ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

June 12, 2024

SUBJECT: **Kelly Run Sanitation, Inc.**
1500 Hayden Boulevard
Elizabeth, PA 15037
Allegheny County

Title V Operating Permit No. 0190- OP24

TO: JoAnn Truchan, P.E.
Program Manager, Engineering

FROM: Hafeez Ajenifuja
Air Quality Engineer

FACILITY DESCRIPTION:

Kelly Run Sanitation, Inc. operates Kelly Run Landfill, located at 1500 Hayden Boulevard, Elizabeth (Forward Township) is a municipal solid waste landfill. The landfill is approximately 400 acres in surface area and is composed of four units or cells. The landfill has an active landfill gas (LFG) collection system with one enclosed ground flare to control the off-gas emissions. Blasting of ground cover is also performed during landfill expansion, along with portable overburden screening to produce cover soil for capping of the landfill.

The primary source of emissions at the facility is the landfill itself, which emits VOCs and HAPs as defined in CAA section 112. Since the landfill was modified after May 30, 1991, and has a design capacity of greater than 2.5 million megagrams, this facility is subject to the requirements of the Federal Plan Requirement for Municipal Solid Waste Landfills, 40 CFR 62 Subpart OOO. Pursuant to the requirements of 40 CFR 62, Subpart OOO, landfills having design capacities greater than or equal to 2.5 million megagrams must obtain a Part 70 operating permit.

This facility is therefore subject to the Part 70 major source operating permit requirements of §2103.20. This notwithstanding, the facility is a minor source of particulate matter (PM), particulate matter less than 10 µm in diameter (PM_{10}), particulate matter less than 2.5 µm in diameter ($PM_{2.5}$), oxides of nitrogen (NO_X), oxides of sulfur (SO_X), carbon monoxide (CO), and volatile organic compounds (VOCs) as defined in Article XXI, §2101.20. The facility is a minor source of hazardous air pollutants (HAPs) as defined in Article XXI, §2101.20. The facility is also a minor source of greenhouse gas emissions (CO_2e) as defined in the U.S. EPA Greenhouse Gas Tailoring Rule.

OPERATING PERMIT DESCRIPTION:

This is a Title V renewal application for Kelly Run Landfill located in Forward Township, Allegheny County. The original operating permit was issued on May 4, 2005. It was renewed on October 5, 2011 and August 16, 2018. It was amended on December 8, 2020, to revise the weekly visible emissions test to semiannual visible emission test. The renewal permit will incorporate the conditions of the new federal landfill regulation 40 CFR 62 Subpart OOO and the revised 40 CFR 63 Subpart AAAA.

The following changes were made during the Title V renewal:

1) All references to NSPS Subpart WWW have been removed from the permit because, pursuant to 40 CFR 63.1930(b), "Beginning no later than September 27, 2021, all landfills described in §63.1935 must meet the requirements of 40 CFR 63 Subpart AAAA. The requirements of subpart AAAA apply at all times, including during periods of SSM, and the SSM requirements of the General Provisions of this part do not apply".

2) All the applicable requirements from the newly promulgated 40 CFR 62 Subpart OOO for Municipal Solid Waste Landfills That Commenced Construction on or Before July 17, 2014, and have not been modified or reconstructed since July 17, 2014, have been incorporated.

PERMIT APPLICATION COMPONENTS:

1. Title V Operating Permit #0190, issued August 16, 2018, amended December 8, 2020
2. Title V Operating Permit Renewal Application #0190, was received on December 6, 2022
3. Installation Permit #0190-I001, issued February 6, 1997, amended October 5, 2011 (Gas Collection and Control System)

Determinations

1. January 31, 2019: To install a temporary portable crusher.
   - Request for determination received on January 19, 2019
   - Exempted from permitting.

2. March 4, 2019: To install a temporary screening operation.
   - Request for determination received on February 27, 2019
   - Exempted from permitting.

3. November 13, 2020: To adjust operating standard.
   - Request for determination received on October 26, 2020
   - Exempted from permitting.

Older Permits

The table below contains a list of permits issued prior to 1996, and if applicable, any reasons the permit was not referenced in the Title V Operating Permit.

Table 1: Permits Issued Prior to 1996

Permit Number	Issue Date	Description	Reason for Exclusion from TVOP
90-I0024-I	12/14/1973	Temporary Candle Flare	No longer exist in the facility
93-I-0066-I	11/18/1993	Enclosed Ground Flare	Incorporated into the TVOP under Sections V.A, V.B

EMISSION SOURCES:

Table 2: Emissions Sources

I.D.	Source Description	Control Device(s)	Maximum Capacity	Fuel/Raw Material	Stack I.D.
G008	Municipal Solid Waste Landfill	Collection System and one Enclosed Ground Flare	400 acres (7.3 million megagrams)	Solid Waste	--
I002	One Enclosed Ground Flare #2	None	36 MMBtu/hr (1,200 scfm)	Landfill Gas	I002
F001	Landfill Construction and Operation Activities	**See Section C Below**			
G010, G011, G014	One Generator, One Air Compressor, & Two Light Plants	None	0.132 MMBtu/hr 0.237 MMBtu/hr 0.227 MMBtu/hr	Gasoline Diesel Diesel	--

Stacks

Table 3: Stacks

Stack ID	Stack Height (ft)	Stack Diameter (ft)	Exhaust Rate (acfm)	Exhaust Temp. (^{o}F)	Lining/Outer Material
I001	35	6.66	5,470	1,716	Ceramic fiber

METHOD OF DEMONSTRATING COMPLIANCE:

Methods of demonstrating compliance with the emission standards set in this permit are summarized in the Table below. See Operating Permit No. 0190-OP24 for the specific conditions for determining compliance with the applicable requirements. Compliance with the short-term (lb/hr) limits must be maintained at all times, including startup and shutdown unless explicitly stated otherwise in the permit. Any emissions due to startup and/or shutdown are included in facility's total annual emissions.

Table 4: Method(s) of Demonstrating Compliance

TVOP Section	Process	Method(s) of Demonstrating Compliance
V.A	Municipal Solid Waste Landfill	• Calculate the maximum expected gas generation rate. • Measure the monthly gauge pressure in the gas collection header applied to each individual well. • Monitor the monthly gauge pressure in the gas collection header. • Monitor individual well to ensure no positive pressure exist. • Monitor each wellhead monthly for temperature for the purpose of identifying whether excess air infiltration exists. • Monitor the monthly nitrogen or oxygen concentration in the landfill gas using EPA Method 3C or 3A of appendix A-2 to part 60. • Monitor the surface concentrations of methane along the entire perimeter of the collection area and along a pattern that traverses the landfill at 30-meter intervals to ensure that methane concentration is below 500 ppm. • Ensure that all collected gases are vented to the control system (enclosed flare).
V.B	Enclosed Ground Flare	• Continuously record the flare flue gas temperature. • Stack testing once every five years to demonstrate compliance with VOC destruction efficiency. • Continuously monitor the temperature of the enclosed flare. • Perform semiannual visible emission using EPA Method 22.
V.C	Landfill Construction and Landfill Operation Activities	• Perform fugitive dust monitoring plan. • Recordkeeping of the type and amount of roadway surface treatment. • Recordkeeping of the time and location of any vacuum sweeping conducted. • Recordkeeping of daily log of the dilution ratios of the dust suppressants and diluent used. • Recordkeeping of meter readings of spray bar and/or pump or odometer reading of trucks used to apply water and/or dust suppressants.
IV.A	Plant Roads and Vehicular Traffic	• Recordkeeping of the dust control measures. • Reporting of the monthly summary of the hours of operation and dust control measures taken.

EMISSION CALCULATIONS:

Municipal Solid Waste Landfill

Emissions from the municipal solid waste landfill are based on the Methane Generation Rate (m^3/yr) and LFG Generation Rate (m^3/yr) from LANDGEM results and are shown in Table 5 and Appendix A below.

