Notice of Construction (NOC) Worksheet

pscleanair.org
Puget Sound Clean Air Agency

Applicant: King Co Solid Waste – Cedar Hills Landfill	**NOC Number**: 11307
Project Location: 16645 228th Ave SE, Maple Valley, WA 98027	**Registration Number**: 10138
Applicant Name and Phone: Pat McLaughlin (206) 477-4466	**NAICS:** 562212
Engineer: Ralph Munoz	**Inspector**: Megan Chaplin

A. DESCRIPTION

For the Order of Approval:
Area 8 lateral expansion landfill development which will be equipped with a landfill gas collection system and a leachate collection system. Collected landfill gas is then either sent to a landfill gas-to-energy facility for processing or combusted at the existing onsite flare station.

Additional Information

Facility: The King County Cedar Hills Regional Landfill (CHRL) is a facility that is specifically constructed for the purpose of disposing of municipal solid waste. It is constructed in cells or sections isolated from other parts of the landfill by soil or other noncombustible cover material. According to the application, older sections have clay-based or flexible membrane caps that Cedar Hills actively monitors for tears or damage. CHRL is located at 16645 228th Avenue Southeast, off Cedar Grove Road, three miles north of Maple Valley, six miles east of the City of Renton and about four miles south of the City of Issaquah. CHRL is a current Air Operating Permit source. CHRL occupies approximately 940 acres in total size, and this lateral expansion of Area 8 was planned as part of the original design of the facility (See SEPA section of this worksheet for further details).

Landfill gas collection is accomplished by a network of vertical wells and horizontal collection trenches installed in both the closed and active areas of the landfill. When vacuum is applied to these wells and trenches, the system is said to be under "active extraction." In contrast, a collection system that relies on gas flowing only as a result of internal, natural pressure gradients in the landfill is said to be a "passive" system. Both active and passive systems are used at the Cedar Hills Landfill. This collection network is known as the "Gas Collection and Control System" and is a required part of a federal rule (40 CFR 60 Subpart WWW or XXX). As part of the landfill design, leachate from the landfill is collected and transported by pipes to an on-site treatment system. Leachate is water that has passed through some of the landfill solids and extracted some of the components of the solid. As a result, leachate can contain strong odors and other air contaminants as it evaporates.

From the application:

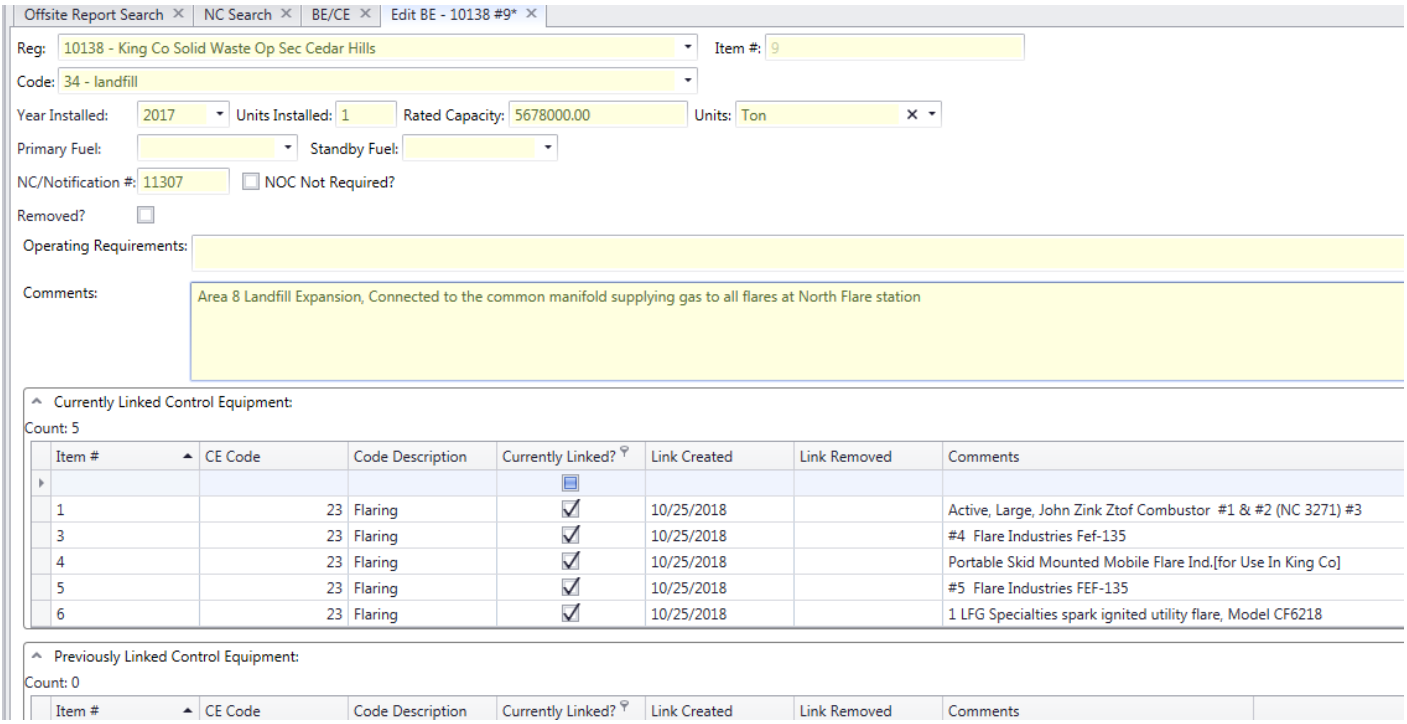
> *The purpose of developing Area 8 of the CHRL is to provide a lateral expansion of the landfill. In total, Area 8 is approximately 32 acres and is bounded on the north by Areas 6 and 7 and on the west by the West Perimeter Road. Area 8 is bounded on the east by landfill maintenance and support facilities, as well as a planned stockpile that will be adjacent to the excavation area. The existing Main Soil Stockpile is located in the eastern half of the Area 8 footprint, and soil from this stockpile will be relocated to the top deck of Area 6 to the north. Area 8 of the CHRL is intended to be available for placement of refuse prior to Area 7 reaching its capacity in April of 2019.*

