MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

April 13, 2018

PERMIT TO INSTALL
79-17

ISSUED TO
Advanced Disposal Services Arbor Hills Landfill, Inc.

LOCATED AT
10690 Six Mile Road
Northville, Michigan

IN THE COUNTY OF
Washtenaw

STATE REGISTRATION NUMBER
N2688

The Air Quality Division has approved this Permit to Install, pursuant to the delegation of authority from the Michigan Department of Environmental Quality. This permit is hereby issued in accordance with and subject to Section 5505(1) of Article II, Chapter I, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Pursuant to Air Pollution Control Rule 336.1201(1), this permit constitutes the permittee's authority to install the identified emission unit(s) in accordance with all administrative rules of the Department and the attached conditions. Operation of the emission unit(s) identified in this Permit to Install is allowed pursuant to Rule 336.1201(6).

DATE OF RECEIPT OF ALL INFORMATION REQUIRED BY RULE 203: **October 23, 2017**	
DATE PERMIT TO INSTALL APPROVED: 4/13/18	SIGNATURE: Michael McCulloch
DATE PERMIT VOIDED:	SIGNATURE:
DATE PERMIT REVOKED:	SIGNATURE:

PERMIT TO INSTALL

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Common Abbreviations / Acronyms

Common Acronyms		Pollutant / Measurement Abbreviations	
AQD	Air Quality Division	acfm	Actual cubic feet per minute
BACT	Best Available Control Technology	BTU	British Thermal Unit
CAA	Clean Air Act	°C	Degrees Celsius
CAM	Compliance Assurance Monitoring	CO	Carbon Monoxide
CEM	Continuous Emission Monitoring	CO_2e	Carbon Dioxide Equivalent
CFR	Code of Federal Regulations	dscf	Dry standard cubic foot
COM	Continuous Opacity Monitoring	dscm	Dry standard cubic meter
Department/ department	Michigan Department of Environmental Quality	°F	Degrees Fahrenheit
		gr	Grains
EU	Emission Unit	HAP	Hazardous Air Pollutant
FG	Flexible Group	Hg	Mercury
GACS	Gallons of Applied Coating Solids	hr	Hour
GC	General Condition	HP	Horsepower
GHGs	Greenhouse Gases	H_2S	Hydrogen Sulfide
HVLP	High Volume Low Pressure*	kW	Kilowatt
ID	Identification	lb	Pound
IRSL	Initial Risk Screening Level	m	Meter
ITSL	Initial Threshold Screening Level	mg	Milligram
LAER	Lowest Achievable Emission Rate	mm	Millimeter
MACT	Maximum Achievable Control Technology	MM	Million
MAERS	Michigan Air Emissions Reporting System	MW	Megawatts
MAP	Malfunction Abatement Plan	NMOC	Non-methane Organic Compounds
MDEQ	Michigan Department of Environmental Quality	NO_x	Oxides of Nitrogen
		ng	Nanogram
MSDS	Material Safety Data Sheet	PM	Particulate Matter
NA	Not Applicable	PM10	Particulate Matter equal to or less than 10 microns in diameter
NAAQS	National Ambient Air Quality Standards		
NESHAP	National Emission Standard for Hazardous Air Pollutants	PM2.5	Particulate Matter equal to or less than 2.5 microns in diameter
NSPS	New Source Performance Standards	pph	Pounds per hour
NSR	New Source Review	ppm	Parts per million
PS	Performance Specification	ppmv	Parts per million by volume
PSD	Prevention of Significant Deterioration	ppmw	Parts per million by weight
PTE	Permanent Total Enclosure	psia	Pounds per square inch absolute
PTI	Permit to Install	psig	Pounds per square inch gauge
RACT	Reasonable Available Control Technology	scf	Standard cubic feet
ROP	Renewable Operating Permit	sec	Seconds
SC	Special Condition	SO_2	Sulfur Dioxide
SCR	Selective Catalytic Reduction	TAC	Toxic Air Contaminant
SNCR	Selective Non-Catalytic Reduction	Temp	Temperature
SRN	State Registration Number	THC	Total Hydrocarbons
TEQ	Toxicity Equivalence Quotient	tpy	Tons per year
USEPA/EPA	United States Environmental Protection Agency	µg	Microgram
		µm	Micrometer or Micron
VE	Visible Emissions	VOC	Volatile Organic Compounds
		yr	Year

*For HVLP applicators, the pressure measured at the gun air cap shall not exceed 10 psig.

GENERAL CONDITIONS

1. The process or process equipment covered by this permit shall not be reconstructed, relocated, or modified, unless a Permit to Install authorizing such action is issued by the Department, except to the extent such action is exempt from the Permit to Install requirements by any applicable rule. **(R 336.1201(1))**

2. If the installation, construction, reconstruction, relocation, or modification of the equipment for which this permit has been approved has not commenced within 18 months, or has been interrupted for 18 months, this permit shall become void unless otherwise authorized by the Department. Furthermore, the permittee or the designated authorized agent shall notify the Department via the Supervisor, Permit Section, Air Quality Division, Michigan Department of Environmental Quality, P.O. Box 30260, Lansing, Michigan 48909-7760, if it is decided not to pursue the installation, construction, reconstruction, relocation, or modification of the equipment allowed by this Permit to Install. **(R 336.1201(4))**

3. If this Permit to Install is issued for a process or process equipment located at a stationary source that is not subject to the Renewable Operating Permit program requirements pursuant to R 336.1210, operation of the process or process equipment is allowed by this permit if the equipment performs in accordance with the terms and conditions of this Permit to Install. **(R 336.1201(6)(b))**

4. The Department may, after notice and opportunity for a hearing, revoke this Permit to Install if evidence indicates the process or process equipment is not performing in accordance with the terms and conditions of this permit or is violating the Department's rules or the Clean Air Act. **(R 336.1201(8), Section 5510 of Act 451, PA 1994)**

5. The terms and conditions of this Permit to Install shall apply to any person or legal entity that now or hereafter owns or operates the process or process equipment at the location authorized by this Permit to Install. If the new owner or operator submits a written request to the Department pursuant to R 336.1219 and the Department approves the request, this permit will be amended to reflect the change of ownership or operational control. The request must include all of the information required by subrules (1)(a), (b), and (c) of R 336.1219 and shall be sent to the District Supervisor, Air Quality Division, Michigan Department of Environmental Quality. **(R 336.1219)**

6. Operation of this equipment shall not result in the emission of an air contaminant which causes injurious effects to human health or safety, animal life, plant life of significant economic value, or property, or which causes unreasonable interference with the comfortable enjoyment of life and property. **(R 336.1901)**

7. The permittee shall provide notice of an abnormal condition, start-up, shutdown, or malfunction that results in emissions of a hazardous or toxic air pollutant which continue for more than one hour in excess of any applicable standard or limitation, or emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation, as required in Rule 912, to the Department. The notice shall be provided not later than two business days after start-up, shutdown, or discovery of the abnormal condition or malfunction. Written reports, if required, must be filed with the Department within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal conditions or malfunction has been corrected, or within 30 days of discovery of the abnormal condition or malfunction, whichever is first. The written reports shall include all of the information required in Rule 912(5). **(R 336.1912)**

8. Approval of this permit does not exempt the permittee from complying with any future applicable requirements which may be promulgated under Part 55 of 1994 PA 451, as amended or the Federal Clean Air Act.