Table 5: Municipal Solid Waste Landfill Emission Limitations

Pollutant	Hourly Emission Limit (lb/hr)	Annual Emission Limit (tons/year) *
Volatile Organic Compounds	1.48	6.14
Non-Methane Organic Compounds (NMOCs)	3.80	15.76

*A year is defined as any consecutive twelve-month period.

Enclosed Ground Flare

Emissions from the enclosed flare are based on based A-42, Section 2.4 and the manufacturer's emission guarantee. The NMOC is based on the default concentration from AP-42. The emissions are shown in Table 6 below:

Table 6: Enclosed Flare #2 Emission Limitations

Pollutant	Emission Factors	Source	Hourly Emission Limit (lb/hr)	Annual Emission Limit (tons/year) *
Particulate Matter/PM10	17 lb/10^6 dscf Methane	AP-42, Section 2.4	0.56	2.47
Carbon Monoxide	0.08 lb/MMBtu	Manufacturers Guarantee	7.2	31.54
Nitrogen Oxides	0.20 lb/MMBtu	Manufacturers Guarantee	2.9	12.61
Sulfur Dioxide	46.9 ppm TRS Conc.	AP-42, Section 2.4	0.60	2.64
Volatile Organic Compounds	39% of NMOC	AP-42, Section 2.4	0.08	0.33
Non-Methane Organic Compounds (NMOCs)	595 PPM as hexane	AP-42, Table 2.4-2	0.19	0.85
GHGs (CO_2e)				16,433.60

*A year is defined as any consecutive twelve-month period.
**NMOC is Based on AP-42, Table 2.4-2 (595 ppmv), 86.16 lb/lb-mol Hexane and 98% destruction efficiency.

Landfill Construction and Operation Activities

Emissions from the landfill construction and operation activities are fugitives and based on AP-42, Table 11.9.1 (for overburden blasting emission), Table 11.19.2-2 (for soil screening emission), and the potential soil screening throughput. The emissions are shown in Table 7 below and Appendix A.

Table 7: Landfill Construction Emission Limitations

Pollutant	Hourly Emission Limit (lb/hr)	Annual Emission Limit (tons/year) *
Particulate Matter	0.94	4.11
PM_{10}	0.87	3.82
$PM_{2.5}$	0.84	3.68

*A year is defined as any consecutive twelve-month period.

GHG Mass and CO_2e Emissions

Flare calculation

Calculations of greenhouse gases (GHG) and CO_2-equivalent (CO_2e) emissions are based on the methodology found in 40 CFR Part 98, Subpart C, §98.33(a)(1), and factors found in Table C-1 and Table C-2 of that subpart. Greenhouse gas emissions from the landfill comprises of the following steps:

Step 1: Determine the combustion CO_2e emission based on the flare capacity.
Step 2: Determine the escape CH_4 = Collected methane that escapes destruction in flares

Step 3: Determine the collected or recovered CO_2.
Step 4: Determine the total potential landfill gas CO_2e emission from the flare (step 1 + step 2 + Step 3)

Total rated heat input capacity of the flare:

Table 8: Flare Heat Inputs

Flare	Capacity
Enclosed Flare	1,200 CFM
Enclosed Flare*	**286,914.53 MMBtu/yr**
Heating content	454.9 Btu/scf
CH_4 Destruction Efficiency	99% (manufacturer DE for LFG Enclosed Flares
LFG CH_4 Concentration	50%
LFG CO_2 Concentration	43% (based on site data)

*Flare Capacity(cfm)× 60 min/hr × 8,760 hrs/yr × 454.9 btu/scf) ÷ 1,000,000
(1,200 cfm × 60 min/hr × 8,760 hrs/yr × 454.9 btu/scf) ÷ 1,000,000)

Emission Factors:

Table 9: GHG Factors

Pollutants	Natural Gas
CO_2	52.07 kg/MMBtu
N_2O	6.3×10^{-4} kg/MMBtu
CH_4	3.2×10^{-3} kg/MMBtu

Step 1: <u>Determine the combustion CO_2e emission based on the flare capacity.</u>

Emissions(ton/yr.) = Flare Capacity (MMBtu/yr.) × Emission Factor(kg/MMBtu) × 2.2 lb/kg ÷ 2,000 lbs/ton

CO_2 Emissions (tons/yr) = (286,915 MMBtu/yr.) × (52.07 kg/MMBtu) × (2.2 lb/kg) ÷ (2,000 ton/lb)

= **<u>16,433.63 tons/year</u>**

N_2O Emissions (tons/yr) = (286,915 MMBtu/yr) × (6.3×10^{-4} kg/MMBtu) × (2.2 lb/kg) ÷ (2,000 ton/lb)

= **<u>0.20 tons/yr</u>**

CH_4 Emissions (tons/yr): (286,915 MMBtu/yr) × (3.20×10^{-3} kg/MMBtu) × (2.2 lb/kg) ÷ (2,000 ton/lb)

= **<u>1.01 tons/year</u>**

Global Warming Potential (GWP) Factors (from Part 98, Subpart A, Table A-1):

CO_2 = 1
N_2O = 298
CH_4 = 25

Total GHG Mass Emissions for enclosed flare:

CO_2e = (16,433.63 × 1) + (0.20 × 298) + (1.01 × 25) = **16,518.48 tons/year of CO_2e**

The total potential landfill gas CO_2e emission = 16,518.48 tons

Step 2: Escape CH_4 = Collected methane that escapes destruction in flares

(1,200 ft^3/min) × (60 min/hr) × (8,760 hrs/yr) × (0.50) × (1-099) × (0.0423 lbs/ ft^3) ÷ 2,000 = **66.70 TPY**

CO_2e = 66.70 × 25 (GWP) = **1,667.50 tons/year of CO_2e**

Step 3: Determine the amount of CO_2 collected or recovered.

(1,200 ft^3/min) × (60 min/hr) × (8,760 hrs/yr) × (0.43) × (0.116 lbs/ ft^3) ÷ 2,000 = **15,693.58**

Step 4: The total potential landfill gas CO_2e emission from the flare.

16,518.48 tons + 1,667.50 + 15,693.58 = **33,879.14 tons/year of CO_2e**

See Appendix A, Table D

Emission Sources of Minor Significance

The following sources are insignificant, and there are no applicable requirements for these sources.

1. One 4,000-gallon aboveground diesel storage tank.
2. Two 300-gallons each aboveground hydraulic oil storage tanks.
3. One 275-gallon aboveground waste oil tanks; and
4. One 275-gallon aboveground motor oil storage tank
5. Two Leachate Storage Impoundments (1,750,000 & 1,000,000 gallons, respectively)

REGULATORY APPLICABILITY:

1. **Article XXI Requirements for Issuance:**
   See Permit Application No. 0190-OP24, Section 5. The requirements of Article XXI, Parts B and C for the issuance of operating permits have been met for this facility. Article XXI, Part D, Part E & Part H will have the necessary sections addressed individually.

2. **Testing Requirements:**
   The facility is required to test the enclosed ground flare for compliance with the established VOC destruction efficiency (i.e., 98% by weight). Such testing will be conducted once every five years according to approved U.S. EPA test methods and Section 2108.02 of Article XXI.

   The Department reserves the right to require additional testing, if necessary, in the future to assure compliance with the terms and conditions of this Title V Operating Permit.

3. New Source Performance Standards (NSPS):

a. *40 CFR PART 60, Subpart WWW – Standards of Performance for Municipal Solid Waste Landfills*

The facility is no longer subject to the New Source Performance Standard Subpart WWW.

On August 29, 2016, the EPA issued a new Emission Guidelines (EG) for existing Municipal Solid Waste (MSW) Landfills in 40 CFR Part 60, Subpart Cf. The revised EG is intended to replace requirements under New Source Performance Standard (NSPS) WWW once implemented through revised state plans or a federal plan.

An affected source must continue to comply with the older NSPS Subpart Cc or WWW requirements until it becomes subject to the more stringent requirements in an approved and effective state or federal plan that implements NSPS Subpart Cf. In March 2020, the US EPA issued a notice of finding of failure to submit state plans (85 FR 14474), identifying forty-two states and territories that failed to submit for review and approval plans to implement the 2016 EG for MSW Landfills.

