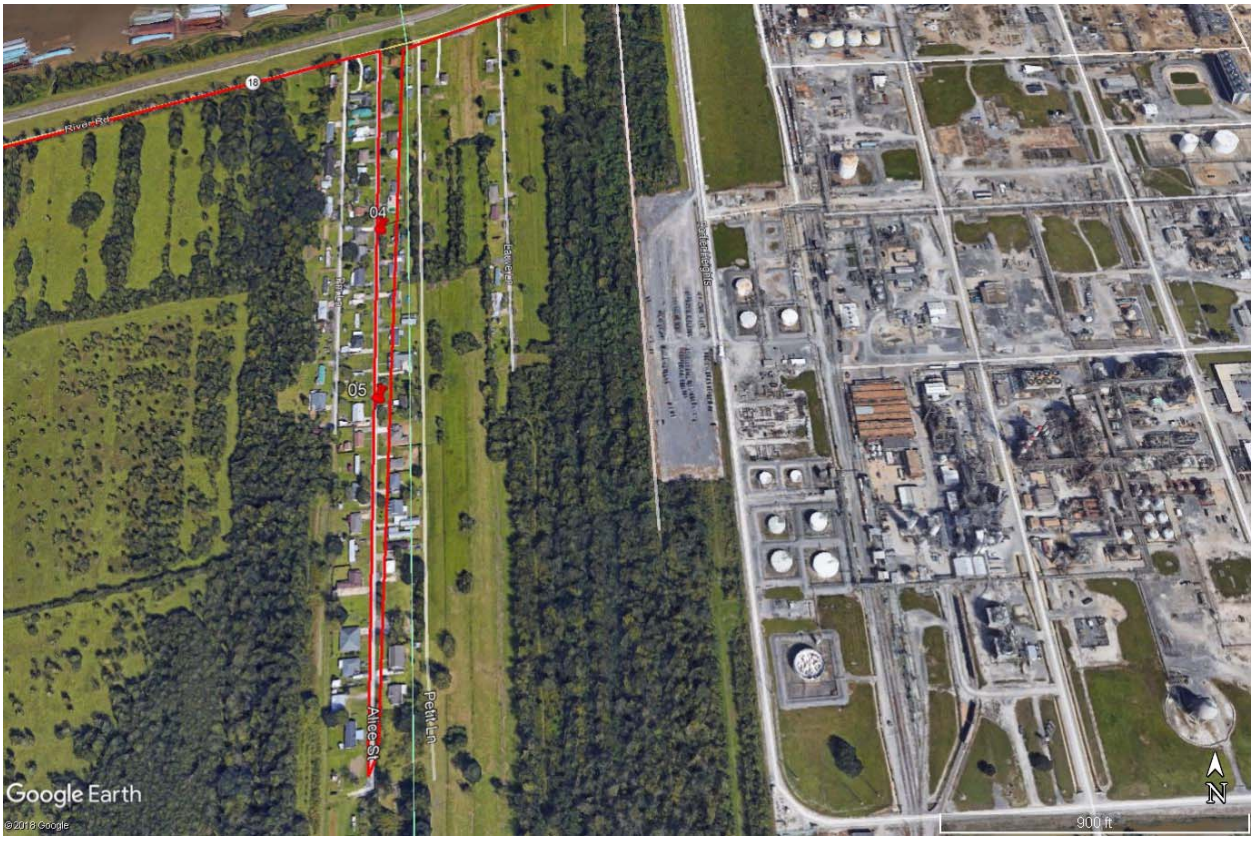

Figure 6. Site 6

Figure 7. Sites 7, 8, and 9

Figure 8. Sites 10 through 13

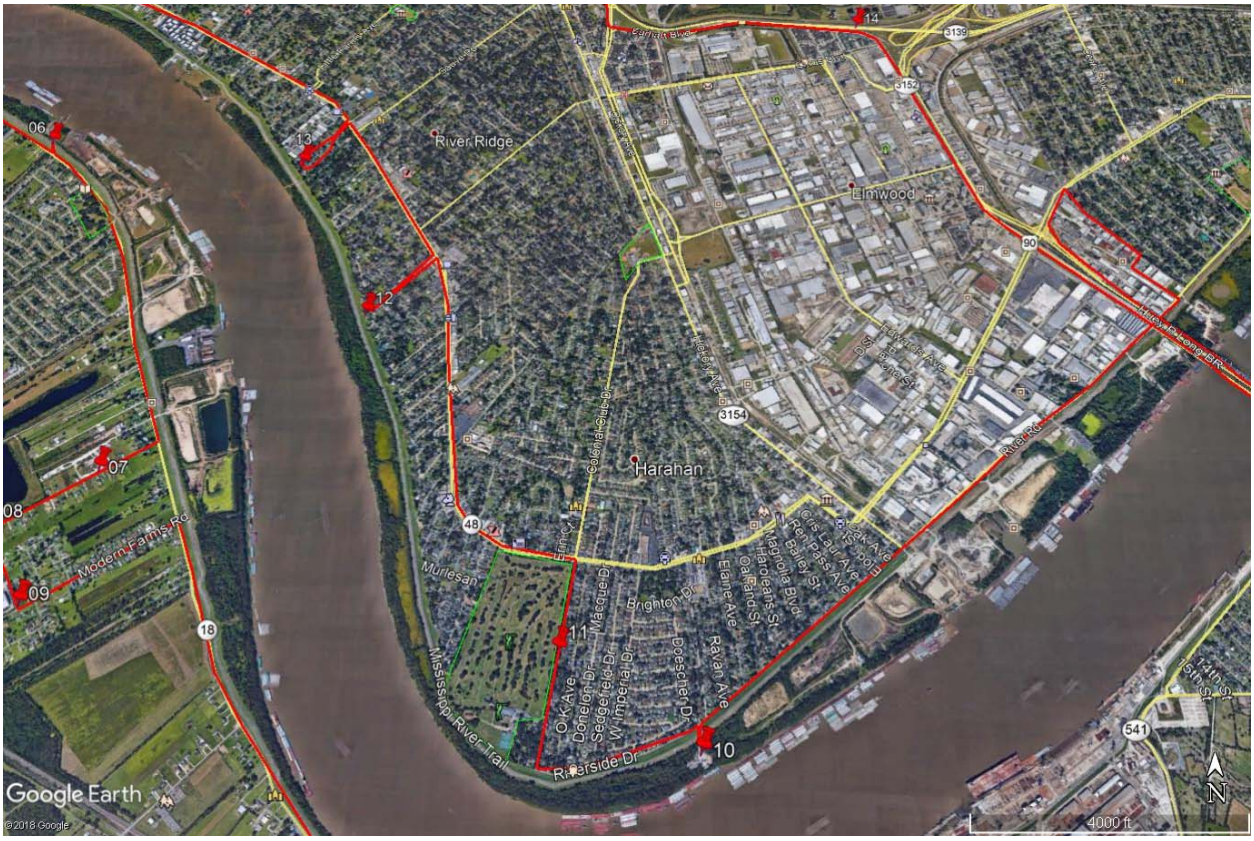

Figure 9. Site 14

Table 3. Source Receptor Location for the Regional Survey Conducted on 9-14-2018

Receptor Location Number	Description of Potential Source/Receptor Location *
1	C&D Landfill/Highway 90 (NNE, NE and ENE winds), Avondale, LA
2	C&D Landfill /Highway 90 (NNE, NE and ENE winds), Avondale, LA
3	ADM Grain Processing Plant/ River Rd. near Ama, LA
4	Cornerstone Chemical, Evonik, and Kemira facilities/Alice Rd., Waggaman, LA
5	Cornerstone Chemical, Evonik, and Kemira facilities/Alice Rd., Waggaman, LA
6	Soil Processing Facility/River Road on Levy near Jeffer Drive in Waggaman, LA
7	Waste Bin Container Yard/Litigue St., Waggaman, LA
8	Carpenter and Peterson Facility/Litigue St. and Foundry Rd in Waggaman, LA
9	Metals USA Plant/Foundry Rd. and Modern Farms Rd. in Waggaman, LA
10	Barging near Levi/Riverside Dr and Imperial Woods Dr., Harahan, LA
11	Sewer Excavation Near Colonial Country Club/Colonial Club Drive, Harahan, LA
12	River Activity/Orchard Rd and River Lane, River Ridge, LA
13	River Activity/East & West Henfer Ave., River Ridge, LA
14	WWTP near Rt 3139, Elmwood, LA

* List of potential sources is not exhaustive.

