

ALLEGHENY COUNTY HEALTH DEPARTMENT AIR QUALITY PROGRAM

June 6, 2019

SUBJECT: Review of Application
Title V Operating Permit
Allied Waste- Imperial Landfill
11 Boggs Road
Findlay Township, PA 15126

RE: Renewal Operating Permit File No. 0068
Municipal Waste Landfill

TO: JoAnn Truchan, PE
Chief Engineer

FROM: Hafeez Ajenifuja
Air Quality Engineer

FACILITY DESCRIPTION:

Allied Waste Systems of Pennsylvania, LLC operates Allied- Imperial Landfill, a municipal solid waste landfill, in Findlay Township, Allegheny County, Pennsylvania. The landfill is approximately 803 acres in surface area and is comprised of ten (10) disposal areas and has an active landfill gas (LFG) collection system with two (2) enclosed ground flare to control the offgas emissions. Currently nine (9) disposal areas have reached full capacity and are no longer accepting waste, only one disposal area is accepting waste. The total disposal capacity of the landfill is approximately 52,300,000 tons.

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. Pursuant to the requirements of 40 CFR 60, Subpart WWW, landfills having design capacities greater than or equal to 2.5 million megagrams must obtain a Part 70 operating permit. Imperial Landfill is a major source of carbon monoxide (CO) emission and is a minor source for remaining criteria pollutant and HAP emissions, as defined at §2102.20 (Definitions) of Article XXI. This facility is therefore subject to the Part 70 major source operating permit requirements of §2103.20.

PROCESS DESCRIPTION:

This is a Title V renewal application for Imperial Landfill located in Findlay Township, Allegheny County. 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 name and title was changed;
- 2) The facility's contact name was changed;
- 3) The Portable Nonmetallic Mineral Processing Plant (P001) and the associated caterpillar engines were removed from the permit because the facility is no longer performing the operation. The crushing activity

is being conducted by an outside contractor bringing their mobile equipment on site. This will cancel the IP 0068-I003, and the facility is not allowed to perform any crushing activity without obtaining permit;

- 4) The Dedicated Diesel Emission source has been removed because source is comprised of non-road mobile sources;
- 5) This renewal permit will incorporate IP 0068-I004b conditions, which revised the enclosed ground flare 1 & 2 NMOC, VOC, HAPs and SO₂ emissions;
- 6) The Department also incorporated a 5MMBtu/hr natural gas fired boiler into the permit. The boiler, which was issued an RFD on August 29, 2016 is used to maintain the minimum temperature of the leachate pre-treatment plant at Imperial Landfill facility;
- 7) This renewal will incorporate a 635 hp and 896 diesel fuel fired emergency generators into the permit. The 635 hp generator, which was issued an RFD on November 29, 2009 is used as a backup at the facility's flare station and the 896 hp is used as a backup at the leachate pre-treatment station.

The facility's operations and processes are still the same as in the original operating permit and it is described below:

1. One (1) existing stationary municipal solid waste landfill with a design capacity of 47.44 million megagrams;
2. One (1) active landfill gas collection and control system consisting of two (2) enclosed ground flares, rated at a maximum capacity of 6,000 scfm of landfill offgas each, and combined capacity of 8,000 scfm;
3. Two (2) fuel tanks, including one (1) 1,000-gallon unleaded gasoline fuel tank and one (1) 10,000-gallon No. 2 diesel fuel tank;
4. Six (6) leachate storage tanks, including two (2) 1,000,000-gallon tanks, two (2) 2,500-gallon tanks at the Neville Location, one (1) 2,500-gallon tank at the Alcosan location, and one (1) 5,000-gallon tank at the Cell 4 location;
5. One (1) 5 MMBtu/hr natural gas fired boiler;
6. Paved and Unpaved roads.