CHRL currently routes all landfill gas to the landfill gas-to-energy facility: Bio energy (Washington), LLC (Registration #29205). The landfill gas from Area 8 is also planned to go to Bio energy (Washington), LLC. However; CHRL does have flares of their own at the North Flare Station that can process landfill gas before being emitted to the atmosphere. The Flares for CHRL are covered under separate NOCs – 6002, 7076, 7836, 8062, 10532. These flares are not being physically modified as part of this permitting action and are therefore not subject to NSR under this permit action.

Air quality impacts of the Cedar Hills Regional Landfill Area 8 Development project associated with construction activities possibly include on-site vehicular emissions, excavation, and corresponding dust, and odors. Sources of particulate matter are fugitive dust from clearing, excavation activities, uncovered stockpiles, and/or diesel smoke from engine use. Some construction activities may cause odors, particularly during paving operations using tar and asphalt. Construction activities are not evaluated under this NOC, however CHRL will still be required to monitor for odors and other fugitive dust emissions during construction as required in their Air Operating Permit and PSCAA Regulations.

B. DATABASE INFORMATION

Added landfill operations to database – BE #9



Offsite Report Search | NC Search | BE/CE | Edit BE - 10138 #9*

Reg: 10138 - King Co Solid Waste Op Sec Cedar Hills Item #: 9

Code: 34 - landfill

Year Installed: 2017 Units Installed: 1 Rated Capacity: 5678000.00 Units: Ton

Primary Fuel: Standby Fuel:

NC/Notification #: 11307 NOC Not Required?

Removed?

Operating Requirements:

Comments: Area 8 Landfill Expansion, Connected to the common manifold supplying gas to all flares at North Flare station

Currently Linked Control Equipment:

Count: 5

Item #	CE Code	Code Description	Currently Linked?	Link Created	Link Removed	Comments
1	23	Flaring	☑	10/25/2018		Active, Large, John Zink Ztof Combustor #1 & #2 (NC 3271) #3
3	23	Flaring	☑	10/25/2018		#4 Flare Industries Fef-135
4	23	Flaring	☑	10/25/2018		Portable Skid Mounted Mobile Flare Ind.[for Use In King Co]
5	23	Flaring	☑	10/25/2018		#5 Flare Industries FEF-135
6	23	Flaring	☑	10/25/2018		1 LFG Specialties spark ignited utility flare, Model CF6218

Previously Linked Control Equipment:

Count: 0

Item #	CE Code	Code Description	Currently Linked?	Link Created	Link Removed	Comments

NSPS	**Yes**	**Applicable NSPS: XXX**	**Delegated? Yes**
NESHAP	**No**	**Applicable NESHAP:**	**Delegated?**
Synthetic Minor	**No**		

See federal rule section for a discussion on the applicability of NSPS XXX. CHRLF is already subject to the requirements of 40 CFR 60 Subpart WWW and 40 CFR 63 Subpart AAAA, this modification will change the applicability of the landfill from a WWW subpart landfill to a XXX subpart landfill.

C. NOC FEES AND ANNUAL REGISTRATION FEES

NOC Fees:

Fee Description	Cost	Amount Received (Date)
Filing Fee	$ 1,150	
Equipment (1 Landfill Expansion (600$) and 1 Landfill gas system(2,500$))	$3,100	
SEPA (DNS)	$0	
NSPS XXX, WWW and NESHAP AAAA	$3,000	
Refined Dispersion model (submitted by applicant, reviewed by Agency)	$1,000	
Public Notice Fees	TBD after public notice	
Filing received		$ 1,150 (1/5/17)
Additional fee received		$7,100 (3/20/19)
Total		

Sent email to Megan for an additional $7,100 for NOC fees 2/25/19
Public notice fees will be determined after public notice is over.

$7,100 paid on 3/20/19 with receipt #037755

Registration Fees:

Cedar Hills is an AOP source which pays fees associated with their NAICS code, no change in registration fees with the addition of this landfill Area 8 are expected besides the additional costs per ton of air pollution outlined in Reg 1 Section 7.07(b)(2).

A copy of the 2018 registration is posted below for informational purposes. Note that the pollutant emission surcharges could potentially change every year, based on actual emission rates:

pscleanair.org
Puget Sound Clean Air Agency

Bill to:
King Co Solid Waste Op Sec Cedar Hills **201 S Jackson St Ste 701** **Seattle, WA 98104-3855** **Attention: Accounts Payable**

Invoice Date:	Invoice #
November 20, 2017	20180019
Due Date:	**Terms:**
January 04, 2018	Net 45 Days
Facility ID (Permit #):	
10138	

Site Address: ***King Co Solid Waste Op Sec Cedar Hills***
16645 228th Ave SE, Maple Valley, WA, 98038

The annual operating permit fee is required by Washington State law and Puget Sound Clean Air Agency's Regulation I. Your fees are based on your NAICS code and your actual emissions during 2016.

