

**ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM**

October 5, 2011

SUBJECT: Review of Application
Title V Renewal Operating Permit
Kelly Run Landfill
State Highway 51,
Forward Township, PA 15037

RE: Operating Permit File No. 0190
Municipal Waste Landfill

TO: Sandra L. Etzel
Chief Engineer

FROM: Hafeez Ajenifuja.
Air Quality Engineer

FACILITY DESCRIPTION:

Kelly Run Sanitation, Inc. operates Kelly Run Landfill, a municipal solid waste landfill, in Forward Township, Allegheny County, Pennsylvania. The landfill is approximately 400 acres in surface area and is composed of four units or cells and has an active landfill gas (LFG) collection system with one (1) enclosed ground flare to control the offgas emissions. Blasting of ground cover is also performed during landfill expansion, along with a portable overburden screening to produce cover soil for capping 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 New Source Performance Standards (NSPS) for Municipal Solid Waste Landfills, 40 CFR 60 Subpart WWW. The landfill has a capacity greater than or equal to 2.5 million megagrams. Kelly Run Landfill is a minor source of criteria pollutant emissions, and is also a minor source of HAP emissions, as defined at §2102.20 (Definitions) of Article XXI.

PROCESS DESCRIPTION:

This is a Title V renewal application for Kelly Run Landfill located in the City of Elizabeth, Allegheny County. The original operating permit was issued on May 4, 2005 and the facility's operations, processes and emissions are still the same as in the original operating permit.

The following changes were made during the Title V renewal:

- 1) The responsible official's title was changed; contact official's name was also changed.

- 2) The minimum operating temperature of the enclosed flare S001 was revised from 1600°F to 1500°F. Condition was also added to allow flare S001 to operate at the minimum operating temperature at which 98% destruction efficiency was demonstrated during the most recent stack test, whichever is greater.
- 3) Condition V.A.2.f was revised by adding the word “**during operation**” to the condition. It now reads “*The flare shall operate with a flame present at all times during operations*”

Kelly Run requested a modification to condition V.B.1.g, to allow the enclosed flare to meet either the 98% NMOC destruction efficiency or 20 ppm (hexane, on a dry basis at 3% oxygen) at the outlet. The Department declines the request because the 98% destruction efficiency was determined to be BACT.

EMISSION CALCULATION:

POTENTIAL EMISSION SUMMARY:

Facility Potential Emissions

Pollutant	MSW Landfill tons/yr ^{1,2}	Flare # 2 tons/yr ¹	Screening tons/yr ¹	Blasting tons/yr ¹	Unpaved & Paved Roads (tons/yr) ¹	Portable Combustion tons/yr ¹	Leachate Process tons/yr ¹	Total tons/yr ¹
PM	36.8	2.47	3.45	5.0	157.96 ³	0.35	0.0	206.03
PM10	36.8	2.47	1.33	5.0	51.89 ³	0.35	0.0	97.84
NOx	13.2	12.61	0.0	0.0	0.0	4.93	0.0	30.74
CO	43.9	31.54	0.0	0.0	0.0	5.18	0.0	80.62
SO ₂	0.01	2.64	0.0	0.0	0.0	0.32	0.0	2.97
VOC	31.5	0.33	0.0	0.0	0.0	2.29	0.1	34.22
HAPs	2.99 (single) 7.44 (total)	0.06 (single) 1.45 (total)	0.0	0.0	0.0	Negl.	Negl.	3.11 (single) 10.35 (total)

1. A year is defined as any consecutive 12-month period.
2. Reflects total landfill emissions, including Flare # 2 and screening/blasting whose emissions are also listed individually. As such, total emissions column does not include (i.e., double-count) Flare # 2 and screening/blasting emissions for all pollutants, except HAPs.
3. PM and PM 10 emissions from unpaved and paved roads are fugitive emissions.