Pursuant to 40 CFR 60.27a(c), the finding of failure to submit starts a two-year deadline clock for the EPA to promulgate a Federal Plan applicable to facilities in states that were part of the finding (i.e., by February 29, 2022). The EPA proposed a Federal Plan to implement the 2016 EG on August 22, 2019. The Federal Plan was finalized on May 21, 2021, effective on June 21, 2021.

All existing MSW landfills that commenced construction, modification, or reconstruction on or before July 17, 2014, will become subject to the new Federal Plan at 40 CFR 62, Subpart OOO starting May 21, 2021, unless they are already subject to an approved state plan implementing NSPS Cf.

All existing MSW landfills that commenced construction, modification, or reconstruction on or before July 17, 2014, will become subject to the new Federal Plan at 40 CFR 62, Subpart OOO starting May 21, 2021.

b. *40 CFR PART 60, Subpart Ka – Standards of Performance for Volatile Organic Liquid Storage Vessels for Petroleum Liquids*

The facility's storage tanks are not subject to the New Source Performance Standard (40 CFR 60, Subpart Ka) because diesel fuel oil does not meet the definition of petroleum liquids the storage capacities of all the tanks are less than the rule applicability threshold of 40,000 gallons. Below are the list and capacity of the facility's storage tanks:

Table 10: Storage Tanks

I.D.	Source Description	Maximum Capacity (gallon)	Turnover Per Year	Annual Throughput (gallon)	Fuel/Raw Material	Vapor Pressure psia	VOC (tpy)
T001	Fuel Oil Storage Tank	4,000	10	80,000	No. 2 (diesel) Fuel Oil	0.013	0.002
T002	Fuel Oil Storage Tank	300	16	10,000	Oil	9	NA
T003	Fuel Oil Storage Tank	300	NA	NA	Oil	NA	NA
T004	Fuel Oil Storage Tank	275	NA	NA	Waste (used) Oil	NA	NA
T005	Fuel Oil Storage Tank	275	NA	NA	Motor Oil	NA	NA

I.D.	Source Description	Maximum Capacity (gallon)	Turnover Per Year	Annual Throughput (gallon)	Fuel/Raw Material	Vapor Pressure psia	VOC (tpy)
T006	Leachate Impoundments	2,750,000 (Total)	NA	NA	Leachate	NA	0.028

c. *40 CFR PART 60, Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels*

The two leachate storage impoundment tanks with a total capacity of 2,750,000 (1,750,000 gallons & 1,000,000 gallons) gallons are not subject to the New Source Performance Standard (40 CFR 60, Subpart Kb), because leachate does not meet the definition of volatile organic liquid.

d. *40 CFR PART 60, Subpart OOO – Standards of Performance for Nonmetallic Mineral Processing Plants*

The portable overburden (soil/rock) screening operation and the material handling and storage activities at this source are not subject to the New Source Performance Standard (40 CFR Part 60, Subpart OOO) because these activities do not utilize crushers/grinders and are not considered as a nonmetallic mineral processing plant, as defined by §60.671.

4. Approval and Promulgation of State Plans for Designated Facilities and Pollutants:

40 CFR PART 62, Subpart OOO – Federal Requirements for Municipal Solid Waste Landfills that Commenced Construction on or before July 17, 2014, and Have Not Been Modified or Reconstructed Since July 17, 2014

The municipal solid waste landfill is subject to the requirements of this subpart because the landfill commenced construction before July 17, 2014, and has not been modified or reconstructed. The requirements have been incorporated into the operating permit, and the following sections of Subpart OOO do not apply:

- **40 CFR §62.16716** was not included because the facility chose to comply with the operational standards in §63.1958, instead of this as suggested by this standard.
- **40 CFR §62.16720** was not included because the facility chose to comply with the compliance provision of 40 CFR §63.1960.
- **40 CFR §62.16722** was not included because the facility chose to comply with the monitoring provision of §63.1961.
- **40 CFR §62.16714(h)(1,2,5 through 7)** were not included because it references 40 CFR §62.16716, §62.16720 and §62.16722 and the facility has decided to comply with 40 CFR §63.1958 (operational standards for collection and control systems); §63.1960 (Compliance provisions) and §63.1961 (Monitoring of operations) instead.
- **40 CFR §62.16724(l)** was not applicable to the facility because it deals with facility that employed leachate recirculation or added liquids based on a Research, Development, and Demonstration permit.
- **40 CFR §62.16726(c)** was not applicable because it references 40 CFR §62.16722 (monitoring), and the facility decided to comply with the monitoring provision of §63.1961 as referenced above.
- **40 CFR §62.16726(j)** was included because it does not apply to the facility. It requires the facility to keep records of leachate recirculation or added liquids.
- **40 CFR §62.16726(h)** was not included because it references §62.16722, which is not applicable to the facility.

5. NESHAP and MACT Standards:

40 CFR PART 63, Subpart AAAA – Standards of Hazardous Air Pollutants for Municipal Solid Waste Landfills

Pursuant to §63.1930(b), all landfills described in §63.1935 must meet the requirements of subpart AAAA. A landfill may choose to meet the requirements of this subpart rather than the requirements identified in §63.1930(a) at any time before September 27, 2021. The requirements of this subpart apply at all times, including during periods of SSM, and the SSM requirements of the General Provisions of this part do not apply. The requirements have been incorporated into the operating permit, and the following sections of Subpart AAAA do not apply:

- **40 CFR §63.1955(b)** was not included because it does not apply to the facility. It deals with facilities that own or operate a bioreactor.
- **40 CFR §63.1964(a)** was not included because it does not apply to the facility. It requires facilities to develop and implement an SSM plan before September 28, 2021, and the plan is no longer applicable after September 28, 2021.
- **40 CFR §63.1982** is not applicable to the facility because the facility does not operate a bioreactor or liquid addition.

6. **Emission Inventory:**
This facility is required to provide annual Emission Inventory reports per §2108.01.e of Article XXI because this facility has the potential to emit more than 25 tpy of PM and CO.

7. **Risk Management Plan; CAA Section 112(r):**
The facility is not required to have a risk management plan at this time because none of the regulated chemicals exceed the thresholds in the regulation.

8. **Greenhouse Gas Reporting (40 CFR Part 98):**
The facility is subject to the mandatory greenhouse gas (GHG) reporting requirements because it has the potential to emit 25,000 metric tons or more of carbon dioxide equivalent (CO_2e). Pursuant to 40 CFR §98.2.a.2, the facility shall submit reports to the US EPA in accordance with 40 CFR Part 98.

9. **Compliance Assurance Monitoring (40 CFR Part 64):**
The Compliance Assurance Monitoring (CAM) rule found in 40 CFR 64 is not applicable to the facility pursuant to §64.2(b)(1), which states "emission limitations or standards proposed by the administrator after November 15, 1990, pursuant to section 111 or 112 of the Act". Section 112, NESHAP (MACT) Subpart AAAA, promulgated on January 16, 2003, is applicable to the facility. In addition, the landfill has uncontrolled potential to emit (PTE) of regulated pollutants less than 100 tons per year.

10. Environmental Justice:
The area of Forward Township/Elizabeth, PA where the facility is located is considered an environmental justice (EJ) area, defined by the Pennsylvania DEP as "any census tract where 20 percent or more individuals live at or below the federal poverty line, and/or 30 percent or more of the population identifies as a non-white minority, based on data from the U.S. Census Bureau and the federal guidelines for poverty". Because this is an existing facility, alternative site location is not feasible. The operating permit contains all testing, monitoring, recordkeeping, and reporting requirements (as required under §70.6(a)(3)).