9. Approval of this permit does not obviate the necessity of obtaining such permits or approvals from other units of government as required by law.

10. Operation of this equipment may be subject to other requirements of Part 55 of 1994 PA 451, as amended and the rules promulgated thereunder.

11. Except as provided in subrules (2) and (3) or unless the special conditions of the Permit to Install include an alternate opacity limit established pursuant to subrule (4) of R 336.1301, the permittee shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of density greater than the most stringent of the following. The grading of visible emissions shall be determined in accordance with R 336.1303. **(R 336.1301)**
    a) A six-minute average of 20 percent opacity, except for one six-minute average per hour of not more than 27 percent opacity.
    b) A visible emission limit specified by an applicable federal new source performance standard.
    c) A visible emission limit specified as a condition of this Permit to Install.

12. Collected air contaminants shall be removed as necessary to maintain the equipment at the required operating efficiency. The collection and disposal of air contaminants shall be performed in a manner so as to minimize the introduction of contaminants to the outer air. Transport of collected air contaminants in Priority I and II areas requires the use of material handling methods specified in R 336.1370(2). **(R 336.1370)**

13. The Department may require the permittee to conduct acceptable performance tests, at the permittee's expense, in accordance with R 336.2001 and R 336.2003, under any of the conditions listed in R 336.2001. **(R 336.2001)**

SPECIAL CONDITIONS

EMISSION UNIT SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Emission Unit ID	Emission Unit Description (Process Equipment & Control Devices)	Installation Date / Modification Date	Flexible Group ID
EU5000CFMFLARE	One 5,000 standard cubic feet per minute (scfm) open utility flare to provide additional back-up landfill gas control capacity and operational flexibility.	To Be Determined	FGPROJECT
EUENCLOSEDFLARE1-S2	One existing enclosed flare with a rated design capacity of 2,600 scfm used to control excess landfill gas.	1991 Modified 2014	FGENCLOSEDFLARES-S2, FGPROJECT
EUENCLOSEDFLARE2-S2	One existing enclosed flare with a rated design capacity of 4,600 scfm used to control excess landfill gas.	1994 Modified 2014	FGENCLOSEDFLARES-S2, FGPROJECT
EUACTIVECOLL-S2	This emission unit represents the active landfill gas collection system at the landfill that uses gas mover equipment to draw landfill gas from the wells and moves the gas to the control equipment.	1990	FGPROJECT
EUOPENFLARE_TEMP	A temporary open flare (an open combustor without enclosure or shroud) used for controlling excess landfill gas. This flare will be shut down within 60 days of operation of EU5000CFMFLARE and rendered inoperable according to PTI No. 19-17A or any subsequent PTI's.	2017	NA
Changes to the equipment described in this table are subject to the requirements of R 336.1201, except as allowed by R 336.1278 to R 336.1290.			

The following conditions apply to: EU5000CFMFLARE

DESCRIPTION: One 5,000 standard cubic feet per minute (scfm) open utility flare to provide additional back-up landfill gas control capacity and operational flexibility.

Flexible Group ID: FGPROJECT

POLLUTION CONTROL EQUIPMENT:

I. EMISSION LIMITS

Pollutant	Limit	Time Period / Operating Scenario	Equipment	Testing / Monitoring Method	Underlying Applicable Requirements
1. Visible Emissions	0 percent Opacity	Hourly	EU5000CFMFLARE	SC V.2, SC V.3	R 336.1301, 40 CFR 60.18(c)(1)
2. NOx	0.068 lb/MMBtu	Hourly	EU5000CFMFLARE	SC V.4	R 336.1205(1)(a) & (b), R 336.2802(4), R 336.2803, R 336.2804
3. CO	0.31 lb/MMBtu	Hourly	EU5000CFMFLARE	SC VI.4, SC VI.5	R 336.1205(1)(a) & (b), R 336.2804

II. MATERIAL LIMITS

Material	Limit	Time Period / Operating Scenario	Equipment	Testing / Monitoring Method	Underlying Applicable Requirements
1. Net heating value of landfill gas	≥ 200 Btu/scf for non-assisted flares	At all times	EU5000CFMFLARE	SC V.1	40 CFR 60.18(c)(1)

III. PROCESS/OPERATIONAL RESTRICTION(S)

1. The permittee shall operate EU5000CFMFLARE in accordance with 40 CFR 60.18 except as noted in 40 CFR 60.754(e). **(40 CFR 60.752(b)(2)(iii)(A), 40 CFR 63.1955(a))**

2. The permittee shall operate EU5000CFMFLARE at all times when the collected gas is routed to it. **(40 CFR 60.753(f), 40 CFR 63.1955(a)))**

3. The permittee shall operate EU5000CFMFLARE with a flame present at all times, as determined by the methods specified in 40 CFR 60.18(f). **(40 CFR 60.18(c)(2))**

4. EU5000CFMFLARE shall be used only with the net heating value of the gas being combusted of 7.45 MJ/scm (200 Btu/scf) or greater if the flare is non-assisted. The net heating value of the gas being combusted shall be determined by the methods specified in 40 CFR 60.18(f). **(40 CFR 60.18(c)(3))**

5. Non-assisted flares shall be designed for and operated with an exit velocity, as determined by the methods specified in 40 CFR 60.18(f)(4), less than 18.3 m/sec (60 ft/sec), except as provided in 40 CFR 60.18(c)(4)(ii) and (iii). **(40 CFR 60.18(c)(4)(i))**
   a. Non-assisted flares designed for and operated with an exit velocity, equal to or greater than 18.3 m/sec (60 ft/sec) but less than 122 m/sec (400 ft/sec) are allowed if the net heating value of the gas being combusted is greater than 37.3 MJ/scm (1,000 Btu/scf). **(40 CFR 60.18(c)(4)(ii))**
   b. Non-assisted flares designed for and operated with an exit velocity, as determined by the methods specified in 40 CFR 60.18(f)(4) less than the velocity, Vmax, as determined by the method specified in 40 CFR 60.18(f)(5), and less than 122 m/sec (400 ft/sec) are allowed. **(40 CFR 60.18(c)(4)(iii))**