5.0 FINDINGS AND CONCLUSIONS

The findings and conclusions from this study are presented below.

- **Odor complaint correlation with concurrent wind measurements suggests that numerous sources in the region contribute to odor detection by the public.**

  – Odor complaints within five miles of the Landfill that occurred between July 28 and September 7, 2018 [15] were evaluated for correlation to the wind directions measured at the nearby New Orleans International Airport [22]. Each odor event location was first mapped using Google Earth and then categorized according to the direction (N, NNE, NE, ENE, E, etc.) from the Landfill to the odor event. Next, the direction from the Landfill to each odor event was compared to the wind direction measured at the New Orleans International Airport just before and just after the odor event start time based on hourly measurements. Of the 157 odor events with valid data (e.g., complaint log recorded the event start date, start time, and address), only 29 events (18.5%) correlated to the airport wind direction measured just before the start of the odor event and only 4 events (2.5%) correlated to the airport wind direction measured just after the start of the odor event. This indicates that over 80% of the odor observations were most likely from sources other than the Jefferson Parish Landfill.

- **Observed odors and measured concentrations of H_2S at the Jefferson Parish Landfill are minimal and not detectable at off site locations.**

  – Based upon our inspection of the Jefferson Parish Landfill, minimal concentrations of H_2S at only selected areas of the landfill were observed. Any odors detected near the landfill borders (near small segments of the western border of Phases 3a and 3b) were observed to be transient, not sustainable and insignificant. Based on these observations and accompanying H_2S measurements, any generated odors at the Jefferson Parish Landfill would not be detectable at offsite locations.

  – Odor observations and the H_2S measurements taken support a conclusion that the gas plant on the River Birch Landfill could be producing significant emissions of H_2S. Based on H_2S measurements taken, the Highway 90 C&D Landfill just east of the Jefferson Parish Landfill is a confirmed generator of H_2S emissions [24] as its plume was measured on Highway 90 the morning of September 14, 2018.

- **Results of the Mobile Air Monitoring Lab (MAML) report dated April 27 2018, River Ridge and Harahan, LA corroborates the finding that the Jefferson Parish Landfill was not the source of odors detected on April 28th and 29th, 2018.**

  – The MAML report [12] provides useful and accurate information resulting from detailed air monitoring conducted in the River Ridge, Harahan, and Westwego, LA regions. Based upon the information reflected in the MAML report, it appears that, in general, LDEQ's measurements were collected according to recognized methods and practices with ample quality assurance to back the validity of the data. During the six days (April 27 through May 2, 2018) of nearly continuous monitoring of numerous chemical species, the region experienced an odor event during the late hours of April 28 that extended into the early hours of April 29. During this event, hourly averages of methane and H_2S concentrations were shown to increase by a factor of about 3 and 6, respectively. Methane was seen to increase from an hourly average of 2.56 ppmC to

7.54 ppmC. At the same time, hourly averages of H_2S were seen to increase from 1.9 ppb to 12.0 ppb. During this approximate five-hour episode, three instantaneous grab samples were collected and analyzed by a certified contracted analytical laboratory for speciated volatile sulfur compounds (ASTM method 5504-12) and volatile organic compounds (EPA Method TO-15). Those grab samples indicated instantaneous H_2S concentrations ranging from 100 ppb to 120 ppb, which were below the Louisiana Ambient Air Standard (LAAS), but not below the established odor threshold of H_2S of 0.5 ppb. [27]

- Wind measurements made by the MAML indicated wind direction averages were from the sector defined by 226 degrees clockwise through 246 degrees, which placed the Jefferson Parish Landfill as one of the possible alleged sources of the pollutants measured. The information in the MAML report did not allow SCS to verify the method that the LDEQ used to align the meteorological sensors correctly during their monitoring exercises.