Facility Fees and Applicable Regulations				**Charges**
Facility Fee for Operating Permit Sources. Reg I, 7.07(b)(1)(iii)			**$**	**28,600.00**
NAICS 562212 -- Solid Waste Landfill				
Emission Surcharges - Reg I,7.07(b)(2)	**Tons in 2016**	**Per Ton**		
HAP (Hazardous Air Pollutants)	1	$ 60	$	60.00
NOx (Nitrogen Oxides)	23	$ 60	$	1,380.00
VOC (Volatile Organic Compounds)	12	$ 60	$	720.00
			$	**2,160.00**
Fee Totals				
Operating Permit Fee (After February 18, 2018, the fee is $37,260.00)			**$**	**30,760.00**
The Total Fee is due by January 04, 2018. If unpaid after February 18, 2018, an additional delinquent fee of $6,500.00 will be applied. The delinquent fee is equal to 25% of the Operating Permit Fee, not to exceed $6,500 (Reg I, 7.07(b)).				
WA State Department of Ecology (WDOE) surcharge, Reg I, 7.07(d)			**$**	**591.08**
For further information regarding the WDOE surcharge, please call 1-360-407-7530.				
TOTAL FEE			**$**	**31,351.08**

D. STATE ENVIRONMENTAL POLICY ACT (SEPA) REVIEW

Regulation I, Article 2 includes the Puget Sound Clean Air Agency SEPA rules and regulations, along with Chapter 197-11 of the WAC. SEPA allows the Agency to consider the environmental impacts of an application before an order of approval is given out. SEPA review is required for applications which involve a government "action" as defined in SEPA rules and regulations (categorical SEPA exemptions are listed in WAC 197-11-800 through -890). Projects requiring an air permit are not categorically exempt under WAC 197-11-800(1)(a)(iii) and (2)(a)(iii) – projects that require a license governing emissions to air except variances and open burning permits.

Cedar Hills underwent a SEPA review with King County in 2010, under their site development plan with King County Department of Natural Resources and Parks, Solid Waste Division

(KCSWD). The contact for this SEPA determination is Laura Belt – Project Manager at 206-477-5215. The Final Environmental Impact Statement and all associated documents can be found on the web at:

https://your.kingcounty.gov/solidwaste/facilities/cedar-hills-development.asp#project_documents

This EIS included the development plan for Area 8 (Called Alternative 2 in the EIS document) and for this NOC action we will rely on the existing EIS. Alternative 2 is located in the "alternatives" EIS section:

https://kingcounty.gov/~/media/depts/dnrp/solid-waste/facilities/documents/Final_EIS_Chapter_2.ashx?la=en

No further action will be taken by the Agency for SEPA.

E. BACT REVIEW

Regulatory Background:
WAC 173-400-113 states that a permitting authority that is reviewing an application to establish a new source or modification in an attainment or unclassifiable area shall issue an order of approval if it determines that the proposed project satisfies "*The proposed new source or modification will employ BACT for all pollutants not previously emitted or whose emissions would increase as a result of the new source or modification*." This BACT (defined below) requirement applies to the Area 8 development project since it is considered a new source.

Washington State regulation, WAC 173-400-030, defines **Best available control technology (BACT)** as an emission limitation based on the maximum degree of reduction for each air pollutant subject to regulation under chapter 70.94 RCW emitted from or which result from any new or modified stationary source, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such pollutant. In no event shall application of the "best available control technology" result in emissions of any pollutants which will exceed the emissions allowed by any applicable standard under 40 C.F.R. Part 60 and Part 61. Emissions from any source utilizing clean fuels, or any other means, to comply with this paragraph shall not be allowed to increase above levels that would have been required under the definition of BACT in the Federal Clean Air Act as it existed prior to enactment of the Clean Air Act Amendments of 1990.

The Puget Sound Clean Air Agency hasn't issued a permit for a new landfill operation since 2008, which was for the Area 7 expansion for this facility. BACT at that time was simply considered the landfill gas collection system required by 40 CFR 60 Subpart WWW.

The agency has issued numerous permits for flare replacements or control technology replacements for landfills, including NOCs 11073 and 10795. These changes did not require BACT, only reasonably available control technology (RACT) since they were replacement or substantial alterations of control technology.