RENEWAL OPERATING APPLICATION COMPONENTS:

1. Renewal Permit Application No. 0190 was received on November 2, 2009.

METHOD OF COMPLIANCE DETERMINATION:

Compliance with the landfill offgas capture efficiency limitation, control device destruction efficiency, and other operational standards required for this landfill in accordance to 40 CFR 60, Subpart WWW will be demonstrated by complying with the monitoring requirements of §60.756, the reporting requirements of §60.757, and the record keeping requirements of §60.758. Compliance with the fugitive particulate emission limitations for the blasting, screening and soil handling activities will be demonstrated according to the work practice and fugitive dust control measures established in IP No. 0190-001, as incorporated herein.

REGULATORY APPLICABILITY

1. Article XXI Requirements for Issuance:

The requirements of Article XXI, Parts B and C for the issuance of this renewal 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:

In order to comply with §2105.06.a of Article XXI, Major Sources of NO_x and VOCs Reasonably Available Control Technology, the facility will test enclosed ground flare # 2 for compliance with the established VOC destruction efficiency (i.e., 98% by weight). Such testing will be conducted once every five (5) years according to approved U.S. EPA test methods and Section 2108.02 of Article XXI.

3. New Source Performance Standards (NSPS):

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

The municipal solid waste landfill is subject to the New Source Performance Standard Subpart WWW because the municipal solid waste landfill commenced construction, reconstruction or modification or began accepting waste on or after May 30, 1991. The applicable requirements have been incorporated into the permit.

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, Article XXI §2105.05, (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:

- One (1) 4,000 gallons above diesel storage tank;
- One (1) 350 gallons above ground hydraulic oil storage tank;
- One (1) 350 gallons above ground new motor oil storage tank;
- One (1) 275 gallon above ground waste oil tanks; and
- One (1) 275 gallons above ground anti freeze tanks

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

The two (2) 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, Article XXI '2105.05, (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 conveying and storage facilities at this source are not subject to the New Source Performance Standard, Article XXI §2105.05, (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. **NESHAP and MACT Standards:**

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

Pursuant to §63.1935 and as stated in the renewal Title V application, page 12, the municipal solid waste landfill is subject to the National Emission Standards for Hazardous Air Pollutants for Municipal Solid Waste Landfills, 40 CFR 63, Subpart AAAA. This landfill, is an area source of HAP emissions, has a design capacity greater than 2.5 megagrams (Mg) and 2.5 million cubic meters (m³) and has uncontrolled emissions greater than 50 Mg NMOC as calculated pursuant to 40 CFR 60.754(a). As such, the permittee is required to comply with the applicable requirements for an existing affected source that is an area source. These requirements have been incorporated into section IV of the operating permit and primarily require the permittee to comply with all requirements of Subpart WWW. One additional requirement pursuant to Subpart AAAA is for the permittee to prepare and maintain a startup, shutdown and malfunction (SSM) plan, and such is incorporated into the permit.

5. **Compliance Assurance Monitoring:**

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 111, which is the NSPS Subpart WWW, is applicable to the facility since it is a landfill and it was promulgated on March 12, 1996, while Section 112 which is the NESHAP (MACT) Subpart AAAA is also applicable to the facility. Subpart AAAA referenced Subpart WWW and it was promulgated on January 16, 2003. The landfill also has uncontrolled potential to emit (PTE) of regulated pollutants at less than 100 tons per year.

6. **Reasonably Available Control Technology (RACT) (§2105.06):**

Section 2105.06 of Article XXI requires that RACT be applied to all major sources of VOC (and NO_x). This landfill was determined to be subject to this rule as a major source of VOC, since the existing plant offgas collection and control system was has the uncontrolled potential to emit of VOC exceeded 50 tons per year. Plan Approval Order and Agreement No. 236 issued on January 23, 1997, determined RACT to be thermal incineration (i.e., ground flaring), with the flare properly maintained and operated at a minimum destruction efficiency of 98% by weight, and an offgas collection system efficiency of 75%. Related testing, recordkeeping, reporting and monitoring was also required. This approval made the existing offgas collection and control system federally enforceable, with potential VOC emissions thereafter determined by taking the existing collection/control system into account.