6. Flares used to comply with provisions of 40 CFR Part 60, Subpart A shall be operated at all times when emissions may be vented to them. **(40 CFR 60.18(e))**

7. The permittee shall operate the control system such that all collected gases are vented to a control system designed and operated in accordance with 40 CFR 60.752(b)(2)(iii). In the event the collection or control system is inoperable, the gas mover system shall be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere shall be closed within one hour. **(40 CFR 60.753(e), 40 CFR 63.1955(a))**

8. No later than 60 days after issuance of this permit, the permittee shall submit to the AQD District Supervisor, for review and approval, an updated malfunction abatement/preventative maintenance plan for EU5000CFMFLARE. After approval of the malfunction abatement/preventative maintenance plan by the AQD District Supervisor, the permittee shall not operate EU5000CFMFLARE unless the malfunction abatement/preventative maintenance plan, or an alternate plan approved by the AQD District Supervisor, is implemented and maintained. The plan shall incorporate procedures recommended by the equipment manufacturer as well as incorporating standard industry practices. At a minimum the plan shall include:
   a. Identification of the equipment and, if applicable, air-cleaning device, and the supervisory personnel responsible for overseeing the inspection, maintenance, and repair.
   b. Description of the items or conditions to be inspected and frequency of the inspections or repairs.
   c. Identification of the equipment and, if applicable, air-cleaning device, operating parameters that shall be monitored to detect a malfunction or failure, the normal operating range of these parameters and a description of the method of monitoring or surveillance procedures.
   d. Identification of the major replacement parts that shall be maintained in inventory for quick replacement.
   e. A description of the corrective procedures or operational changes that shall be taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits.

   If the plan fails to address or inadequately addresses an event that meets the characteristics of a malfunction at the time the plan is initially developed, the owner or operator shall revise the plan within 45 days after such an event occurs and submit the revised plan for approval to the AQD District Supervisor. Should the AQD determine the malfunction abatement/preventative maintenance plan to be inadequate, the AQD District Supervisor may request modification of the plan to address those inadequacies. **(R 336.1702(a), R 336.1910, R 336.1911, R 336.1912)**

IV. DESIGN/EQUIPMENT PARAMETER(S)

1. The nameplate capacity of EU5000CFMFLARE shall not exceed 5,000 standard cubic feet per minute (scfm) as specified by the equipment manufacturer. **(R 336.1205(1)(a) & (b), R 336.1225, R 336.1702, R 336.2802(4))**

2. The permittee shall install, calibrate, maintain, and operate, according to the manufacturer's specifications, a heat sensing device, such as an ultraviolet beam sensor or thermocouple, at the pilot light or the flame itself to indicate the continuous presence of a flame for EU5000CFMFLARE. **(40 CFR 60.756(c)(1), 40 CFR 63.1955(a))**

3. The permittee shall install, calibrate, maintain, and operate EU5000CFMFLARE with a landfill gas flow rate measuring device to record the flow to the flare at least every 15 minutes. **(R 336.1205(1)(a) & (b), R 336.1225, R 336.1702, R 336.2802(4), 40 CFR 60.756(c)(2))**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1201(3))**

1. For the performance test required in 40 CFR 60.752(b)(2)(iii)(A), the net heating value of the combusted landfill gas as determined in 40 CFR 60.18(f)(3) is calculated from the concentration of methane in the landfill gas as measured by Method 3C. A minimum of three 30-minute Method 3C samples are determined. The measurement of other organic components, hydrogen, and carbon monoxide is not applicable. Method 3C may be used to determine the landfill gas molecular weight for calculating the flare gas exit velocity under 40 CFR 60.18(f)(4). **(40 CFR 60.752(b)(2)(iii)(A), 40 CFR 60.754(e))**

2. Within 60 days after achieving maximum production rate, but not later than 180 days after commencement of initial startup, the permittee shall evaluate visible emissions from EU5000CFMFLARE, as required by federal Standards of Performance for New Stationary Sources, at owner's expense, in accordance 40 CFR Part 60, Subparts A and WWW. Visible emission observation procedures must have prior approval by the AQD. Verification of visible emissions includes the submittal of a complete report of opacity observations to the AQD within 60 days following the last date of the evaluation. **(40 CFR Part 60, Subparts A & WWW)**

3. Method 22 of appendix A to 40 CFR Part 60 shall be used to determine the compliance of EU5000CFMFLARE with the visible emission provisions of this subpart. The observation period is 2 hours and shall be used according to Method 22. **(40 CFR 60.18(f)(1), 40 CFR 60.752(b)(2)(iii)(A))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1201(3))**

1. The permittee shall monitor and record on a monthly basis the average Btu content of the landfill gas burned in EU5000CFMFLARE. As an alternative, the permittee may use the monitored Btu value of the landfill gas burned in the Gas to Energy Plant. All records shall be kept on file for a period of at least five years and make them available to the Department upon request. **(R 336.1205(1)(a) & (b), R 336.2802(4))**

2. Except as provided in 40 CFR 60.752(b)(2)(i)(B), the permittee shall keep up-to-date, readily accessible records for the life of EU5000CFMFLARE of the data listed in SC VI.4, as measured during the initial performance test or compliance determination. Records of subsequent tests or monitoring shall be maintained for a minimum of 5 years. Records of the open flare vendor specifications shall be maintained until removal. **(40 CFR 60.758(b), 40 CFR 63.1955(a))**

3. The permittee shall maintain records regarding the flare type (i.e., steam-assisted, air-assisted, or non-assisted), all visible emission readings, heat content determination, flow rate or bypass flow rate measurements, and exit velocity determinations made during the performance test as specified in 40 CFR 60.18; continuous records of the open flare pilot flame or open flare flame monitoring and records of all periods of operations during which the pilot flame of the flare flame is absent. **(40 CFR 60.758(b)(4), 40 CFR 63.1955(a))**