- The elevated H_2S levels measured that evening could not be attributed to the Jefferson Parish Landfill due to the fact that the corresponding TO-15 data shows a non-detect of d-limonene and ethyl acetate in all samples. D-limonene and ethyl acetate are common markers of gaseous emissions from municipal waste but not found in C&D landfills. [23, 25] This is due to the absence of food and other organic wastes in C&D landfills. If the H_2S concentrations measured in the samples collected during the odor event on April 28-29 contained d-limonene and/or ethyl acetate, it would have suggested that Jefferson Parish Landfill emissions were contributing to the odors. The absence of these markers, however, indicates that the Jefferson Parish Landfill emissions were not contributing to the odor event experienced that evening.

- **Potential Jefferson Parish Landfill emissions do not support downwind instantaneous and hourly impacts of H_2S of the ranges measured by the Louisiana Department of Environmental Quality via the MAML Study – a much more substantial source is responsible.**

  - SCS conducted screening level dispersion modeling using the United States Environmental Protection Agency's (EPA's) SCREEN3 model to gauge a hypothetical surface concentration from an area source located at the Jefferson Parish Landfill that could generate a downwind hourly H_2S concentration of 12 ppb or an instantaneous concentration of 120 ppb in River Ridge or Harahan, LA (approximately 2-3 miles away and generally in the location of the April 2018 MAML air monitoring locations). This modeling revealed that it would take an area source, having the dimensions equal to the landfill's active face, an average surface H_2S concentration over 10,000 ppm (10,000,000 ppb) to generate such downwind impacts. Additional modeling revealed that it would take a theoretical point source, located at Phase 4a with a diameter of 320 meters, an average surface H_2S concentration of approximately 180 ppm (180,000 ppb) to generate such hourly downwind impacts. For the instantaneous concentration, it would require an even higher surface H_2S average concentration.

  - The surveys conducted by SCS on September 13 and 14, 2018, and those conducted by CEC on May 14 to 18, 2018, do not indicate that there are any sources of this magnitude (size and concentration) at the Jefferson Parish Landfill. The CEC report indicates some small isolated cracks in the cover at isolated locations and next to well heads penetrations in phases 3b and 4a had H_2S readings as high as 8.5 ppmv (8,500

ppbv) [26]. These isolated fugitive sources do not add up to the size of the area and concentration used in the modeling analysis. The CEC report also indicates that the surface air concentrations in the region where there were small isolated cracks and discrete well head fugitive sources was about 200 ppb – which if modeled, would not generate the observed downwind concentrations measured by LDEQ.

- Based on the modeling performed, another substantial source of H_2S likely exists in the region. The C&D Landfill has the potential to generate these types of surface concentrations due to the nature of waste generally deposited in a C&D facility (plaster board) and the requirements to cover waste only on a weekly basis. [24] This is further supported by the H_2S measurements collected on the morning of September 14, 2018 on Highway 90 that directly measured a significant H_2S plume coming from the direction of the C&D Landfill.

- Landfill Performance Observations

  - The landfill gas management system at Jefferson Parish Landfill has challenges with liquid accumulations, deferred maintenance, and deferred improvements. It is not optimized for maximum collection of fugitive landfill gas emissions. However, it appears to be in substantial compliance with the NSPS regulations most of the time. At the time of the SCS visit on September 13 and 14, 2018, the system was collecting enough landfill gas so as to manage the risk of landfill gas causing an off-site nuisance odor.

  - The leachate management system also has its challenges - with excess liquid buildup, deferred maintenance, and deferred improvements. But there appears to be no major leachate breakouts or spring-like releases of leachate on the landfill side slopes. The leachate system at this time is entirely contained and not exposed to the atmosphere. It seems unlikely that leachate or the leachate management system could be the cause of an off-site nuisance odor.

  - The landfill's working face is well operated and the odors well managed. It seems unlikely that the working face could be the cause of any off-site nuisance odor.

Appendix A

Survey and Sample Logs

Appendix B

Calibration and Operation of the Jerome 631-X

Appendix C

Odor Complaint Analysis

Appendix D

Screening Modeling of H_2S

Appendix E

CVs