EMISSIONS SUMMARY:

Table 11: Emissions Summary for Kelly Run Landfill

Pollutant	Total (tpy*)
Particulate Matter	35.32
Particulate Matter <10 µm (PM_{10})	13.51
Particulate Matter <2.5 µm ($PM_{2.5}$)	7.07
Nitrogen Oxides (NO_X)	13.43
Sulfur Oxides (SO_X)	2.69
Carbon Monoxide (CO)	31.72
Volatile Organic Compounds (VOC)	6.54**
Non-Methane Organic Compound (NMOC)	16.61
Hazardous Air Pollutants (HAP)	5.39
Greenhouse Gases (CO_2e)	96,756.73

*A year is defined as any consecutive twelve-month period.

RECOMMENDATION:

All applicable Federal, State, and County regulations have been addressed in the permit application. The Renewal Title V Operating Permit for the Kelly Run Landfill should be approved with the emission limitations, terms and conditions in Permit No. 0190-OP24.

APPENDIX A

Table A
ESTIMATE OF LANDFILL FUGITIVE EMISSIONS - HAPs

KELLY RUN SANITATION, INC.

SUMMARY OF NMOC/VOC EMISSIONS

Waste Placement Year	Gas Collection Percentage	Methane Generation Rate (m3/yr)	Methane Generation Rate (cfm)	LFG Generation Rate (m3/yr)	LFG Generation Rate (cfm)	LFG to Collection System (cfm)	Fugitive LFG (cfm)	Fugitive LFG (m3/yr)	Fugitive NMOC (tons)	Fugitive VOC (tons)
2014	75%	7,657,185	514.46	15,314,370	1,028.92	771.69	257.23	3,828,593	9.00	3.51
2015	75%	7,596,983	510.42	15,193,966	1,020.83	765.63	255.21	3,798,491	8.93	3.48
2016	75%	8,179,128	549.53	16,358,255	1,099.06	824.29	274.76	4,089,564	9.62	3.75
2017	75%	8,731,950	586.67	17,463,900	1,173.34	880.01	293.34	4,365,975	10.27	4.00
2018	75%	9,049,723	608.02	18,099,447	1,216.04	912.03	304.01	4,524,862	10.64	4.15
2019	75%	9,373,460	629.77	18,746,921	1,259.55	944.66	314.89	4,686,730	11.02	4.30
2020	75%	9,616,601	646.11	19,233,203	1,292.22	969.16	323.05	4,808,301	11.31	4.41
2021	75%	9,818,426	659.67	19,636,852	1,319.34	989.50	329.83	4,909,213	11.54	4.50
2022	75%	9,991,882	671.32	19,983,764	1,342.65	1,006.98	335.66	4,995,941	11.75	4.58
2023	75%	10,480,121	704.13	20,960,243	1,408.25	1,056.19	352.06	5,240,061	12.32	4.80
2024	75%	10,949,217	735.64	21,898,433	1,471.29	1,103.46	367.82	5,474,608	12.87	5.02
2025	75%	11,399,918	765.92	22,799,837	1,531.85	1,148.89	382.96	5,699,959	13.40	5.23
2026	75%	11,832,948	795.02	23,665,896	1,590.04	1,192.53	397.51	5,916,474	13.91	5.43
2027	75%	12,248,998	822.97	24,497,996	1,645.94	1,234.46	411.49	6,124,499	14.40	5.62
2028	75%	12,648,735	849.83	25,297,469	1,699.66	1,274.74	424.91	6,324,367	14.87	5.80
2029	75%	13,032,797	875.63	26,065,595	1,751.26	1,313.45	437.82	6,516,399	15.32	5.98
2030	75%	13,401,801	900.42	26,803,602	1,800.85	1,350.64	450.21	6,700,900	15.76	6.14
2031	75%	12,876,309	865.12	25,752,617	1,730.24	1,297.68	432.56	6,438,154	15.14	5.90
2032	75%	12,371,421	831.20	24,742,843	1,662.39	1,246.79	415.60	6,185,711	14.54	5.67
2033	75%	11,886,331	798.60	23,772,662	1,597.21	1,197.91	399.30	5,943,166	13.97	5.45
2034	75%	11,420,261	767.29	22,840,523	1,534.58	1,150.94	383.65	5,710,131	13.43	5.24
2035	75%	10,972,467	737.20	21,944,933	1,474.41	1,105.81	368.60	5,486,233	12.90	5.03
2036	75%	10,542,230	708.30	21,084,460	1,416.60	1,062.45	354.15	5,271,115	12.39	4.83
2037	75%	10,128,863	680.53	20,257,726	1,361.05	1,020.79	340.26	5,064,432	11.91	4.64
2038	75%	9,731,705	653.84	19,463,410	1,307.68	980.76	326.92	4,865,852	11.44	4.46
2039	75%	9,350,119	628.20	18,700,238	1,256.41	942.31	314.10	4,675,060	10.99	4.29
2040	75%	8,983,496	603.57	17,966,992	1,207.14	905.36	301.79	4,491,748	10.56	4.12
2041	75%	8,631,248	579.91	17,262,496	1,159.81	869.86	289.95	4,315,624	10.15	3.96
2042	75%	8,292,812	557.17	16,585,624	1,114.33	835.75	278.58	4,146,406	9.75	3.80
2043	75%	7,967,646	535.32	15,935,292	1,070.64	802.98	267.66	3,983,823	9.37	3.65
2044	75%	7,655,230	514.33	15,310,460	1,028.66	771.50	257.17	3,827,615	9.00	3.51
2045	75%	7,355,064	494.16	14,710,129	988.33	741.24	247.08	3,677,532	8.65	3.37
2046	75%	7,066,668	474.79	14,133,336	949.57	712.18	237.39	3,533,334	8.31	3.24
2047	75%	6,789,580	456.17	13,579,160	912.34	684.26	228.09	3,394,790	7.98	3.11
2048	75%	6,523,357	438.28	13,046,714	876.57	657.43	219.14	3,261,678	7.67	2.99
2049	75%	6,267,572	421.10	12,535,145	842.20	631.65	210.55	3,133,786	7.37	2.87
2050	75%	6,021,817	404.59	12,043,635	809.17	606.88	202.29	3,010,909	7.08	2.76
Notes:						**Max Emissions Calculated from LANDGEM**			**15.76**	**6.14**

1. Methane Generation Rate (m3/yr) and LFG Generation Rate (m3/yr) from LANDGEM results.
2. Methane Generation Rate (cfm) = Methane Generation Rate (m3/yr) × (3.2808 ft/m) ^3 × (yr/ 8760 hr) × (hr/ 60 min)
3. LFG Generation Rate (cfm) = LFG Generation Rate (m3/yr) × $(3.2808\ ft/m)^3$ × (yr/ 8760 hr) × (hr / 60 min)
4. FG to Collection System (cfm) = LFG Generation Rate (cfm) × 75%
5. Fugitive LFG (cfm) = LFG Generation Rate (cfm) - LFG to Collection System (cfm)
6. Fugitive LFG (m3/yr) = Fugitive LFG (cfm) × $(m/3.2808\ ft)^3$ × (60 min / hr) (8760 hr/yr)
7. Fugitive NMOC (tons) = Fugitive LFG (m3/yr) × 595 ppm × 86.18 MW / 24.45 MW x 2.2046 x10-6 pounds per mg / 2000 pounds per ton
8. Fugitive VOCs (tons) = Fugitive NMOC Emissions (tons/yr) x 39% (as per AP-42)

Table B
ESTIMATE OF LANDFILL FUGITIVE EMISSIONS – HAPs
KELLY RUN SANITATION, INC.
ESTIMATE OF LANDFILL FUGITIVE EMISSIONS - HAPs

Standard Temperature	520	°R
Maximum LFG Generation Rate[a]	450	cfm
Operating Hours	8,760	hrs