POTENTIAL EMISSION SUMMARY:

Facility Potential Emissions Table 1

Pollutant	Enclosed Ground Flares tons/yr ¹	Leachate Pre-Treatment Boiler	Emergency Generator – Flare Station 635 HP	Emergency Generator – Pre-treatment 896 HP	Misc. ³	Unpaved & Paved Roads (tons/yr) ^{1,2}	Fugitive Emissions Due to LF construction
PM	17.87	0.13	0.03	0.01	1.02	105.92	36.32
PM10	17.87	0.13	0.03	0.01	1.02	27.99	11.86
NOx	63.07	1.80	1.0	2.53	14.45	0.0	
CO	210.24	1.60	0.91	0.15	3.27	0.0	
SO ₂	21.11	0.13	0.39	0.54	0.95	0.0	
VOC	2.21	0.09	0.05	0.12	1.64	0.0	
Single HAP	8.43						
Total HAP	9.67						

1. A year is defined as any consecutive 12-month period.

2. PM and PM 10 emissions from unpaved roads are fugitive emissions only. These fugitive emissions are not counted towards the determination of this source as a major source, pursuant to §2101.20, Definitions. 85% control efficiency was applied to the fugitive emissions based on routine water suppression of the dust.

³Includes miscellaneous small combustion units (i.e. generators, pumps, air compressors, heated pressure washers, light plants, using diesel and gasoline as fuel), heated soap washer with a capacity rated at 16 HP using diesel fuel, and storage tanks.

RENEWAL OPERATING APPLICATION COMPONENTS:

1. Renewal Permit Application No. 0068 was received on January 13, 2016.

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. Vehicle travel on plant roads will be demonstrated according to the work practice and fugitive dust control measures established in IP No. I003, 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 major source renewal 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:

Plan Approval Order and Agreement upon Consent Number 231A, Dated April 23, 1997:

In order to comply with §2105.06.a of Article XXI, Major Sources of NOx and VOCs Reasonably Available Control Technology, the facility will test the two (2) enclosed ground flares 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 Cc, Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills, and Subpart WWW, Standards of Performance for Municipal Solid Waste Landfills:**

The municipal solid waste landfill is subject to the New Source Performance Standard, Article XXI §2105.05 and §2105.73, (40 CFR 60, Subpart WWW) because the municipal solid waste landfill commenced construction, reconstruction or modification or began accepting waste on or after May 30, 1991. Since a plant modification occurred after May 30, 1991, the requirements of Subpart Cc are not applicable. Pursuant to Subpart WWW, the landfill must operate a landfill offgas collection system and the collection system must be operated with a negative pressure head, except under the conditions stated at 40 CFR 60.753. The collected gas must be vented to a control system designed and operated in accordance with §60.752 (b)(2)(iii). This landfill complies with these requirements by using a landfill offgas control system that consists of two (2) enclosed ground flare having a VOC destruction efficiency of at least ninety-eight (98) percent by weight. The landfill is also subject to testing, compliance, monitoring, reporting and recordkeeping requirements specified in §60.754, §60.755, §60.756, §60.757 and §60.758, respectively.

Pursuant to 40 CFR 60.752, a municipal solid waste landfill with a design capacity greater than 2.5 million megagrams (Mg) shall comply with 40 CFR 60.752(b)(2)(ii) if the non-methane organic compound emission (NMOC) rate is greater than 50 Mg/year based on calculation procedures specified in 40 CFR 60.754. Based on 40 CFR 60.754(a)(1); the following values for the NMOC calculations: $k = 0.05 \text{ /yr}$, $L_o = 170 \text{ m}^3/\text{Mg}$ and $\text{NMOC} = 4,000 \text{ ppmv}$ (as hexane); and using the EPA's LandGEM Model (Version 2.01), the calculation shows that the NMOC emission rate exceeds 50 Mg/year. The proposed gas collection and control systems are therefore required to comply with the requirements of 40 CFR 60 Subpart WWW- Standards of Performance for Municipal Solid Waste Landfills.

Based on the above, and pursuant to IP 0068-I004a, issued on January 26, 2016, IP 0068-I001, issued on July 6, 1999, and Plan Approval Order and Agreement No.231A, issued on April 23, 1997, the requirements pertaining to the operation and maintenance of the off-gas collection and control system apply to this source and are incorporated into the major source operating permit.