The Phase III landfill expansion was approved as Installation Permit No. 0190-001 on February 6, 1997. This approval occurred after Plan Approval Order No. 236 took effect, and no conditions from the order apply to the Phase III expansion.

7. GREENHOUSE GASES:

Calculations of greenhouse gases are based on methodology found in 40 CFR Part 98, Subpart HH and EPA Climate Leaders Greenhouse Gas Inventory Protocol-Core Module Guidance, October 2004.

The 40 CFR Part 98, Subpart HH only addressed the reporting of methane (CH₄) emission even though CO₂ and CH₄ are made up of approximately equal amounts on a volumetric basis. According to the October 2004, EPA Climate Leaders Greenhouse Gas Inventory Protocol-Core Module Guidance, methane accounts for the majority of the GHG emissions from landfills. It was assumed that waste decomposition does not contribute to the net addition of CO₂ to the atmosphere, and this is consistent with intergovernmental panel on climate change (IPCC) guidance. The EPA guidance believes that CO₂ is produced from combustion of CH₄ in captured LFG, and it is considered biomass CO₂, which does not contribute to CO₂-equivalent emissions. This is evident in Table A-1 to Subpart A of Part 98, that shows the global warming potential of CO₂ is 1, while that of CH₄ is 21.

The CH₄ emissions that contribute to CO₂-equivalent emissions is estimated using the equation HH-8 from 40 CFR Part 98, Subpart HH or equation from the EPA Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance, October 2004.

$$\text{CH}_4 \text{ Emissions} = \left[\frac{(\text{CH}_4 \text{ Collected} - \text{CH}_4 \text{ Collected}) \times (1 - \text{OF})}{\text{Collection}_{\text{eff}}} \right] + (\text{CH}_4 \text{ Collected} \times \text{Vent}) - \text{eq. 1}$$

Equation 1 above is from EPA Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance, October 2004

Where:

CH₄ Collected = CH₄ Collected by active gas collection system

Coll_{eff} = collection system efficiency

OF = oxidation fraction

Vent = fraction vented

$$\text{Emissions} = \left[\left(\frac{R}{\text{CE} \times f_{\text{Rec}}} - R \right) \times (1 - \text{OX}) + R \times (1 - (\text{DE} \times f_{\text{Dest}})) \right] \quad (\text{Eq. HH-8})$$

Where:

Emissions (CH₄) = Methane emissions from the landfill in the reporting year (metric tons CH₄).

R = Quantity of recovered CH₄ [from Equation HH-4 of this section in metric tons CH₄] or CH₄ collected for the reporting year.

CE = Collection efficiency estimated at landfill, taking into account system coverage, operation, and cover system materials from Table HH-3 of this subpart. If area by soil cover type information is not

available, use default value of 0.75 (CE4 in table HH-3 of this subpart) for all areas under active influence of the collection system.

f_{Rec} = Fraction of hours the recovery system was operating (annual operating hours/8760 hours per year).

OX = Oxidation fraction. Use the oxidation fractions default value of 0.1 (10%).

DE = Destruction efficiency, (lesser of manufacturer's specified destruction efficiency and 0.99). If the gas is transported off-site for destruction, use DE = 1.

f_{Dest} = Fraction of hours the destruction device was operating (device operating hours/8760 hours per year). If the gas is destroyed in a back-up flare (or similar device) or if the gas is transported off-site for destruction, use f_{Dest} = 1.

Step 1: Determine the landfill methane generation rate. This is determined using the LandGEM model based on First Order Decomposition Rate Equation below.

$$Q_{CH_4} = \sum_{i=1}^n \sum_{j=0.1}^1 kL_o \left(\frac{M_i}{10} \right) e^{-k_{i,j}}$$

From the model output result provided by Kelly Run Landfill, the highest landfill gas produced is 2045 cfm for the reporting year 2020. Kelly Run landfill assumes 50% methane.