LFG Compound	HAP	CAS	MW (lb/lb-mol)	Compound Conc & Mass in Inlet Gas (ppmv)b	(lb/hr)	(tpy)
1,1,1 - Trichloroethane (methyl chloroform)	x	71-55-6	133.41	0.48	4.56E-03	2.00E-02
1,1,2,2 - Tetrachloroethane	x	79-34-5	167.85	1.11	1.33E-02	5.81E-02
1,1 - Dichloroethane (ethylidene dichloride)	x	75-34-3	98.96	2.35	1.65E-02	7.25E-02
1,1 - Dichloroethene (vinylidene chloride)	x	75-35-4	96.94	0.20	1.39E-03	6.07E-03
1,2 - Dichloroethane (ethylene dichloride)	x	107-06-2	98.96	0.41	2.87E-03	1.26E-02
1,2 - Dichloropropane (propylene dichloride)	x	78-87-5	112.99	0.18	1.45E-03	6.34E-03
2-Propanol (isopropyl alcohol)	--	67-63-0	60.11	50.1	2.14E-01	9.38E-01
Acetone (2-propanone)	--	67-64-1	58.08	7.01	2.90E-02	1.27E-01
Acrylonitrile (Propenenitrile)	x	107-13-1	53.06	6.33	2.39E-02	1.05E-01
Benzene	x	71-43-2	78.12	1.91	1.06E-02	4.65E-02
Bromodichloromethane	--	75-27-4	163.83	3.13	3.65E-02	1.60E-01
Butane	--	106-97-8	58.12	5.03	2.08E-02	9.11E-02
Carbon Disulfide	x	75-15-0	76.14	0.58	3.16E-03	1.38E-02
Carbon Tetrachloride	x	56-23-5	153.84	0.004	4.38E-05	1.92E-04
Carbonyl Sulfide	x	463-58-1	60.07	0.49	2.09E-03	9.17E-03
Chlorobenzene (monochlorobenzene)	x	108-90-7	112.56	0.25	2.03E-03	8.91E-03
Chlorodifluoromethane (CFC-22, freon-22)	--	75-45-6	86.47	1.30	8.00E-03	3.50E-02
Chloroethane (ethyl chloride)	x	75-00-3	64.52	1.25	5.74E-03	2.51E-02
Chloroform (trichloromethane)	x	67-66-3	119.38	0.03	2.55E-04	1.12E-03
Chloromethane (methyl chloride)	x	74-87-3	50.49	1.21	4.35E-03	1.90E-02
1,4 Dichlorobenzene (p-dichlorobenzene)	x	106-46-7	147	0.21	2.23E-03	9.76E-03
Dichlorodifluoromethane (CFC-12, freon-12)	--	75-71-8	120.91	15.7	1.35E-01	5.92E-01
Dichlorofluoromethane (freon-21)	--	75-43-4	102.92	2.62	1.92E-02	8.40E-02
Dichloromethane (methylene chloride)	x	75-09-2	84.93	14.3	8.64E-02	3.78E-01
Dimethyl Sulfide (methyl sulfide)	--	75-18-3	62.13	7.82	3.46E-02	1.51E-01
Ethane	--	74-84-0	30.07	889	1.90E+00	8.33E+00
Ethanol (ethyl alcohol)	--	64-17-5	46.08	27.2	8.92E-02	3.91E-01
Ethylbenzene[g]	x	100-41-4	106.17	4.61	3.48E-02	1.53E-01
Ethyl Mercaptan (ethanethiol)	--	75-08-1	62.13	2.28	1.01E-02	4.41E-02
Ethylene dibromide (1,2 dibromoethane)	x	106-93-4	187.88	0.001	1.34E-05	5.85E-05
Fluorotrichloromethane (CFC-11, freon-11)	--	75-69-4	137.37	0.76	7.43E-03	3.25E-02
Hexane	x	110-54-3	86.18	6.57	4.03E-02	1.76E-01
Hydrogen Sulfide	--	7783-06-4	34.08	35.5	8.61E-02	3.77E-01
Mercury (total)	x	7439-97-6	200.61	2.92E-04	4.17E-06	1.83E-05
Methyl Ethyl Ketone (2-butanone)	x	78-93-3	72.11	7.09	3.64E-02	1.59E-01
Methyl Isobutyl Ketone (hexone)	x	108-10-1	100.16	1.87	1.33E-02	5.84E-02
Methyl Mercaptan	--	74-93-1	48.11	2.49	8.52E-03	3.73E-02
Pentane	--	109-66-0	72.15	3.29	1.69E-02	7.40E-02
Tetrachloroethylene (perchloroethylene, -ethene)	x	127-18-4	165.83	3.73	4.40E-02	1.93E-01
Propane	--	74-98-6	44.1	11.1	3.48E-02	1.53E-01
Toluene	x	108-88-3	92.14	39.3	2.58E-01	1.13E+00
Trichloroethylene (trichloroethene)	x	79-01-6	131.38	2.82	2.64E-02	1.15E-01
t - 1,2 - Dichloroethene (1,2 dichloroethylene)	--	156-60-5	96.94	2.84	1.96E-02	8.58E-02
Vinyl Chloride (chloroethylene, VCM)	x	75-01-4	62.50	7.34	3.26E-02	1.43E-01
Xylenes (m, o, p)	x	1330-20-7	106.17	12.1	9.14E-02	4.00E-01
Maximum Single HAP					**0.26**	**1.13**
Total HAP					**0.76**	**3.32**

NOTE:

[a]The maximum LFG Fugitive (cfm) calculated from LANDGEM in Table 1B is greater than the estimate based on the flare capacity. LFG Fugitive (cfm) = Flare Capacity (cfm) / 75% - Flare Capacity (cfm).

[b]U.S. E.P.A., Compilation of Air Pollutant Emission Factors, Volume I. Stationary Point and Area Sources ("AP-42"), 5th Ed., November 1998.Tables 2.4-1, 2.4-2, 2.4-3.

[c]Product of combustion

Note: "x" denotes a HAP only or a HAP and VOC

Table C
FLARE SYSTEM AND FUGITIVE LANDFILL GAS EMISSIONS

ESTIMATE OF FLARE SYSTEM EMISSIONS AND FUGITIVE LANDFILL GAS EMISSIONS

Flare Type	Operating Conditions			Estimated Potential Flare Emissions (TPY)					
	CFM	MMSCF	Hours	PM/PM10/PM2.5	NMOC	CO	NOx	SO2	VOC
Enclosed Flare	1,200	630.72	8760	2.47	0.85	31.54	12.61	2.64	0.33
	Total Emissions (ton/yr)			2.47	0.85	31.54	12.61	2.64	0.33
	Total Emissions (lb/hr)			0.56	0.19	7.20	2.88	0.60	0.08

	Flare Emission Factors				
	PM/PM10/PM2.5	NMOC	CO	NOx	SO2
	lb/MMSCF	lb/hr	lb/MMSCF	lb/MMSCF	lb/hr
Parnell Enclosed	8.50	0.19	36.39	90.98	0.95

Emission Factor Development

1,200 CFM Enclosed Flare

CO:	36.392	lb/MMscf
NOx:	90.98	lb/MMscf

LFG Data

NMOC:	595	ppm
TRS:	78	ppm
CH4:	50%	

Notes:

PM-10	Based on 17 lb per 106 dscf methane combusted per AP-42, Section 2.4 (11/98)
NMOC	Based on AP-42, Table 2.4-2 (595 ppmv), 86.16 lb/lb-mol Hexane and 98% destruction efficiency
CO	Based on typical value provided by LFG Specialty Inc. (0.08 lb/MMBtu)
NOx	Based on typical value provided by LFG Specialty Inc. (0.20 lb/MMBtu)
SO2	46.9 ppm TRS concentration and 0% destruction efficiency per AP-42, Section 2.4 (11/98)
VOC	39% of NMOC per AP-42, Section 2.4 (11/98)
Heating value	454.9 BTU/scf
DE (of NMOC)	98%

NOTE:
PM-10 = Based on 17 lb per 106 dscf methane combusted per AP-42, Section 2.4 (11/98)
NMOC = Based on AP-42, Table 2.4-2 (595 ppmv), 86.16 lb/lb-mol Hexane and 98% destruction efficiency
CO = Based on typical value provided by LFG Specialty Inc. (0.08 lb/MMBtu)
NOX = Based on typical value provided by LFG Specialty Inc. (0.20 lb/MMBtu)
SO2 = 46.9 ppm TRS concentration and 0% destruction efficiency per AP-42, Section 2.4 (11/98)
VOC = 39% of NMOC per AP-42, Section 2.4 (11/98)
Heating value = 454.9 (909.8*0.5) Btu/scf
DE (of NMOC) = 98%