4. The following records for the flare shall be maintained onsite:
   a. Records indicating presence of flare pilot flame. **(40 CFR 60.18(f)(2))**
   b. The net heating value of the gas being combusted in the flare shall be calculated and recorded using the equation provided in Appendix A. **(40 CFR 60.18(f)(3))**
   c. The actual exit velocity of the flare shall be calculated and recorded by dividing the volumetric flow rate (in units of standard temperature and pressure), as determined by Federal Reference Test Methods 2, 2A, 2C, or 2D as appropriate, by the unobstructed (free) cross sectional area of the flare tip. **(40 CFR 60.18(f)(4))**
   d. The maximum permitted velocity, V_{max}, for flares complying with 40 CFR 60.18(c)(4)(iii) shall be calculated and recorded using the equation provided in Appendix A. **(40 CFR 60.18(f)(5))**

5. The permittee shall keep, in a satisfactory manner, records of the landfill gas usage and hours of operation for EU5000CFMFLARE on a daily basis. The permittee shall keep all records on file at the facility and make them available to the Department upon request. **(R 336.1205(1)(a) & (b), R 336.1225, R 336.1702, R 336.1910)**

VII. REPORTING

1. The permittee shall submit to the appropriate AQD District Office semi-annual reports for the gas collection system. Reports shall be postmarked or received by appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. For enclosed combustion devices and flares, reportable exceedances are defined under 40 CFR 60.758(c). The semi-annual report shall contain:
   a. Value and length of time for exceedance of applicable parameters monitored under 60.756(b). **(40 CFR 60.757(f)(1), 40 CFR 63.1980(a), 40 CFR 63.1955(a))**
   b. Description and duration of all periods when the control device was not operating for a period exceeding 1 hour and length of time the control device was not operating. **(40 CFR 60.757(f)(3), 40 CFR 63.1980(a), 40 CFR 63.1955(a))**

2. The permittee shall submit the startup, shutdown, and malfunction (SSM) report to the appropriate AQD District Office and it shall be delivered or postmarked by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(40 CFR 63.10(a)(5), 40 CFR 63.10(d)(5))**

VIII. STACK/VENT RESTRICTIONS

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV5000CFMFLARE	16	75	R 336.1225, R 336.2803, R 336.2804

IX. OTHER REQUIREMENTS

1. The duration of start-up, shutdown, or malfunction for the open flare shall not exceed 1 hour. **(40 CFR 60.755(e), 40 CFR 63.1955(a))**

2. Compliance with 40 CFR Part 63, Subpart AAAA is determined in the same way it is determined for 40 CFR Part 60, Subpart WWW, including performance testing, monitoring of the collection system, continuous parameter monitoring, and other credible evidence. In addition, continuous parameter monitoring data collected above in SC VI.3 and VI.5 are used to demonstrate compliance with the operating conditions for the open flare. The permittee shall have developed and implemented a written SSM for EU5000CFMFLARE. A copy of the SSM plan shall be maintained on site. **(40 CFR 63.1960)**

3. The permittee shall comply with all applicable provisions of 40 CFR Part 60 Subpart A and WWW "Standard of Performance for Municipal Solid Waste Landfills as they apply to EU5000CFMFLARE. **(40 CFR Part 60 Subpart A and WWW)**

4. The permittee shall comply with all applicable provisions of 40 CFR Part 63 Subpart A and AAAA "National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills as they apply to EU5000CFMFLARE. **(40 CFR Part 63 Subpart A and AAAA)**

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).

FLEXIBLE GROUP SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FGENCLOSEDFLARES-S2	Two enclosed flares used to control excess gas not combusted by the landfill gas-to-energy facility.	EUENCLOSEDFLARE1-S2, EUENCLOSEDFLARE2-S2
FGPROJECT	Modification to the existing Gas Collection and Control System (GCCS) which includes existing process equipment and control devices along with proposed replacement of a temporary utility flare with a permanent open utility flare.	EUACTIVECOLL-S2, EUENCLOSEDFLARE1-S2, EUENCLOSEDFLARE2-S2, EU5000CFMFLARE-S2

The following conditions apply to: FGENCLOSEDFLARES-S2

DESCRIPTION: Two enclosed flares used for combusting excess gas not combusted at the gas-to-energy facility, co-located at the source.

Emission Units: EUENCLOSEDFLARE1-S2, EUENCLOSEDFLARE2-S2

POLLUTION CONTROL EQUIPMENT: The flares are the control system for the landfill-gas collection system.

I. EMISSION LIMITS

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Testing/ Monitoring Method	Underlying Applicable Requirements
1. NMOC	Reduce NMOC by 98 weight-percent or reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis as hexane at 3 percent oxygen[2]	Daily	Limit applies to each flare: EUENCLOSEDFLARE1-S2, EUENCLOSEDFLARE2-S2	SC V.1-4	40 CFR 60.752(b)(2)(iii)(B), 40 CFR 60.754(d), 40 CFR 60.758(b)(2)
2. NOx	0.060 lb/MMBtu	Hourly	FGENCLOSEDFLARES-S2	SC V.5-8	R 336.1205(1)(a) & (b), R 336.2802(4), R 336.2803, R 336.2804
3. CO	0.20 lb/MMBtu	Hourly	FGENCLOSEDFLARES-S2	SC V.9-12	R 336.1205(1)(a) & (b), R 336.2804

II. MATERIAL LIMITS

NA

III. PROCESS/OPERATIONAL RESTRICTIONS

1. The permittee shall equip and maintain each flare with a continuous temperature monitor.[2] **(R336.1205(1)(a))**

2. The temperature monitor shall be calibrated or replaced on an annual basis.[2] **(R336.1205(1)(a))**

3. The permittee shall operate the enclosed flare at all times when the collected gas is routed to the enclosed flare. **(40 CFR 60.753(f), 40 CFR 63.1955(a))**

4. The permittee shall operate control system such that all collected gases are vented to a control system designed and operated in accordance 60.752(b)(2)(iii), as specified in SC III.5. In event the collection or control system is inoperable, the gas mover system shall be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere shall be closed within one hour. **(40 CFR 60.753(e), 40 CFR 63.1955(a))**

5. The permittee shall route all collected non-treated gas to the enclosed flare or another control system designed and operated to reduce NMOC by 98 weight-percent or reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis as hexane at 3 percent oxygen. **(40 CFR 60.752(b)(2)(iii)(B), 40 CFR 63.1955(a))**
   a. *The enclosed flare shall be operated within the parameter ranges established during the most recent performance test in compliance with §60.754(d). The operating parameters to be monitored are specified in §60.756 (below in condition **VI.1.**).* ***(40 CFR 60.752(b)(2)(iii)(B)(2), 40 CFR 63.1955(a))***

6. The provisions of NSPS WWW apply at all times, except during periods of start-up, shutdown, or malfunction, provided that the duration of start-up, shutdown, or malfunction shall not exceed 1 hour for the enclosed flare. **(40 CFR 60.755(e), 30 CFR 63.1955(a))**