Step 2: Determine the amount of methane collected or recovered.

The methane generation rate or methane collected in cubic meter per year (m^3/yr) =

(Landfill gas collected in ft^3/min)*(percent methane in the gas)*(conversion factor from ft^3 to m^3)

(2045 ft^3/min)*(0.50)*($m^3/35.31 ft^3$)

= **28.96 m^3/min** or

(28.96 m^3/min)*(60 min/hr)*(8760 hr/yr)

= **15.22 x 10⁶ m^3/yr**

Step 3: Determine the collection efficiency:

The collection efficiency is assumed to be 75% by volume from EPA AP-42, Section 2, page 2.4-6

Step 4: Determine the fraction of methane oxidized

The fraction oxidized is assumed to be 10% by volume, according to 40 CFR §98.343 and the October 2004 EPA- Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance

(Direct Emissions from Municipal Solid Waste Landfill)

Step 5: Determine the fraction of methane vented

The amount of methane vented is determined by using part of equation in the equation HH-8 above. [1-(DE x f_{Dest.})], Where DE = Destruction efficiency = 98% and f_{Dest} = 1 (is the default factor recommended by the equation HH-8)

$$1 - (0.98 \times 1) = 0.02 \text{ or } 2\%$$

Step 6: Calculate methane emissions:

$$\begin{aligned} \text{CH}_4 \text{ Emissions} &= \left[\frac{(\text{CH}_4 \text{ Collected})}{\text{Collection}_{\text{eff}}} - \text{CH}_4 \text{ Collected} \right] \times (1 - \text{OF}) + (\text{CH}_4 \text{ Collected} \times \text{Vent}) - \text{eq. 1} \\ &= \left[\frac{(15.22 \times 10^6 \text{ m}^3/\text{yr})}{0.75} - (15.22 \times 10^6 \text{ m}^3/\text{yr}) \right] \times [(1-0.1)] + [(15.22 \times 10^6 \text{ m}^3/\text{yr} \times 0.02)] \\ &= [5.07 \times 10^6] \times [0.90] + [304,400 \text{ m}^3/\text{yr}] \\ &= \underline{\underline{4.87 \times 10^6 \text{ m}^3/\text{yr}}} \end{aligned}$$

The methane emission is converted from volumetric to mass emission rate using the density of methane. The density of methane is equal to 0.667 kilogram/cubic meter at 1 atmosphere and 59°F

Therefore, the CH₄ Emissions in metric tons =

$$\begin{aligned} &[4.87 \times 10^6 \text{ m}^3/\text{yr}] \times [0.667 \text{ kg/ m}^3] \times [1 \text{ metric ton}/1000 \text{ kg}] \\ &= \underline{\underline{3,248.29 \text{ metric ton/yr of CO}_2\text{e}}} \end{aligned}$$

The highest methane emission from Kelly Run Landfill is 3,248.29 metric ton and it is below the reporting threshold of 25,000 metric ton of CO₂e. Therefore, the facility is presently not subject to the GHG reporting.

EMISSION SOURCES OF MINOR SIGNIFICANCE:

1. One (1) 4,000 gallons above diesel storage tank;
2. One (1) 350 gallons above ground hydraulic oil storage tank;
3. One (1) 350 gallons above ground new motor oil storage tank;
4. One (1) 275 gallon above ground waste oil tanks; and
5. One (1) 275 gallons above ground anti freeze tanks
6. Two (2) Leachate Storage Impoundments (1,750,000 & 1,000,000 gallons respectively)

EMISSION SOURCES OF FUGITIVE

1. Paved areas: Total paved roads <300 ft

2. Unpaved roads: Total unpaved roads < 3,700 ft
3. Parking areas: Total parking lots area < 10,000 ft²
4. Other sources: Overburden blasting and screening,

Materials Handling (§2104.05); Permit Source Premises (§2105.40); Parking Lots and Roadways (§2105.42); Permit Source Transport (§2105.43); Construction and Land Clearing (§2105.45); Mining (§2105.46); and Fugitive Emissions (§2105.49)