Table D
GREENHOUSE GAS EMISSIONS FROM FLARE AND FUGITIVES

Flare Type	Operating Conditions		Estimated Potential Flare Emissions (TPY)						
	CFM	Hours	Combustion CO2	Combustion CH4	Combustion N2O	Escape CH4	Collected CO2	Biogenic CO2	Anthropogenic CO2
Enclosed Flare	1,200	8760	16,433.60	1.01	0.20	66.70	15,693.58	32,127.18	1751.97
	Total Emissions (TPY)		16,433.60	1.01	0.20	66.70	15,693.58	32,127.18	1752.0
	Total Emissions (tons CO2e)		16,433.60	25.25	59.25	1,667.47	15,693.58	32,127.18	1752.0
	Total Emissions (tons CO2e)		33,879.14						

	Combustion Emission Factors		
	CO2	CH4	N2O
	kg/MMBtu	kg/MMBtu	kg/MMBtu
Parnell Enclosed	52.07	3.20E-03	6.30E-04
GWP	1	25	298

		Heating value	454.9	BTU/scf (adjusted for methane)
Notes:		CH4 Destruction Efficiency	99%	% (manufacturer guarantee DE for LFG Enclosed Flares
Combustion CO2	Emission factor referenced from Table C-1 of 40 CFR Part 98, Subpart C	LFG CH4 Concentration	50%	%
Combustion CH4	Emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C	LFG CO2 Concentration	43%	% Site data
Combustion N2O	Emission factor referenced from Table C-2 of 40 CFR Part 98, Subpart C	CH4 Density	0.0423	pound per cubic foot
Escape CH4	Collected methane that escapes destruction in flares	CO2 Density	0.116	pound per cubic foot
Collected CO2	Portion of LFG that already contains CO2	Collection Efficiency	75%	%
Biogenic CO2	Combustion CO2 + Collected CO2			
Anthropogenic CO2	Combustion CH4 + Combustion N2O + Escape CH4, expressed as CO2equivalents			
Total GHG	Total emissions expressed in tons of CO2 equivalents			

Fugitive GHG Emissions

Fugitive LFG (ft3/yr)	Fugitive CH4 (tpy)	Oxidized CO2 (tpy)	Fugitive Biogenic CO2 (tpy)	Fugitive Anthropogenic GHG (tpy)	Total Fugitive GHG (tpy)
236,631,433	2,252.14	686.23	6,574.09	56,303.49	62,877.59

Fugitive CH4 Emissions (tpy) = [Fugitive LFG (ft3/yr)] * [% CH4] * [0.0423 lb/ft3 CH4] * [90% oxidation factor] / [2000 lb/ton]
Oxidized CO2 Emissions (tpy) = [Fugitive LFG (ft3/yr)] * [% CH4] * [0.116 lb/ft3 CH4] * [10% oxidation factor] / [2000 lb/ton]
Fugitive Biogenic CO2 Emissions (tpy) = [Fugitive LFG (ft3/yr)] * [% CO2] * [0.116 lb/ft3 CH4] / [2000 lb/ton] + Oxidized CO2 Emissions
Fugitive Anthropogenic GHG Emissions (tons CO2e) = [Fugitive CH4 Emissions] * 21

Table E
FLARE SYSTEM EMISSIONS - HAPs

Standard Temperature[a]	520	°R
LFG inlet flow	1,200	scfm
Operating Hours	8,760	hrs

LFG Compound	HAP	CAS	MW (lb/lb-mol)	Compound Conc & Mass in Inlet Gas (ppmv)[a]	Compound Conc & Mass in Inlet Gas (lb/hr)	Control Eff[a,b]	Flare Exhaust lb/hr	Flare Exhaust ton/yr
1,1,1 - Trichloroethane (methyl chloroform)	x	71-55-6	133.41	0.48	1.21E-02	91.0%	1.09E-03	4.79E-03
1,1,2,2 - Tetrachloroethane	x	79-34-5	167.85	1.11	3.53E-02	91.0%	3.18E-03	1.39E-02
1,1,2 - Trichloroethane (1,1,2 TCA)	x	79-00-5	133.41	0.10	2.53E-03	91.0%	2.28E-04	9.97E-04
1,1 - Dichloroethane (ethylidene dichloride)	x	75-34-3	98.96	2.35	4.41E-02	91.0%	3.97E-03	1.74E-02
1,1 - Dichloroethene (vinylidene chloride)	x	75-35-4	96.94	0.20	3.69E-03	91.0%	3.33E-04	1.46E-03
1,2 - Dichloroethane (ethylene dichloride)	x	107-06-2	98.96	0.41	7.64E-03	91.0%	6.87E-04	3.01E-03
1,2 - Dichloropropane (propylene dichloride)	x	78-87-5	112.99	0.18	3.86E-03	91.0%	3.47E-04	1.52E-03
2-Propanol (isopropyl alcohol)	--	67-63-0	60.11	50.1	5.71E-01	91.0%	5.14E-02	2.25E-01
Acetone (2-propanone)	--	67-64-1	58.08	7.01	7.72E-02	91.0%	6.95E-03	3.04E-02
Acrylonitrile (Propenenitrile)	x	107-13-1	53.06	6.33	6.37E-02	91.0%	5.73E-03	2.51E-02
Benzene	x	71-43-2	78.12	1.91	2.83E-02	91.0%	2.55E-03	1.12E-02
Bromodichloromethane	--	75-27-4	163.83	3.13	9.72E-02	91.0%	8.75E-03	3.83E-02
Butane	--	106-97-8	58.12	5.03	5.54E-02	91.0%	4.99E-03	2.19E-02
Carbon Disulfide	x	75-15-0	76.14	0.58	8.42E-03	91.0%	7.58E-04	3.32E-03
Carbon Tetrachloride	x	56-23-5	153.84	0.004	1.17E-04	91.0%	1.05E-05	4.60E-05
Carbonyl Sulfide	x	463-58-1	60.07	0.49	5.58E-03	91.0%	5.02E-04	2.20E-03
Chlorobenzene (monochlorobenzene)	x	108-90-7	112.56	0.25	5.42E-03	91.0%	4.88E-04	2.14E-03
Chlorodifluoromethane (CFC-22, freon-22)	--	75-45-6	86.47	1.30	2.13E-02	91.0%	1.92E-03	8.40E-03
Chloroethane (ethyl chloride)	x	75-00-3	64.52	1.25	1.53E-02	91.0%	1.38E-03	6.03E-03
Chloroform (trichloromethane)	x	67-66-3	119.38	0.03	6.79E-04	91.0%	6.11E-05	2.68E-04
Chloromethane (methyl chloride)	x	74-87-3	50.49	1.21	1.16E-02	91.0%	1.04E-03	4.57E-03
1,4 Dichlorobenzene (p-dichlorobenzene)	x	106-46-7	147	0.21	5.94E-03	91.0%	5.34E-04	2.34E-03
Dichlorodifluoromethane (CFC-12, freon-12)	--	75-71-8	120.91	15.7	3.60E-01	91.0%	3.24E-02	1.42E-01
Dichlorofluoromethane (freon-21)	--	75-43-4	102.92	2.62	5.11E-02	91.0%	4.60E-03	2.02E-02
Dichloromethane (methylene chloride)	x	75-09-2	84.93	14.3	2.30E-01	91.0%	2.07E-02	9.08E-02
Dimethyl Sulfide (methyl sulfide)	--	75-18-3	62.13	7.82	9.21E-02	91.0%	8.29E-03	3.63E-02
Ethane	--	74-84-0	30.07	889	5.07E+00	91.0%	4.56E-01	2.00E+00
Ethanol (ethyl alcohol)	--	64-17-5	46.08	27.2	2.38E-01	91.0%	2.14E-02	9.37E-02
Ethylbenzene[g]	x	100-41-4	106.17	4.61	9.28E-02	91.0%	8.35E-03	3.66E-02
Ethyl Mercaptan (ethanethiol)	--	75-08-1	62.13	1.25	1.47E-02	91.0%	1.33E-03	5.81E-03
Ethylene dibromide (1,2 dibromoethane)	x	106-93-4	187.88	0.001	3.56E-05	91.0%	3.21E-06	1.40E-05
Fluorotrichloromethane (CFC-11, freon-11)	--	75-69-4	137.37	0.76	1.98E-02	91.0%	1.78E-03	7.80E-03
Hexane	x	110-54-3	86.18	6.57	1.07E-01	91.0%	9.66E-03	4.23E-02
Hydrogen Sulfide	--	7783-06-4	34.08	35.5	2.29E-01	91.0%	2.06E-02	9.04E-02
Mercury (total)	x	7439-97-6	200.61	2.92E-04	1.11E-05	0.0%	1.11E-05	4.87E-05
Methyl Ethyl Ketone (2-butanone)	x	78-93-3	72.11	7.09	9.69E-02	91.0%	8.73E-03	3.82E-02
Methyl Isobutyl Ketone (hexone)	x	108-10-1	100.16	1.87	3.55E-02	91.0%	3.20E-03	1.40E-02
Methyl Mercaptan	--	74-93-1	48.11	2.49	2.27E-02	91.0%	2.04E-03	8.95E-03
Pentane	--	109-66-0	72.15	3.29	4.50E-02	91.0%	4.05E-03	1.77E-02
Tetrachloroethylene (perchloroethylene, -ethen	x	127-18-4	165.83	3.73	1.17E-01	91.0%	1.06E-02	4.62E-02
Propane	--	74-98-6	44.1	11.1	9.28E-02	91.0%	8.35E-03	3.66E-02
Toluene (methylbenzene)	x	108-88-3	92.14	39.3	6.87E-01	91.0%	6.18E-02	2.71E-01
Trichloroethylene (trichloroethene)	x	79-01-6	131.38	2.82	7.03E-02	91.0%	6.32E-03	2.77E-02
t - 1,2 - Dichloroethene (1,2 dichloroethylene)	--	156-60-5	96.94	2.84	5.22E-02	91.0%	4.70E-03	2.06E-02
Vinyl Chloride (chloroethylene, VCM)	x	75-01-4	62.50	7.34	8.70E-02	91.0%	7.83E-03	3.43E-02
Xylenes (m, o, p)	x	1330-20-7	106.17	12.1	2.44E-01	91.0%	2.19E-02	9.60E-02
Hydrogen Chloride[c,d]	x	7647-01-0	36.50	42.0	2.91E-01	0.0%	2.91E-01	1.27E+00
Maximum Single HAP							0.29	1.27
Total HAP							0.47	2.07