7. The permittee shall operate a flame detection system in conjunction with the flare in the event that the flame is extinguished, shut-in of all lines feeding the flare shall commence automatically. Operation of the flare shall not be restarted unless the non-continuous pilot flame is reignited. Pilot fuel shall only be propane.[2] **(R336.1201(3))**

IV. DESIGN/EQUIPMENT PARAMETERS

1. The permittee shall install, calibrate, maintain, and operate FGENCLOSEDFLARES-S2 with a landfill gas flow monitoring device to measure the amount of landfill gas burned in the enclosed flares. **(R 336.1205(1)(a), R 336.2803, R 336.2804)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1201(3))**

NMOC

1. The permittee shall submit a complete test protocol to the AQD for approval at least 60 days prior to the anticipated test date.[2] **(R 336.2001, R 336.2003)**

2. The permittee shall verify the NMOC emission rate from the FGENCLOSEDFLARES-S2, by testing, every 20 calendar quarters.[2] **(R 336.2001, R 336.2003)**

3. The permittee shall notify the District Supervisor and the Technical Programs Unit no less than seven days prior to the anticipated test date.[2] **(R 336.2001(3))**

4. The permittee shall submit a complete test report of the test results to the District Supervisor and the Technical Programs Unit within 60 days following the last date of the test.[2] **(R 336.2001(4))**

NOx

5. The permittee shall submit a complete test protocol to the AQD for approval at least 60 days prior to the anticipated test date. **(R 336.2001, R 336.2003)**

6. The permittee shall verify the NOx emission rate from the FGENCLOSEDFLARES-S2, by testing, every 20 calendar quarters.[2] **(R 336.1205(1)(a) & (b), R 336.2001, R 336.2003, R 336.2803, R 336.2804)**

7. The permittee shall notify the District Supervisor and the Technical Programs Unit no less than seven days prior to the anticipated test date.[2] **(R 336.2001(3))**

8. The permittee shall submit a complete test report of the test results to the District Supervisor and the Technical Programs Unit within 60 days following the last date of the test.[2] **(R 336.2001(4))**

CO

9. The permittee shall submit a complete test protocol to the AQD for approval at least 60 days prior to the anticipated test date.[2] **(R 336.2001, R 336.2003)**

10. The permittee shall verify the CO emission rate from the FGENCLOSEDFLARES-S2, by testing, every 20 calendar quarters.[2] **(R 336.1205(1)(a) & (b), R 336.2001, R 336.2003, R 336.2804)**

11. The permittee shall notify the District Supervisor and the Technical Programs Unit no less than seven days prior to the anticipated test date.[2] **(R 336.2001(3))**

12. The permittee shall submit a complete test report of the test results to the District Supervisor and the Technical Programs Unit within 60 days following the last date of the test.[2] **(R 336.2001(4))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1201(3))**

1. The permittee shall calibrate, maintain, and operate the enclosed flare according to the manufacturer's specifications, including the following:
   a. A temperature monitoring device equipped with a continuous recorder and having a minimum accuracy of plus or minus 1 percent of the temperature being measured expressed in degrees centigrade or plus or minus 0.5 degrees centigrade, whichever is greater. **(40 CFR 60.756(b)(1), 40 CFR 63.1955(a))**
   b. A device that records flow to or bypass of the control device. The permittee shall either:
      i. Install, calibrate, and maintain a gas flow rate measuring device that shall record the flow to the control device at least every 15 minutes; **(40 CFR 60.756(b)(2)(i), 40 CFR 63.1955(a)) or**
      ii. Secure the bypass line valve in the closed position with a car-seal or a lock-and-key type configuration. A visual inspection of the seal or closure mechanism shall be performed at least once every month to ensure that the valve is maintained in the closed position and that the gas flow is not diverted through the bypass line. **(40 CFR 60.756(b)(2)(ii), 40 CFR 63.1955(a))**

2. Except as provided in §60.752(b)(2)(i)(B), the permittee shall keep readily accessible continuous records of the equipment operating parameters specified to be monitored in §60.756 (above in condition VI.1.), as well as up-to-date, readily accessible records for periods of operation during which the parameter boundaries established during the most recent performance test are exceeded. **(40 CFR 60.758(c))**
   a. The following constitute exceedances that shall be recorded and reported under §60.757(f):
      i. All 3-hour periods of operation during which the average combustion temperature was more than 28 °C (50° F) below the average combustion temperature during the most recent performance test at which compliance with §60.752(b)(2)(iii) was determined. **(40 CFR 60.758(c)(1)(i))**
         (1) 3-hour block averages are calculated in the same way as they are calculated in 40 CFR part 60 subpart WWW, except that the data collected during the events listed below are not to be included in any average computed for 40 CFR Part 63, Subpart AAAA. **(40 CFR 63.1975)**
            (a) Monitoring system breakdowns, repairs, calibration checks, and zero (low-level) and high-level adjustments. **(40 CFR 63.1975(a))**
            (b) Startups. **(40 CFR 63.1975(b))**
            (c) Shutdowns. **(40 CFR 63.1975(c))**
            (d) Malfunctions. **(40 CFR 63.1975(d))**

3. The permittee shall keep up-to-date, readily accessible continuous records of the indication of flow to the control device or the indication of bypass flow or records of monthly inspections of car-seals or lock-and-key configurations used to seal bypass lines, specified in §60.756 . **(40 CFR 60.758(c)(2)**

4. The following information shall be recorded:
   a. The average combustion temperature measured at least every 15 minutes and averaged over the same time period of the performance test. **(40 CFR 60.758(b)(2)(i))**
   b. The percent reduction of NMOC determined as specified in 40 CFR 60.752(b)(2)(iii)(B) achieved by the control device. **(40 CFR 60.758(b)(2)(ii))**

5. The permittee shall keep up-to-date, readily accessible records of all control system exceedances of the operational standards in §60.753. **(40 CFR 60.758(e))**

6. The permittee shall monitor and record the flaring duration each time the enclosed ground flares are ignited in a manner and with instrumentation acceptable to the Air Quality Division. All of the accumulated data shall be kept on file for a period of at least two years and made available to the Air Quality Division upon request.[2] **(R336.1205(1)(a) & (b), R 336.2802(4))**

7. The permittee shall keep, in a satisfactory manner, records of the landfill gas usage and hours of operation of each emission unit of FGENCLOSEDFLARES-S2 on a daily basis. The permittee shall keep all records on file at the facility and make them available to the Department upon request. **(R 336.1205(1)(a) & (b), R 336.1225, R 336.1702, R 336.2802(4))**