NOC 10532 was issued for a new flare at this facility, which was to help burn LFG with lower methane concentration since most of the LFG goes to the landfill gas to energy facility, Bio Energy (Washington) LLC. At that time it was determined that BACT was the use of a landfill gas collection system capable of meeting 40 CFR 60 Subpart WWW requirements, and control technology capable of meeting the rest of the requirements of 40 CFR 60.33(c) and 60.18:

40 CFR 60.33c (c)- Emission guidelines for municipal solid waste landfill emissions.

> ***(c)*** *For approval, a State plan shall include provisions for the control of collected MSW landfill emissions through the use of control devices meeting the requirements of paragraph (c)(1), (2), or (3) of this section, except as provided in § 60.24.*
> ***(1)*** *An open flare designed and operated in accordance with the parameters established in § 60.18; or*
> ***(2)*** *A control system designed and operated to reduce NMOC by 98 weight percent; or*
> ***(3)*** *An enclosed combustor designed and operated to reduce the outlet NMOC concentration to 20 parts per million as hexane by volume, dry basis at 3 percent oxygen, or less.*

40 CFR 60.18 - General control device and work practice requirements further provides the following:

> *(1) Flares shall be designed for and operated with no visible emissions as determined by the methods specified in paragraph (f), except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.*

Other Regulatory Agencies:

A thorough review of several BACT databases was conducted to determine if there were emission-control specifications specifically for landfill operations. The search resulted in the following:

Origin	Process Source	BACT Determination
MassDep	Flares with biomass digester gas for fuel	▪ NO_x – 2.70 lbs per Mscf/min gas flared ▪ CO – 13.70 lbs per Mscf/min gas flared ▪ PM – 0.15 lbs per Mscf/min gas flared ▪ CO_2 – 7,105 lbs per Mscf/min gas flared ▪ VOC – 0.55 lbs per Mscf/min gas flared ▪ SO_2 – 99.5 percent oxidation of 200 ppm H_2S inlet emissions ▪ H_2S – 200 ppm inlet concentration
SCAQMD (No. 538706)	Flare for oil and gas operations	▪ VOC – 10 ppmv on a dry, volumetric basis corrected to 3% oxygen (O_2) ▪ NO_x - 15 ppmv on a dry, volumetric basis corrected to 3% oxygen (O_2) ▪ CO - 10 ppmv on a dry, volumetric basis corrected to 3% oxygen (O_2)
SCAQMD (No. 245157)	Flare for landfill operations	▪ Minimum temperature in flare stack: 1400 ^oF ▪ NOx 0.06 lbs/MMBtu ▪ CO 0.01 lbs/MMBtu ▪ PM 6.1 lbs/MMscf ▪ Minimum non-methane organic compounds (NMHC) destruction efficiency of 98% or maximum NMHC concentration in stack of 20 ppm, dry corrected to 3% O2 as hexane
MaineDep (A-1086-71-A-N)	Flare with biomass digester gas for fuel	▪ NO_x – 48.0 lbs per MMscf gas flared ▪ CO – 1.8 lbs per MMscf gas flared ▪ PM – 0.02 lbs/MMBtu ▪ VOC – 12.10 lbs per MMscf gas flared ▪ SO_2 – 2.0 lbs per MMscf gas flared ▪ Opacity – visible emissions from the flare shall not exceed 10% on a 6 minute block average basis, except for no more than one (1) six (6) minute block average in a 3 hour period
NC 11073 – King County Solid Waste Division	Enclosed Ground Flare for landfill gas	▪ Reduce NMOC by 98% by weight or reduce emissions to 20 ppm by volume hexane ▪ Flare shall be designed for and operated with no visible emissions as determined by EPA method 22, except for periods not to exceed a total of 5 minutes during any consecutive 2 hours.
SJVAPCD	Flare with biomass	▪ NO_x 0.06 lbs/MMBtu

Origin	Process Source	BACT Determination
	digester gas for fuel	▪ ≤ 40 ppmv Sulfur in digester gas

Texas: https://www.tceq.texas.gov/permitting/air/nav/air_bact_chemsource.html
No specific landfill operation BACT found on this site; however, it does include Flare operations which requires that the flare meet the standards of 40 CFR 60.18 (similar to what the Agency has required in the past for flares in NOC 11073)

CARB - https://www.arb.ca.gov/bact/bactnew/determination.php?var=932
The California Air Resources Board website had two results matching the landfill operation BACT requirements.

The first result was for Sycamore Landfill in San Diego County APCD using a landfill gas flare, and the BACT requirement was 20ppmv VOC @3% O2.

The other was for Santa Maria Regional Landfill in Santa Barbara County APCD, requiring the flare meet 20 ppmv @3% O2 for VOC, 0.4 lbs of CO/MMbtu and 0.05 lbs of NOx/MMBtu.

Oregon DEQ:
http://www.oregon.gov/deq/FilterPermitsDocs/110001ColumbiaRidgeLandfill_ST_RR.pdf
This permit went through a top down BACT analysis for SO2, including the use of treatment systems for the gas prior to flare operations. SO2 emissions from landfill operations typically come from the combustion of H2S in the flare, Oregon determined that the use of add on controls for the landfill would not be economically feasible. The amount of SO2 reduced with this project is much more than what they would be reduced for Area 8 landfill.

The project in the Oregon paper above, if reducing SO2 emissions at 90%, would reduce emissions by about 110 tons/year for this project when getting H2S gas at 300 ppm. The Cost per ton of reduction when using a "Sulfa Treat System" was 22,000$/ton and for using a LO-CAT system was 33,000$/ton. Their BACT determination was to monitor the inlet H2S/Total reduced sulfurs in the inlet to 300 ppm.

Missouri Department of Natural Resources:
https://dnr.mo.gov/env/apcp/permits/docs/bridgetonlandf2018cpf.pdf
The Missouri Department of Natural Resources just issued a permit in 2018 of April which included an SO2 BACT of the following:

Landfill gas Monitoring and Landfill Gas Content Sampling:

> 1) The permittee shall collect landfill gas samples at the main blower station using summa canisters.