NOTE:

[a]U.S. E.P.A., Compilation of Air Pollutant Emission Factors, Volume I. Stationary Point and Area Sources ("AP-42"), 5th Ed., November 1998.Tables 2.4-1, 2.4-2, 2.4-3.

[b]AP-42 gives ranges for control efficiencies. Control efficiencies for halogenated species range from 91 to 99.7% and control. Control efficiencies for non-halogenated species range from 38 to 91%. For permitting purposes, the lower end of each range is used here.

[c]Product of combustion

[d]Because HCl is a production of combustion, a default outlet concentration is listed; AP-42, Section 2.4.4.

"x" denotes a HAP only or a HAP and VOC

Table F
EMISSIONS FROM LANDFILL MATERIAL HANDLING

Inputs:		
k (particle size multiplier for PM)	0.74	
k (particle size multiplier for PM-10)	0.35	
k (particle size multiplier for PM-2.5)	0.053	
U (mean wind speed)	9.1	meters / second
M (material moisture content)	10	%
s (material silt content)	6.4	
CE (control efficiency)	90	%

Source	Activity	Emission Factor				Throughput/Area		Emissions (lb/hr)			Emissions (ton/yr)		
		PM	PM10	PM2.5	Units	Amount	Units	PM	PM10	PM2.5	PM	PM10	PM2.5
F001-1	Soil Screening[1]	2.20E-03	7.40E-04	5.00E-05	lb/tons	177,175	tons	0.04	0.01	0.00	0.19	0.07	0.00
F001-2	Overburden Blasting[2]	14.00	7.28	7.28	lb/blast	20	blasts/yr	0.03	0.02	0.02	0.14	0.07	0.07
F001-3	Borrow Material (Soil) Handling and Storage[3]	5.42E-04	2.56E-04	3.88E-05	lb/tons	500,000	tons	0.03	0.01	0.00	0.14	0.06	0.01
F001-3	Cover Soil Removing (Soil Construction)[4,7]	3.70E-02	3.70E-02	3.70E-02	lb/tons	500,000	tons	0.21	0.21	0.21	0.93	0.93	0.93
F001-3	Cover Soil Loading (Soil Loading Construction)[4,7]	3.70E-02	3.70E-02	3.70E-02	lb/tons	500,000	tons	0.21	0.21	0.21	0.93	0.93	0.93
F001-3	Cover Soil Unloading (Soil Unloading Construction)[4,7]	2.00E-04	2.00E-04	2.00E-04	lb/tons	500,000	tons	0.00	0.00	0.00	0.01	0.01	0.01
F001-3	Cover Soil Unloading (Surface Unloading Construction)[5]	4.00E-06	4.00E-06	4.00E-06	lb/tons	500,000	tons	0.00	0.00	0.00	0.00	0.00	0.00
F001-3	Cover Soil Placement (Soil Placement Construction)[6]	6.00E-03	6.00E-03	6.00E-03	lb/tons	500,000	tons	0.03	0.03	0.03	0.15	0.15	0.15
F001-3	Cover Soil Placement (Soil Placement Cover)[4,7]	4.40E-02	4.40E-02	4.40E-02	lb/tons	500,000	tons	0.25	0.25	0.25	1.10	1.10	1.10
	Total	--	--	--	--	--	--	**0.82**	**0.76**	**0.73**	**3.58**	**3.31**	**3.19**

NOTE:

1. Soil screening emission factors referenced from AP-42, Table 11.19.2-2. Maximum soil screening throughput amount determined from permit limit.
2. Overburden blasting emission factors referenced from AP-42, Table 11.9.1. Assumes twenty blasts a year (per 2009 permit application) for an area 10,000 square feet per blast (from permit limit). For consistency with AES, the PM2.5 emission factor is assumed to be equal to PM10.
3. Borrow material handling and storage emission factors referenced from AP-42, Section 13.2.1. Maximum material handling throughput estimated from 2009 permit application.
4. Cover soil removing (construction), cover soil loading, cover soil unloading (construction), and cover soil placement emission factors referenced from AP-42, Table 11.9.4. Maximum material handling throughput estimated from 2009 permit application.
5. Cover soil unloading (surface), and cover soil placement (for cover) referenced from 2014 annual emission statement. Maximum material handling throughput estimated from 2009 permit application.
6. Cover soil placement (construction) referenced from Airs, SCC 3-05-010-48, page 122. Maximum material handling throughput estimated from 2009 permit application.
7. Control efficiency of 90% applied for water spray referenced from annual emission statement.