VII. REPORTING

1. The permittee shall submit to the appropriate AQD District Office semi-annual reports for the gas collection system. Reports shall be received by appropriate AQD District Office by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. For enclosed combustion devices and flares, reportable exceedances are defined under §60.758(c). **(40 CFR 60.757(f), 40 CFR 63.1980(a), 40 CFR 63.1955(a))** The semi-annual report shall contain:
   a. Value and length of time for exceedance of applicable parameters monitored in §60.756(b) (above in condition **VI.1.**). **(40 CFR 60.757(f)(1), 40 CFR 63.1980(a), 40 CFR 63.1955(a))**
   b. Description and duration of all periods when the gas stream is diverted from the control device through a bypass line or the indication of bypass flow as specified in §60.756. **(40 CFR 60.757(f)(2), 40 CFR 63.1980(a), 40 CFR 63.1955(a))**
   c. Description and duration of all periods when the control device was not operating for a period exceeding 1 hour and length of time the control device was not operating. **(40 CFR 60.757(f)(3), 40 CFR 63.1980(a), 40 CFR 63.1955(a))**

2. The permittee shall submit an equipment removal report to the AQD 30 days prior to removal or cessation of operation of the enclosed flare. **(40 CFR 60.757(e))**
   a. The equipment removal report shall contain all of the following items:
      i. A copy of the closure report submitted in accordance with §60.757(d). **(40 CFR 60.757(e)(1)(i), 40 CFR 63.1955(a))**
      ii. A copy of the initial performance test report demonstrating that the 15 year minimum control period has expired **(40 CFR 60.757(e)(1)(ii), 40 CFR 63.1955(a))**
      iii. Dated copies of three successive NMOC emission rate reports demonstrating that the landfill is no longer producing 50 megagrams or greater of NMOC per year. **(40 CFR 60.757(e)(1)(iii), 40 CFR 63.1955(a))**
   b. Additional information may be requested as may be necessary to verify that all of the conditions for removal in §60.752(b)(2)(v) have been met. **(40 CFR 60.757(e)(2), 40 CFR 63.1955(a))**

3. The permittee shall submit the startup, shutdown, and malfunction (SSM) report to the appropriate AQD district office and it shall be delivered or postmarked by March 15 for reporting period July 1 to December 31 and September 15 for reporting period January 1 to June 30. **(40 CFR 63.10(a)(5), 40 CFR 63.10(d)(5))**

VIII. STACK/VENT RESTRICTIONS

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

Stack & Vent ID	Maximum Exhaust Diameter/Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SV-01	156[2]	50[2]	R 336.1225, R 336.2803, R 336.2804
2. SV-02	156[2]	50[2]	R 336.1225, R 336.2803, R 336.2804

IX. OTHER REQUIREMENTS

1. Compliance with 40 CFR Part 63, Subpart AAAA is determined in the same way it is determined for 40 CFR Part 60, Subpart WWW, including performance testing, monitoring of the collection system, continuous parameter monitoring, and other credible evidence. In addition, continuous parameter monitoring data collected under 40 CFR 60.756(b)(1), as specified in SC VI.1, are used to demonstrate compliance with the operating conditions for the enclosed flare. The permittee shall have developed and implemented a written SSM plan according to the provision in 40 CFR 63.6(e)(3) for FGENCLOSEDFLARES-S2. A copy of the SSM plan shall be maintained on site. **(40 CFR 63.1960)**

Footnotes:
[1] This condition is state only enforceable and was established pursuant to Rule 201(1)(b).
[2] This condition is federally enforceable and was established pursuant to Rule 201(1)(a).

The following conditions apply to: FGPROJECT

DESCRIPTION: Modification to the existing Gas Collection and Control System (GCCS) which includes existing process equipment and control devices along with proposed replacement of a temporary utility flare with a permanent open utility flare.

Emission Units: EUACTIVECOLL-S2, EUENCLOSEDFLARE1-S2, EUENCLOSEDFLARE2-S2, and EU5000CFMFLARE

POLLUTION CONTROL EQUIPMENT: The flares are the control system for the landfill-gas collection system.

I. EMISSION LIMITS

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Testing / Monitoring Method	Underlying Applicable Requirements
1. CO	289.1 tpy	12-month rolling time period as determined at the end of each calendar month	FGPROJECT	SC VI.2, SC VI.5	R 336.1205(1)(a) & (b), R 336.2802(4)
2. NO_x	70.1 tpy[A]	12-month rolling time period as determined at the end of each calendar month	FGPROJECT	SC VI.2	R 336.1205(1)(a) & (b), R 336.2802(4)
3. SO_2	142.9 tpy[B]	12-month rolling time period as determined at the end of each calendar month	FGPROJECT	SC V.1, SC VI.3, SC VI.4	R 336.1205(1)(a) & (b), R 336.2802(4)
[A]EUENCLOSEDFLARE1-S2 and EUENCLOSEDFLARE2-S2 are also included in FGNOX of ROP No. MI-ROP-N2688-2011, which has a NOx Limit of 205 tpy based on a 12-month rolling time period as determined at the a [B]The SO2 limit is based on the sulfur content of 408 ppmv in the landfill gas and operating 8760 hours per year. end of each calendar month.					

II. MATERIAL LIMITS

Material	Limit	Time Period / Operating Scenario	Equipment	Testing / Monitoring Method	Underlying Applicable Requirements
1. LFG	4,257 million cubic feet per year	12-month rolling time period as determined at the end of each calendar month	FGPROJECT	SC VI.1	R 336.1205(1)(a) & (b), R 336.2802(4)

III. PROCESS/OPERATIONAL RESTRICTIONS

NA

IV. DESIGN/EQUIPMENT PARAMETERS

1. The permittee shall install, calibrate, maintain, and operate FGPROJECT with a landfill gas flow monitoring device to measure the amount of landfill gas burned in the flares. **(R 336.1205(1)(a), R 336.1225, R 336.1702, R 336.2803, R 336.2804)**

V. TESTING/SAMPLING

Records shall be maintained on file for a period of five years. **(R 336.1201(3))**