2) The permittee shall conduct testing on the landfill gas samples to quantify sulfur compounds using ASTM D5504-12 or an alternative approved by the Air Pollution Control Program's Compliance/Enforcement Section. Testing results shall be in units of ppmv.
3) The permittee shall conduct sampling on the frequency detailed in Table 1. The S02 emissions shall be calculated using Attachment Actual S02 Emissions, or an equivalent.

Table 1: LFG sulfur content sampling frequency

SO_2 Emissions	Sampling shall be performed a minimum of....
For the first six months after the effective date of this permit or until 12 month rolling emissions are less than or equal to 75, whichever is later:	1st and 15th of each month.
If 12 month rolling emissions are less than 75 but greater than or equal to 50:	Monthly.
If 12 month rolling emissions are less than 50.	Annually, to be conducted between 11 and 13 months from the previous test.

This limit seems to have been to support a 100 ton/year limit given at the beginning of the permit. (Special condition 2)

San Joaquin Valley Air Pollution District
http://www.valleyair.org/busind/pto/bact/bactLoader.htm
San Joaquin Valley had a BACT listed for Landfill Gas collection systems, but rescinded this BACT in 2016. (BACT search ID 1.4.3). It's possible that this BACT was incorporated into their Rule instead of being a BACT determination, but I was unable to determine what this BACT requirement was before being rescinded.

Bay Area Air Quality Management District
http://www.baaqmd.gov/permits/permitting-manuals/bact-tbact-workbook
Bay area has BACT information for Landfill Operations, outlined below:

Source:	*Flare - Digester Gas or Landfill Gas from Non-Hazardous Waste landfill*	**Revision:**	*1*
		Document #:	*80.1*
Class:	*All*	**Date:**	*12/16/91*

Determination

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice	TYPICAL TECHNOLOGY
POC	1. *n/d* 2. *Ground level, enclosed, ≥0.6 sec. retention time at ≥1400°F, auto combustion air control, automatic shoutoff gas valve and automatic re-start system*[b]	1. *n/d* 2. *BAAQMD Approved Design and Operation*[b]
NOx	1. *≤0.06 lb/MMBtu* 2. *0.06 lb/MMBtu*	1. *n/s* 2. *n/s*
SO_2	1. *Scrubbing and/or carbon adsorption for hydrogen sulfide removal*[c] 2. *n/d*	1. *BAAQMD Approved Design and Operation*[b] 2. *n/d*
CO	1. *n/d* 2. *Same as for POC above*[b]	1. *n/a* 2. *BAAQMD Approved Design and Operation*[b]
PM_{10}	1. *n/s* 2. *n/s*	1. *Fuel Gas Filter* 2. *Knockout Vessel*
NPOC	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*

Source:	*Landfill Gas Gathering System*	Revision:	*1*
		Document #:	*101.1*
Class:	*All*	Date:	*10/18/91*

Determination

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice	TYPICAL TECHNOLOGY
POC	1. *n/d* 2. *Horizontal and vertical gas collection lines vented to I.C. Engine or enclosed flare*[b]	1. *n/d* 2. *BAAQMD Approved Design and Operation*[c]
NOx	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*
SO_2	1. *n/d* 2. *n/d*	1. *n/d* 2. *n/d*
CO	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*
PM_{10}	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*
NPOC	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*

References

b. See I.C. Engine and flare sections of this workbook for respective BACT limits
c. BAAQMD

A recent permit was issued by Bay Area for a new landfill gas to energy plant, which included the use of two landfill gas fired lean burn IC engines, a landfill gas treatment system, and a waste gas flare. This is similar to the Cedar hills landfill set up, except the lean burn engines are not part of the property and belong to Bio Energy (Washington) LLC. However; some of the non-engine related information for BACT can be used for Cedar Hills:
http://www.baaqmd.gov/~/media/files/engineering/title-v-permits/e0432/22636_2011_8_newmajorfacility_ee.pdf

From the Bay Area permit's statement of basis, this facility was required to meet the BACT guidelines outlined in documents 101.1 and 80.1 for BACT. However; pursuant to Regulation 2-2-110, secondary emissions from abatement devices that are required to meet BACT or BARCT requirements for another pollutant are exempt from the Regulation 2-2-301 BACT requirements but must achieve a RACT level of control for these secondary pollutants instead. This permit did not specifically require the BACT level controls listed in Document 80.1 for NOx, SO2, PM10, and CO but RACT was discussed in detail. This permit required the following for BACT:

VOC: 98% by weight destruction efficiency or no more than 30 ppmv NMOC at the outlet, expressed as methane and corrected to 3% Oxygen.

NOx: 0.06 lbs of NOx/MMBtu (or 17 ppmv NOx, expressed as NO2 at 15% oxygen)

SOx: 6.11 pounds/hr

CO: 0.20 lbs of CO/MMbtu (or 38 ppmv CO at 15% oxygen dry)

Federal Standards

There are 3 federal standards applicable to landfill operations that were also looked at in addition to the BACT reviews of other agencies:

40 CFR WWW requirements
This standard currently applies to Cedar Hills Regional Landfill and requirements are outlined in 40 CFR 60.752 (b) and (c). Section (b)(2)(i) through (iii) of this subpart requires that the facility submit a collection and control system designed by a professional engineer, install a gas collection and control system and then route all the gases through one of the following:

(A) An open flare designed and operated in accordance with §60.18 except as noted in §60.754(e);

(B) A control system designed and operated to reduce NMOC by 98 weight-percent, or, when an enclosed combustion device is used for control, to either 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. The reduction efficiency or parts per million by volume shall be established by an initial performance test to be completed no later than 180 days after the initial startup of the approved control system using the test methods specified in §60.754(d).