Diesel Motor (for Soil Screening)

Inputs:	
Horse Power	53
MMBTU/hr	0.135
Hours of Operation	1000
Global Warming Potential (GWP)	
CO2	1
CH4	25
N2O	298
Reference: 40 CFR 98, Table A-1	

Source	Constituent	Emission Factor (lb / hp-hr)	PTE (lb/hr)	PTE (tpy)
F001-1	NO_x	0.031	1.64	0.82
	CO	6.68E-03	0.35	0.18
	SO_x	2.05E-03	0.11	0.05
	PM/PM-10/PM2.5	2.20E-03	0.12	0.06
	TOC			
	Exhaust	2.47E-03	0.13	0.07
	Evaporative	0.00E+00	0.00	0.00
	Crankcase	4.41E-05	0.00	0.00
	Refueling	0.00E+00	0.00	0.00
	Total TOC	-	0.13	0.07
	Greenhouse Gas Emissions			
		(lb/MMBTU)		
	CO2	164.0	22.12	11.06
	CH4	6.61E-03	0.00	0.00
	N2O	1.32E-03	0.00	0.00
	Total CO2e	-	**22.19**	**11.10**

References:

1. Engine details based on 2014 Air Emission Statement.
2. Hours of operation based on 2009 permit application.
3. Criteria and CO2 Emission Factors referenced from AP-42, Table 3.3-1
4. There are no emission factors for CH4 and N2O in AP-42. CH4 and N_2O Emission Factors referenced from 40 CFR 98, Table C-2

Table G
ESTIMATE OF WASTE HAULING OPERATIONS PM_{10} DUST GENERATION

KELLY RUN SANITATION, INC.

ESTIMATE OF WASTE HAULING OPERATIONS PM10 DUST GENERATION

Waste Vehicle Type	Average Vehicle Weight (ton)	Number Vehicle Per Year (1)	Unpaved Road Roundtrip (mile) (2)	Paved Road Roundtrip (mile) (2)	Unit PM Generation Unpaved Road E (lb/vmt) (3)	Unit PM Generation Paved Road E (lb/vmt) (3)	Uncontrolled PM Emissions Unpaved Road PM (ton/yr) (4)	Uncontrolled PM Emissions Paved Road PM (ton/yr) (4)	Controlled PM Emissions Unpaved Road PM (ton/yr) (4)	Controlled PM Emissions Paved Road PM (ton/yr) (4)
Tractor Trailor	29	71	2.40	1.20	8.76	2.11	0.75	0.09	0.07	0.01
Front-End Loader	29	331	2.40	1.20	8.76	2.11	3.48	0.42	0.35	0.04
Rear-End Loader	31	9,331	2.40	1.20	9.03	2.26	101.07	12.64	10.11	1.26
Roll-Off	28.5	8,914	2.40	1.20	8.69	2.07	92.96	11.08	9.30	1.11
Dump Trucks	25	6,126	2.40	1.20	8.19	1.81	60.23	6.66	6.02	0.67
Light Weight (Pickups, Autos, Other)	3.3	688	2.40	1.20	3.29	0.23	2.72	0.09	0.27	0.01
Sub-Total	28	25,461					261.22	30.98	26.12	3.10

Waste Vehicle Type	Vehicle Weight Unloaded (ton)	Number Vehicle Per Year (1)	Unpaved Road Length (mile) (2)	Paved Road Length (mile) (2)	Unit PM10 Generation Unpaved Road E (lb/vmt) (3)	Unit PM10 Generation Paved Road E (lb/vmt) (3)	Uncontrolled PM10 Emissions Unpaved Road PM10 (ton/yr) (4)	Uncontrolled PM10 Emissions Paved Road PM10 (ton/yr) (4)	Controlled PM10 Emissions Unpaved Road PM10 (ton/yr) (4)	Controlled PM10 Emissions Paved Road PM10 (ton/yr) (4)
Tractor Trailor	29	71	2.40	1.20	2.36	0.4218	0.202	0.0180	0.02	0.00
Front-End Loader	29	331	2.40	1.20	2.36	0.4218	0.940	0.0838	0.09	0.01
Rear-End Loader	31	9,331	2.40	1.20	2.44	0.4515	27.285	2.5276	2.73	0.25
Roll-Off	28.5	8,914	2.40	1.20	2.35	0.4143	25.096	2.2160	2.51	0.22
Dump Trucks	25	6,126	2.40	1.20	2.21	0.3625	16.261	1.3325	1.63	0.13
Light Weight (Pickups, Autos, Other)	3.3	688	2.40	1.20	0.89	0.0460	0.734	0.0190	0.07	0.00
Sub-Total	28	25,461					70.52	6.20	7.05	0.62

Waste Vehicle Type	Vehicle Weight Unloaded (ton)	Number Vehicle Per Year (1)	Unpaved Road Length (mile) (2)	Paved Road Length (mile) (2)	Unit PM2.5 Generation Unpaved Road E (lb/vmt) (3)	Unit PM2.5 Generation Paved Road E (lb/vmt) (3)	Uncontrolled PM2.5 Emissions Unpaved Road PM2.5 (ton/yr) (4)	Uncontrolled PM2.5 Emissions Paved Road PM2.5 (ton/yr) (4)	Controlled PM2.5 Emissions Unpaved Road PM2.5 (ton/yr) (4)	Controlled PM2.5 Emissions Paved Road PM2.5 (ton/yr) (4)
Tractor Trailor	29	71	2.40	1.20	0.24	0.10	0.02	0.00	0.00	0.00
Front-End Loader	29	331	2.40	1.20	0.24	0.10	0.09	0.02	0.01	0.00
Rear-End Loader	31	9,331	2.40	1.20	0.24	0.11	2.73	0.62	0.27	0.06
Roll-Off	28.5	8,914	2.40	1.20	0.23	0.10	2.51	0.54	0.25	0.05
Dump Trucks	25	6,126	2.40	1.20	0.22	0.09	1.63	0.33	0.16	0.03
Light Weight (Pickups, Autos, Other)	3.3	688	2.40	1.20	0.09	0.01	0.07	0.00	0.01	0.00
Sub-Total	28	25,461					7.05	1.52	0.71	0.15

Unpaved Road Emission Factor Equation

AP-42 Section 13.2.2

$E_{unpaved} = [k * (s/12)^a * (W/3)^b]$

Definition of Variables

E	Dust Generation, lb/vmt
k	Particle Size Multiplier
s	Mean Silt Content, %
W	Vehicle Weight, ton
P	Number of Days with precipitation greater than 0.01-inch
CE	Control Efficiency
a	constant
b	constant

Values Utilized

k	4.9	for PM (AP-42, Table 13.2.2-2)
k	1.5	for PM10 (AP-42, Table 13.2.2-2)
k	0.15	for PM10 (AP-42, Table 13.2.2-2)
s	6.4	(AP-42, Table 13.2.2-1)
W	Varies	(Different Vehicle Loaded and Unloaded Weights Used)
CE	90%	(From AP-42 Figure 13.2.2-2 for wetting)
a	0.7	for PM (AP-42, Table 13.2.2-2)
a	0.9	for PM10/PM2.5 (AP-42, Table 13.2.2-2)
b	0.45	(AP-42, Table 13.2.2-2)

Highlighted Cells Represent Inputs

Paved Road Emission Factor Equation

AP-42 Section 13.2.1

$E_{paved} = [k * (sL)^{0.91} * (W)^{1.02}] * [1-(P/4N)]$

Definition of Variables

E	Dust Generation, lb/vmt
k	Particle Size Multiplier
sL	Surface Silt Loading
W	Vehicle Weight, ton
P	Number of Days with precipitation greater than 0.01-inch
CE	Control Efficiency

Values Utilized

k	0.011	for PM (AP-42, Table 13.2.1-1)
k	0.0022	for PM10 (AP-42, Table 13.2.1-1)
k	0.00054	for PM2.5 (AP-42, Table 13.2.1-1)
sL	7.4	(AP-42, Section 13.2.1)
W	Varies	(Different Vehicle Loaded and Unloaded Weights Used)
CE	90%	(From AP-42 Figure 13.2.2-2 for wetting)

2014 Vehicles	No. of Vehicles
Tractor Trailor	57
Front-End Loader	265
Rear-End Loader	7,465
Roll-Off	7,131
Dump Trucks	4,901
Light Weight (Pickups, Autos, Other)	550
Total	**20,369**
Percent Increase	25% Assumption

A 25% increase from the 2014 vehicles was assumed to determine the number of vehicles for the PTE calculations.