1. The permittee shall verify the H_2S or TRS content of the landfill gas burned in FGPROJECT weekly by gas sampling (e.g. Draeger Tubes, Tedlar Sampling Bags, etc.) for 12 weeks and semi-annually by gas sampling using an EPA approved method and laboratory analysis, at the owner's expense, in accordance with Department requirements. Once the weekly sampling results remain less than 80% of 408 ppmvd or 326 ppmvd for the 12-week period, the permittee may reduce to monthly monitoring and recordkeeping of the H_2S (TRS) concentration. If the monthly H_2S (TRS equivalent) concentration exceeds 326 ppmvd, the permittee shall resume weekly sampling and recordkeeping until 12 weeks of the H_2S (TRS equivalent) concentration is less than 326 ppmvd. If at any time, the H_2S (TRS equivalent) concentration of the landfill gas sample exceeds 408 ppmvd, the permittee shall sample and record the H_2S (TRS equivalent) concentration of the landfill gas burned on a daily basis and shall review all operating and maintenance activities for the landfill gas collection and treatment system along with keeping records of corrective actions taken. Once the H_2S (TRS equivalent) concentration of the landfill gas determined from the daily samples are maintained below 408 ppmvd, for one week after an exceedance, the permittee may resume weekly monitoring and recordkeeping for 12 weeks as previously described. No less than 60 days prior to the initial test for each type of gas sampling, the permittee shall submit a complete test plan to the AQD District Office. The AQD must approve the final plan prior to the first test for each type of gas sampling. Thereafter, the permittee shall submit a test plan upon the request of the AQD District Supervisor or if any changes are made to the approved testing protocol. The permittee shall keep all records on file at the facility and make them available to the Department upon request. **(R 336.1205(1)(a) & (b), R 336.2001, R 336.2003, R 336.2004, R 336.2802(4))**

VI. MONITORING/RECORDKEEPING

Records shall be maintained on file for a period of five years. **(R 336.1201(3))**

1. The permittee shall keep, in a satisfactory manner, records of the landfill gas usage and hours of operation of each emission unit of FGPROJECT on a daily basis. The permittee shall keep all records on file at the facility and make them available to the Department upon request. **(R 336.1205(1)(a) & (b), R 336.1225, R 336.1702, R 336.2802(4))**

2. The permittee shall calculate and record the monthly and 12-month rolling time period CO and NOx emissions from FGPROJECT. The permittee shall keep all records on file at the facility and make them available to the Department upon request. **(R 336.1205(1)(a) & (b), R 336.2802(4))**

3. The permittee shall calculate and record the monthly and 12-month rolling SO_2 emissions from FGPROJECT as specified in Appendix 2, or other method as approved by the AQD District Supervisor. The calculations shall utilize the actual gas usage, actual hours of operation, and the sulfur concentration from the most recent gas sampling data unless otherwise requested by the AQD. All records shall be kept on file at the facility and make them available to the Department upon request. **(R 336.1205(1)(A) & (B)), R 336.2803, R 336.2804)**

4. The permittee shall record all sampling data collected for the H_2S (TRS equivalent) concentration for FGPROJECT in the landfill gas. All records shall be kept on file at the facility and make them available to the Department upon request. **(R 336.1205(1)(a) & (b)), R 336.1225)**

5. The permittee shall calculate and keep records of the annual emissions of CO from FGPROJECT described in Appendix 1, in tons per calendar year. Calculations and record keeping shall begin the month in which regular operations of EU5000CFMFLARE commences operation and shall continue for ten (10) years. **(R 336.2818(3))**

6. The permittee shall keep, in a satisfactory manner, monthly and 12-month rolling heat input calculations for FGPROJECT. The permittee shall keep all records on file at the facility and make them available to the Department upon request. **(R 336.1205(1)(a) & (b), R 336.1225, R 336.1702, R 336.2802(4))**

VII. REPORTING

1. The permittee shall submit records of the annual emission of CO from FGPROJECT described in Appendix 1, in tons per calendar year, to the AQD Permit Section Supervisor within 60 days following the end of each reporting year if both the following occur:
   a. The calendar year actual emission of CO exceed the baseline actual emissions (BAE) by a significant amount, and
   b. The calendar year actual emissions differ from the pre-construction projection. The pre-construction projection is the sum of the projected actual emissions from each existing emission unit and the potential emissions from each new emission unit included in the Hybrid Applicability Test used for FGPROJECT.

   The report shall contain the name, address, and telephone number of the facility (major stationary source); the annual emissions as calculated pursuant to SC VI.2, and any other information the owner or operator wishes to include (i.e., an explanation why emissions differ from the pre-construction projection). **(R 336.2818(3))**

VIII. STACK/VENT RESTRICTIONS

NA

IX. OTHER REQUIREMENTS

NA

Footnotes:
[1]This condition is state only enforceable and was established pursuant to Rule 201(1)(b).

APPENDIX 1
Recordkeeping Provisions for A Source Using
The Hybrid Applicability Test

All information in this Appendix shall be maintained pursuant to R 336.2818 and 40 CFR 52.21(r)(6)(i) for ten years after the emission units identified in FGPROJECT resume normal operations and shall be provided to the Department for the first year and thereafter made available to the Department upon request.

A. Source Description:
Advanced Disposal Services Arbor Hills Landfill, Inc. (ADS) operates the Arbor Hills Landfill, a Type II solid waste landfill, located in northeast Washtenaw County. ADS operates the gas collection and control system (GCCS) as required under state and federal air pollution control and solid waste regulations to collect and control gas generated by the landfill mass. The existing GCCS consists of a significant number of extraction points, including vertical wells and horizontal collectors that are located within the waste mass. These extraction points convey the collected landfill gas through a series of lateral and header pipes to an adjacent landfill gas-to-energy facility for electricity production. The gas-to-energy facility, owned and operated by Arbor Hills Energy, LLC, serves as the primary control device for the collected landfill gas. Two permitted enclosed flares with a combined capacity of 7,200 standard cubic feet per minute (scfm) are utilized as back-up control devices for the GCCS in the event the gas-to-energy facility is off-line or operating at reduced capacity.

B. Project Description:
As a result of gradually increasing landfill gas generation rates and current limitations in the GCCS, the United States Environmental Protection Agency (USEPA) Region 5 entered an order requiring ADS must install a 5,000 scfm capacity open utility flare to permanently supplement the existing control devices when the gas-to-energy facility is not utilizing all of the collected landfill gas. The proposed flare will also provide additional operational flexibility for gas control, not currently available through the existing flares. Specifically, the new flare will have an extended range capable of operating at smaller heat input rates (the turn down ratio for utility flares is approximately 4 times greater than enclosed flares). The greater turn down ratio will allow the open utility flare to combust gas under a wider range of operating scenarios unattainable by the existing enclosed flares. This will assure the operational flexibility to assure all necessary control of the captured landfill gas. The “Project” is a modification to the existing GCCS, which will include installing a new 5,000 scfm flare and the modification to the operation of the two existing flares that will be used to control landfill gas captured at the landfill.