(*1*) If a boiler or process heater is used as the control device, the landfill gas stream shall be introduced into the flame zone.

(*2*) The control device shall be operated within the parameter ranges established during the initial or most recent performance test. The operating parameters to be monitored are specified in §60.756;

(C) Route the collected gas to a treatment system that processes the collected gas for subsequent sale or use

Additionally, this subpart exempts sources from complying during start-up, shutdown, and malfunctions as follows:

> (e) The provisions of this subpart 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 5 days for collection systems and shall not exceed 1 hour for treatment or control devices.

EPA has taken a recent stance that startup, shutdown, and malfunctions must contain standards and cannot be completely exempt from permitting. As a result, the averaging allowed under 40 CFR subpart AAAA will be allowed during Startup, shutdown and malfunctions.

Cedar Hills is complying with 40 CFR 60.752(b)(2)(iii)(C) outlined above since they are sending their LFG to Bio Energy (Washington) LLC. At the Bio Energy (Washington) plant, the gas refinement process begins with compression of the landfill gas. The compressed gas is then sent through a series of processes that remove all the Hydrogen Sulfide, Carbon Dioxide, non-methane Volatile Organic Compounds, Water, and Nitrogen. The waste gas, which is the stream comprised of all the byproducts of the various separation processes, is burned at BEW's flare. Some of the waste gas can also be sent to the engines at the BEW facility. The recycled engines are modified to run on both diesel fuel and methane gas. The gas generated from the landfill can then be used to power the BEW plant. After separation and compression, the purified methane is sent through one final compression stage, pressurizing the gas to 900 PSI so it can be directly injected into the Puget Sound pipeline for residential use.

Cedar Hills complies with (B) if the engines and/or flare at the BEW facility go down and are unable to take the landfill gas for processing by routing the collected landfill gas to the north flare station.

40 CFR 63 AAAA requirements:

This subpart is the federal standard promulgated under 40 CFR 63 Subpart AAAA which regulates hazardous air pollutants at municipal solid waste landfills that are a major source of HAPs, co-located with a major source of HAPs or are area sources that meet the landfill size thresholds in the rule.

Section 40 CFR 63.1955 contains the requirements of this subpart, which is outlined below:

> (a) You must fulfill one of the requirements in paragraph (a)(1) or (2) of this section, whichever is applicable:
>
> > (1) Comply with the requirements of 40 CFR part 60, subpart WWW.
> >
> > (2) Comply with the requirements of the Federal plan or EPA approved and effective State plan or tribal plan that implements 40 CFR part 60, subpart Cc.

The requirements of 40 CFR 60, Subpart Cc are outlined above under "similar permits" 60.33c (c) and 40 CFR 60 Subpart WWW is also outlined above under "**40 CFR WWW requirements"**

40 CFR 60 XXX Requirements:

The final rule that is evaluated under this BACT analysis is the newly promulgated NSPS 40 CFR 60 Subpart XXX. On July 14, 2016, EPA issued New Source Performance Standards for Municipal Solid Waste Landfills as Subpart XXX: Standards of Performance for Municipal Solid Waste Landfills that Commenced Construction, Reconstruction, or Modification after July 17. 2014.

Subpart XXX replaces the current NSPS regulating MSW landfills, Subpart WWW for those new source landfills that have commenced lateral or vertical expansion after July 17, 2014.

The relevant standards from this subpart are outlined in 60.763(b)(2)(ii)

(ii)Collection system. Install and start up a collection and control system that captures the gas generated within the landfill as required by paragraphs (b)(2)(ii)(C) or (D) and (b)(2)(iii) of this section:

(C) An active collection system must:

(1) Be designed to handle the maximum expected gas flow rate from the entire area of the landfill that warrants control over the intended use period of the gas control system equipment;

(2) Collect gas from each area, cell, or group of cells in the landfill in which the initial solid waste has been placed for a period of 5 years or more if active; or 2 years or more if closed or at final grade.

(3) Collect gas at a sufficient extraction rate;

(4) Be designed to minimize off-site migration of subsurface gas.

(D) A passive collection system must:

(1) Comply with the provisions specified in paragraphs (b)(2)(ii)(C)(1), (2), and (3) of this section.

(2) Be installed with liners on the bottom and all sides in all areas in which gas is to be collected. The liners must be installed as required under 40 CFR 258.40.

(iii)Control system. Route all the collected gas to a control system that complies with the requirements in either paragraph (b)(2)(iii)(A), (B), or (C) of this section.

(A) A non-enclosed flare designed and operated in accordance with the parameters established in § 60.18 except as noted in § 60.764(e); or

(B) A control system designed and operated to reduce NMOC by 98 weight-percent, or, when an enclosed combustion device is used for control, to either 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. The reduction efficiency or parts per million by volume must be established by an initial performance test to be completed no later than 180 days after the initial startup of the approved control system using the test methods specified in § 60.764(d). The performance test is not required for boilers and process heaters with design heat input capacities equal to or greater than 44 megawatts that burn landfill gas for compliance with this subpart.

(1) If a boiler or process heater is used as the control device, the landfill gas stream must be introduced into the flame zone.