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

The two (2) fuel storage tanks, with capacities of 1,000 gallons storing unleaded fuel and 10,000 gallons tank storing diesel fuel, are not subject to the New Source Performance Standard, Article XXI §2105.05, (40 CFR 60, Subpart Ka) because unleaded fuel and diesel fuel oil do not meet the definition of petroleum liquids.

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

The two (2) 1,000,000-gallon leachate storage tanks are not subject to the New Source Performance Standard, Article XXI §2105.05, (40 CFR 60, Subpart Kb), as modified October 15, 2003, because the maximum true vapor pressure of the stored material is less than 3.5 kPa for these two tanks with capacities that exceed 151 m^3 .

The two (2) fuel storage tanks, with capacities of 1,000 gallons storing unleaded fuel and 10,000 gallons tank storing diesel fuel, are not subject to the New Source Performance Standard, Article XXI §2105.05, (40 CFR 60, Subpart Kb), as modified on October 15, 2003, because the tank storage capacities are less than the rule applicability threshold of 75m³ (19,800 gallons).

4. NESHAP and MACT Standards:

- a. 40 CFR PART 63 Subpart AAAA--National Emission Standards for Hazardous Air Pollutants for Municipal Solid Waste Landfills:

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, as 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 NMOC emissions greater than 50 Mg/yr as calculated pursuant to 40 CFR 60.754(a) (see above discussion on Subpart WWW applicability). As such, the permittee is required to comply with the applicable requirements for an existing affected source that is an area source. These requirements are incorporated into the 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, which is incorporated into the permit.

- b. 40 CFR Part 63, Subpart ZZZZ- National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines:

The facility is subject to this subpart because it owns and operates two (2) stationary RICE at a major source of HAP emissions.

5. Compliance Assurance Monitoring:

The requirements of 40 CFR Part 64, “Compliance Assurance Monitoring” are not applicable to the landfill. Pursuant to 40 CFR 64.2(b)(1)(i), the requirements of this rule do not apply to a source subject to emission limits or standards proposed by the Administrator after November 15, 1990 pursuant to section 111 (NSPS) or 112 (NESHAP) of the Act. This landfill is subject to both section 111 (40 CFR 60, Subpart WWW) and 112 (40 CFR 63, Subpart AAAA) and therefore is not subject to this rule. There are no other emission units (PSEUs) at the plant with emission rates above the Part 70 applicable emission rate thresholds that are controlled and that have established emission limits. Therefore, the requirements of this rule do not apply.

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 NOx). 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 not initially considered as federally enforceable by the U.S. EPA, and the uncontrolled potential to emit of VOC exceeded 50 tons per year. Plan Approval Order and Agreement No. 231A issued on April 28, 1997, determined RACT to be landfill offgas 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 were 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.

Although RACT Order No. 231A initially exempted Area Seven (7), Phase Two (2) from the requirements for the operation of the landfill gas collection and control system, such exemption expired after December 31, 1998. Subsequent to this date, the operating requirements for the collection/control system became applicable with the completion of installed vertical collection wells at this area of the landfill and such requirements are reflected in the operating permit for the entire source.

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 (CH_4) emission even though CO_2 and CH_4 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 CO_2 to the atmosphere, and this is consistent with intergovernmental panel on climate change (IPCC) guidance. The EPA guidance believes that CO_2 is produced from combustion of CH_4 in captured LFG, and it is considered biomass CO_2 , which does not contribute to CO_2 -equivalent emissions. This is evident in Table A-1 to Subpart A of Part 98, that shows the global warming potential of CO_2 is 1, while that of CH_4 is 21.

The CH_4 emission that contributes to CO_2 -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.

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

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

Where:

CH_4 Collected = CH_4 Collected by active gas collection system

Coll_{eff} = collection system efficiency

OF = oxidation fraction

Vent = fraction vented

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

Where:

Emissions (CH_4) = Methane emissions from the landfill in the reporting year (metric tons CH_4).