C. Applicability Test Description:
ADS has demonstrated that the proposed project will not cause a significant emissions increase of any criteria pollutant, and specifically CO to the source using the Hybrid Applicability Test. The Project Emissions Change equals the Projected Actual Emissions (existing + new) minus the Baseline Actual Emissions (existing) minus the Excluded Emissions (existing), as described in R 336.2802(4)(c).

D. CO Emission Increase (tpy):

A. Baseline Actual Emissions (MAERS 2015/2016 Enclosed Flare 1 + 2)	16.6
B. Capable of Accommodating (Dec 2016 Enclosed Flare 1 + 2)	189.2
C. Projected Emissions (Enclosed Flare 1 + 2 + Open Flare 3)	289.1
D. Excluded Emissions (D=B-A)	172.6
E. Projected Actual Emissions (E=C-D)	116.5
F. Emission Increase (F=E-A)	**99.9**

APPENDIX 2
Emission Calculations

The permittee shall use the following calculations in conjunction with monitoring, testing or recordkeeping data to determine compliance with the applicable requirements referenced in EU5000CFMFLARE and FGPROJECT. The permittee shall use emission factors from vendor data or from source specific testing (if test data is available, use most recent test data), as available for each emission unit. The permittee shall use emission factors contained in the most recent AP-42 (Compilation of Air Pollutant Emission Factors) or FIRE (Factor Information Retrieval) database if vendor or testing data is not available. If emission factors from other sources are used, the permittee shall obtain the approval of the AQD District Supervisor before using the emission factors to calculate emissions. The permittee shall document the source of each emission factor used in the calculations.

Calculation used to determine NMOC emissions from any nonproductive area

The following shall be used to determine if any nonproductive area of the landfill may be excluded from control, provided that the total of all excluded areas can be shown to contribute less than one percent of the total amount of NMOC emissions from the landfill. The amount, location, and age of the material shall be documented and provided to the District Supervisor upon request. A separate NMOC emissions estimate shall be made for each section proposed for exclusion, and the sum of all such sections shall be compared to the NMOC emissions estimate for the entire landfill. Emissions from each section shall be computed using the following equation:

$$Qi = 2\ k\ Lo\ Mi\ (e\text{-}kt\ i)\ (CNMOC)\ (3.6 \times 10{-}9)$$ where,

Qi = NMOC emission rate from the ith section, megagrams per year

k = methane generation rate constant, year−1

Lo = methane generation potential, cubic meters per megagram solid waste

Mi = mass of the degradable solid waste in the ith section, megagram

ti = age of the solid waste in the ith section, years

CNMOC = concentration of non-methane organic compounds, ppm by volume

3.6×10−9 = conversion factor

The values for k and CNMOC determined in field testing shall be used if field testing has been performed in determining the NMOC emission rate or the radii of influence (this distance from the well center to a point in the landfill where the pressure gradient applied by the blower or compressor approaches zero). If field testing has not been performed, the default values for k, LO and CNMOC provided in 40 CFR 60.754(a)(1) or the alternative values from 40 CFR 60.754(a)(5) shall be used. The mass of non-degradable solid waste contained within the given section may be subtracted from the total mass of the section when estimating emissions provided the nature, location, age, and amount of the non-degradable material is documented as provided in 40 CFR 60.759(a)(3)(i). **(40 CFR 60.759(a)(3)(iii), 40 CFR 63.1955(a))**

Net Heating Value of the gas being combusted in the flare:
The net heating value of the gas being combusted in the flare shall be calculated and recorded using the equation provided in 40 CFR 60.18(f)(3). **(40 CFR 60.18(f)(3))**

$$H_T = K \sum_{i=1}^{n} C_i H_i$$

WHERE:

HT=Net heating value of the sample,
MJ/scm; where the net enthalpy per mole of offgas is based on combustion at 25 °C and 760 mm Hg, but the standard temperature for determining the volume corresponding to one mole is 20 °C;

$K = \text{Constant}, 1.740 \times 10^{-7} \left(\frac{1}{ppm}\right) \left(\frac{g\ mole}{scm}\right) \left(\frac{MJ}{kcal}\right)$

where the standard temperature for $\left(\frac{g\ mole}{scm}\right)$ is 20°C;

Ci=Concentration of sample component i in ppm on a wet basis, as measured for organics by Reference Method 18 and measured for hydrogen and carbon monoxide by ASTM D1946–77 or 90 (Reapproved 1994) (Incorporated by reference as specified in 40 CFR 60.17); and
Hi=Net heat of combustion of sample component i, kcal/g mole at 25 °C and 760 mm Hg. The heats of combustion may be determined using ASTM D2382–76 or 88 or D4809–95 (incorporated by reference as specified in 40 CFR 60.17) if published values are not available or cannot be calculated.

Calculation for Vmax steam-assisted and non-assisted flares
The maximum permitted velocity, Vmax, for flares complying with 40 CFR 60.18(c)(4)(iii) shall be calculated and recorded using the equation provided in 40 CFR 60.18(f)(5). **(40 CFR 60.18(f)(5))**

Log10 (Vmax)=(HT+28.8)/31.7

Vmax=Maximum permitted velocity, M/sec 28.8=Constant 31.7=Constant HT=The net heating value as determined above.

Calculation for Vmax for air-assisted flares
The maximum permitted velocity, Vmax, for air-assisted flares shall be calculated and recorded using the equation provided in 40 CFR 60.18(f)(6). **(40 CFR 60.18(f)(6))**

Vmax=8.706+0.7084 (HT)

Vmax=Maximum permitted velocity, m/sec 8.706=Constant 0.7084=Constant HT=The net heating value as determined above.

Calculation for SO_2 Emissions
The following calculation for SO_2 emissions shall utilize the actual gas usage, actual hours of operation, and the sulfur concentration from the most recent laboratory test sample.

$SO_2 = [(scfm) \times (60\ min/hr) \times (H) \times (ppmv_{sulfur} * 1E\text{-}06) \times (MW_{SO_2})] \div [(R \times T)] = pounds/month$

Where:
scfm = standard cubic feet per minute gas flow
$ppmv_{sulfur}$ = parts per million by volume of Sulfur in the gas (based on the most recent test sample)
MW_{SO_2} = Molecular Weight of SO_2 = 64.066 lb/lb-mol
H = Actual Hours per month operated
R = Universal Gas Constant = 0.7302 atm-ft^3/lb-mol-R
T = Standard Temperature (absolute) = 519 R