(2) The control device must be operated within the parameter ranges established during the initial or most recent performance test. The operating parameters to be monitored are specified in § 60.766;

(C) Route the collected gas to a treatment system that processes the collected gas for subsequent sale or beneficial use such as fuel for combustion, production of vehicle fuel, production of high-Btu gas for pipeline injection, or use as a raw material in a chemical manufacturing process. Venting of treated landfill gas to the ambient air is not allowed. If the treated landfill gas cannot be routed for subsequent sale or beneficial use, then the treated landfill gas must be controlled according to either paragraph (b)(2)(iii)(A) or (B) of this section.

(D) All emissions from any atmospheric vent from the gas treatment system are subject to the requirements of paragraph (b)(2)(iii)(A) or (B) of this section. For purposes of this subpart, atmospheric vents located on the condensate storage tank are not part of the treatment system and are exempt from the requirements of paragraph (b)(2)(iii)(A) or (B) of this section.

The relevant standards for controlling landfill gas are the same in Subpart XXX as they are in Subpart WWW.

Analysis and recommendations:

Based on the information found from other agencies as well as federal standards, the use of a gas collection system and flare that meets the standards of 40 CFR 60 Subpart WWW Section 60.752 (b)(2)(iii)(B) or 60 Subpart XXX 60.763(b)(2)(ii)(B) is considered BACT for VOC and TAC:

40 CFR 60 subpart WWW
A control system designed and operated to reduce NMOC by 98 weight-percent, or, when an enclosed combustion device is used for control, to either 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. The reduction efficiency or parts per million by volume shall be established by an initial performance test to be completed no later than 180 days after the initial startup of the approved control system using the test methods specified in §60.754(d).

40 CFR 60 Subpart XXX
(B) A control system designed and operated to reduce NMOC by 98 weight-percent, or, when an enclosed combustion device is used for control, to either 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. The reduction efficiency or parts per million by volume must be established by an initial performance test to be completed no later than 180 days after the initial startup of the approved control system using the test methods specified in § 60.764(d).

Although NSPS WWW/NSPS XXX only requires one performance test, this NOC will give the ability to conduct additional performance tests as needed to adjust the flare operating temperature as the LFG concentration continues to decline (as expected) in a landfill operation once it has closed. The Permittee will have the operational flexibility to continue meeting the standard at whatever temperature was recorded at the most RECENT performance test.

I was unable to find a consistent H2S/Odor BACT that closely matched a landfill expansion operation. The Bay Area standard was possible the most stringent since it suggests the use of a Scrubber and/or Carbon Adsorption system to reduce Hydrogen Sulfide emissions, but did not include a numerical standard on the H2S. The MainDEP SO2 BACT was also fairly stringent for a biomass flare at a landfill which was 2.0 lbs of SO2 per MMscf of gas flared. Area 8 landfill has variable amounts of LFG going to the landfill gas to energy facility, so the compliance demonstration for this SO2 limit would be burdensome since the H2S may not be combusted on site. The only other SO2 limit was from the Bay Area at 6.11 lbs/hour which was based on the fact that the total landfill gas to their flare was 1010.9 Mscf/year and 998 Mscf/year of purge gas. For this permit, the landfill gas from Area 8 is much less than the LFG from the bay area permit. The other BACT for H2S/Odor was from MassDEP which required a destruction efficiency of H2S to control odor, but did not give an SO2 limit like the other permits discussed. Oregon DEQ determined that no controls for SO2 was economically feasible for their landfill, and simply limited the inlet H2S concentration to 300 ppm but was more of an emission standard since this landfill also had varying inlet concentration of H2S.

Emission calculations of H2S for Area 8 were calculated in LandGEM using a value of 1000 ppm for conservative estimates. The emission factor 2.2 lb $H2S/10^6$ cf LFG was used as a basis for calculating the amount of H2S that gets released to the atmosphere from the flares. CHRLF proposed an emission factor value of 2.2 lb $H2S/10^6$ cf LFG as means of verifying that H2S emissions remain below appropriate ASIL values (see toxic section). This limit is equivalent to an inlet H2S ppm limit given in other permits outlined above, except it's based

on the amount of LFG being abated by the flares at the outlet. This limit will be monitored and verified with performance testing.

Additionally in regards to H2S, some of the LFG is not collected through the landfill gas collection and control system. In the emission calculation section, it will be discussed that about 90% of LFG is collected, and the other 10% permeates through the surface of the landfill and gets released as fugitive emissions. Based on the attached study below, nearly 100% of the H2S is oxidized and does not get released to the atmosphere as H2S:

i. Push Pull Gas Test Landfill Cover H2S.PD

For conservative estimates, CHRLF still calculated emissions of H2S through the Area 8 landfill as 1 ppm. As part of BACT to ensure odors and H2S emissions remain low, CHRLF will be required to conduct periodic testing of H2S oxidation and release through the cover of the Area 8 landfill.