Installation Permit (IP) No. 0190-001, issued on February 6, 1997, approved the installation of the Phase III expansion for this facility. This included the approved installation of a rock crusher, overburden (rock/soil) screening operations, and land clearing and blasting for the Phase III expansion of the landfill. It is noted that the crusher has not been installed at this plant, and this major source operating permit reflects such. These requirements are applicable to this source, pursuant to §2105.48, *Areas Subject to Sections 2105.40 through 2105.47*. The landfill is located near Elizabeth, PA which is south of the Mansfield Bridge, but north of the Westmoreland County line. Pursuant to §2105.48 and IP No. 0190-001, the landfill facility operations are subject to the requirements of Materials Handling (§2104.05); Permit Source Premises (§2105.40); Parking Lots and Roadways (§2105.42); Permit Source Transport (§2105.43); Construction and Land Clearing (§2105.45); Mining (§2105.46); and Fugitive Emissions (§2105.49). The installation permit specifies the requirements necessary to comply with these rules, and such are incorporated into the Part 70 operating permit.

RECOMMENDATIONS:

All applicable Federal, State and County regulations have been addressed in the permit. The Title V renewal operating permit should be approved with the emission limitations, terms and conditions in the Title V Operating Permit No. 0190.

Emission Unit Data

Unit: Municipal Solid Waste Landfill
Capacity: 7.3 million megagrams
Area: 400 acres
Date accepting waste: 1967
Exhaust: fugitive
Emission controls: landfill offgas collection system and control system consisting of one (1) enclosed ground flare

Unit: Enclosed Ground Flare # 2
Make: LFG Specialties
Model: EF7351B
Fuels:
Landfill Gas: 36 MMBtu/hr maximum heat input, based on capacity flow rate to the flare of 1,200 cubic feet of landfill offgas (50% methane, 50% CO₂, <1% VOC)
Propane or Nat. Gas: Flare startup only
Date installed: 1997
Exhaust: Stack no.I002
Emission controls: None
Outlet grain loading: 7 % O₂ gr/Cu.ft – manufacturer’s specifications

Unit: Overburden Blasting
Area: 10,000 sq. ft
Blasts per year: 20
Emission controls: fugitive dust control measures

Unit: Overburden Screening
Stones Screened: 177,175 tons of stone/soil per year
Emission controls: fugitive dust control measures

Unit: One (1) Diesel Storage Tanks
Capacity: 4,000 gal.
Material Stored: Diesel fuel
Emission Controls: None

Unit: Two (2) Oil Storage Tanks
Capacity: 275 gallon each.
Material Stored: Antifreeze and Waste Oil
Emission Controls: None

Unit: Two (2) Hydraulic and New Motor Oil Storage Tanks
Capacity: 350 gal. Each
Material Stored: Hydraulic and New Motor Oil
Emission Controls: None

Emission Unit Data

Unit: **Portable Generator**
Type: IC engine
Input rating: 0.132 MMBtu/hr
Primary fuel: Gasoline
Exhaust: Fugitive
Emission controls: None

Unit: **Two (2) Portable Light Plants**
Input rating: 0.0568 MMBtu/hr, per Light Plant
Primary fuel: Diesel
Exhaust: Fugitive
Emission controls: None

Unit: **Air Compressor**
Type: Diesel
Input rating: 0.237 MMBtu/hr
Primary fuel: Diesel
Exhaust: Fugitive
Emission controls: None

Unit: **Paved roads**
Amount: <300 ft
Emission Control: fugitive dust control measures

Unit: **Unpaved roads**
Amount: <3700 ft
Emission Control: fugitive dust control measures

Unit: **Parking Lots**
Area: < 10,000 ft²
Emission Control: fugitive dust control measures

Unit: **Two (2) Leachate Storage Impoundments**
Capacity: 2,750,000 gal.
Material Stored: Leachate
Emission Controls: None