R = Quantity of recovered CH_4 [from Equation HH-4 in metric tons CH_4] or CH_4 collected for the reporting year.

CE = Collection efficiency estimated at landfill, considering system coverage, operation, and cover system materials from Table HH-3. If area by soil cover type information is not available, use default value of 0.75 (CE_4 in table HH-3) 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 done using the LandGEM model based on First Order Decomposition Rate Equation below.

$$Q_{CH_4} = \sum_{i=1}^n \sum_{j=0.1}^l kL_o \left[\frac{M_i}{10} \right] e^{-kt_{ij}}$$

Imperial Landfill has legacy area 1-6, which started accepting waste in 1935 and the highest gas produced was in 1979, and the area is no longer active. There is active area 7, which started accepting waste in 1988 and the highest landfill gas produced or forecasted based on LandGem is in the year 2060.

From the LandGem Model Output:

Total Landfill Gas (reporting year 2060) = 4,454 CFM

Total Landfill gas produced = 4,454 CFM

Imperial 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) \times (percent methane in the gas) \times (conversion factor from ft^3 to m^3)

$(4,454 ft^3/min) \times (0.50) \times (m^3/35.31 ft^3)$

= **63.07 m³/min** or

$(63.07 m^3/min) \times (60 min/hr) \times (8760 hr/yr)$

= **33.15 × 10⁶ m³/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

Landfill gas that is not collected passes through the landfill cover before being released to the environment. There is the potential that microbes in the soil of the landfill cover oxidize some of the methane in the gas. This oxidation reduces the amount of methane released to the environment.

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

This is the amount of the collected gas that is vented directly to the atmosphere. It could either be through an active venting system, or in some cases gas may also be vented during scheduled startup/shut down and malfunction period.

The amount of methane vented is determined by using part of equation in the equation HH-8 above. $[1 - (DE \times f_{Dest.})]$, 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:

$$\begin{aligned}
CH_4 \text{ Emissions} &= \left[\left(\frac{CH_4 \text{ Collected}}{Coll_{eff}} \right) - CH_4 \text{ Collected} \times (1 - OF) \right] + (CH_4 \text{ Collected} \times Vent) \\
&= [(33.15 \times 10^6 \text{ m}^3/\text{yr}) - (33.15 \times 10^6 \text{ m}^3/\text{yr})] \times [(1 - 0.1)] + [(33.15 \times 10^6 \text{ m}^3/\text{yr} \times 0.02)] \\
&\quad 0.75 \\
&= [11.05 \times 10^6] \times [0.90] + [681,200 \text{ m}^3/\text{yr}] \\
&\equiv \mathbf{10.62 \times 10^6 \text{ m}^3/\text{yr}}
\end{aligned}$$

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 =

$$[10.62 \times 10^6 \text{ m}^3/\text{yr}] \times [0.667 \text{ kg/m}^3] \times [1 \text{ metric ton}/1000 \text{ kg}]$$

= 7,087.68 metric ton/yr of CO₂e

The highest methane emission from Imperial Landfill is 7,087.68 metric ton and it is below the reporting threshold of 25,000 metric ton of CO₂e. Therefore, the facility is not a major source of greenhouse gas emission and there are presently no Greenhouse gas requirements at the landfill.

EMISSIONS SUMMARY:

The allowable emission summary for the Imperial Landfill is given in Table below:

EMISSION SUMMARY	
Emission Limitations Summary	
POLLUTANT**	ANNUAL EMISSION LIMIT (tons/year)*
Particulate Matter	161.31
PM-10	58.92
SO_x	23.12
NO_x	82.84
CO	216.17
VOC	20.33
NMOC	46.70
Single HAP***	11.38
Total Hazardous Air Pollutants (HAP)	18.13

*A year is defined as any consecutive 12-month period.

** PM/PM₁₀ emission include fugitive emissions due to LF operations construction

***Single HAP is toluene (2.90 tpy) & HCL (8.49 tpy)

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 Operating Permit No. 0068.