The following table summarizes the Agency's BACT determination for the Area 8 Development project:

Pollutant	BACT Limitation	BACT Compliance Demonstration
VOC	A minimum destruction efficiency of 98% of non-methane organic compounds (NMOC) or 20 ppmv by volume, dry basis as hexane at 3% O2.	▪ Vent the following processes to a flare that meets the minimum NMOC destruction efficiency or NMOC outlet concentration: LFG gas collection and control system for Area 8 ▪ H2S testing at the outlet of the flares to ensure BACT limit ▪ H2S Testing of the landfill cover to ensure less than 1 ppm of H2S is released. ▪ Initial and ongoing compliance testing using Puget Sound Clean Air Agency and EPA approved test methods. Compliance testing must be conducted for VOC, NOx, H2S and CO and must consist of at least three separate test runs.
H2S/Odor	-2.2 lb H2S/10^6 cf LFG at the outlet of the flares. -Less than 1 ppm H2S release through the area 8 landfill cover as fugitive emissions.	
PM	No Visible Emissions	

		▪ Odor complaint response plan.

An Odor Complaint Response Plan was not incorporated into this NOC since CHRLF already has an odor complaint response plan in their Air Operating Permit (Condition II.A.1.(b)). Odors from Area 8 will continue to be monitored via this AOP Condition.

Complaint Response

King County Solid Waste Division shall maintain and follow a complaint response plan, which includes the following:

1) Designation of a responsible person to respond to and record complaints regarding odor, fugitive dust or nuisance. [Puget Sound Clean Air Agency - Order of Approval No. 7676 Condition No. 8]
2) An informational bulletin that will be mailed out to any person that contacts the landfill, or to other interested persons forwarded from a local governmental agency that has a complaint or questions about the complaint response process. This informational bulletin shall include an explanation of the landfill's odor and nuisance control plans and the name and telephone number of the person responsible for responding to the complaints. [Puget Sound Clean Air Agency Order of Approval No. 7676, Condition No. 8]
3) King County Solid Waste Division shall record and investigate complaints regarding odor, fugitive dust, or nuisance as soon as possible, but no later than 12 hours after receipt of the complaint. The investigation will include documentation of wind direction and speed during the time the complaint occurred. King County Solid Waste Division shall use good industrial practices to correct any problems identified by the complaint investigations within 24 hours. [Puget Sound Clean Air Agency Order of Approval No. 7676, Condition No. 8]. King County Solid Waste Division shall record and investigate complaints about any emissions that are, or likely to be, injurious to human health, plant or animal life, or property, or which unreasonably interfere with enjoyment of life and property, emissions from fallout and any track-out onto paved roads open to the public, or complaints regarding other applicable requirements.
4) King County Solid Waste Division shall maintain records on-site of all complaints received regarding odor, fugitive dust or nuisance including the date and time of the complaint, the nature of the complaint, the wind speed and wind direction at the time of the complaint, and the date, time and nature of any corrective action taken. [Puget Sound Clean Air Agency Order of Approval No. 7676, Condition No. 8]
5) The complaint response plan shall be maintained on-site and made available to Puget Sound Clean Air Agency personnel upon request. [Puget Sound Clean Air Agency Order of Approval No. 7676, Condition No. 8]

King County Solid Waste Division shall investigate the complaint and determine if there was noncompliance with an applicable requirement of this permit. King County Solid Waste

Division shall correct any such compliance problems as soon as possible. King County Solid Waste Division shall shut down the unit or activity if the unit or activity is not returned to a compliant status within 24 hours of identification.

Regarding startup, shutdown, and malfunctions:
In a final determination published in the Federal Register in June 12, 2015 – EPA determined that some state SIPs were inadequate due to their treatment of excess emissions during start up shutdown, and malfunction events. As a result, EPA concluded that provisions treating excess emissions during startup, shutdown and malfunction as excluded from emission limitations and not in violation with emission standards is not supportive of the Clean Air Act. Due to this, emission limitations will not be exempt for flare startup, shutdowns and malfunctions events, and in order to help comply with these events a startup, shutdown and malfunction (SSM) plan will be required as part of this permit, similar to the requirements found in 40 CFR 63 AAAA 63.1960.

EPA has not pushed states to finalize these SIP calls for SSM events, but EPA Region 6 did issue a stay for the State of Texas SIP on October 16, 2018. It is unclear whether this stay would be applicable to Washington as well, but SSM Rules are still being implemented in the event that the SIP call for SSM events is still applicable.

F. EMISSION ESTIMATES

Proposed Project Emissions

Landfill gas emissions are generated from the decomposition of materials deposited into the landfill. Landfill gas is composed primarily of Methane (CH4) and carbon dioxide(CO_2). There are other constituents present in the gas as well, which include hydrogen sulfide and non-methane organic compound(s) (NMOC). Landfill gas is collected from the site by an active gas collection system that is complying with 40 CFR 60 Subpart WWW/XXX. Collected landfill gas is then either directed through the Bio Energy (Washington) landfill gas-to-energy facility (reg 29205, NOC 9900) where it is processed and either placed back in the pipeline as natural gas for customer use, or is sent to the existing flare station on BEW's site for combustion.

Landfill Gas (LFG) production was estimated for waste placed in the CHRL using the U.S. EPA's LandGEM, V3.02 model (LandGEM). LandGEM predicts the amount of LFG based on a first-order decomposition rate equation from the decomposition of landfilled waste in municipal solid waste landfills. The model defaults are based on empirical data from U.S. landfills. If available, field test data can be used in lieu of certain model default input values.

According to Cedar Hills' application, the following assumptions were used for estimating the amount of LFG from Area 8:

- Waste acceptance will start in 2019 and end in 2029 (small amount accepted in 2029)
- Waste Design Capacity of Area 8 is 10,258,183 short tons
- Waste tonnage projections provided by King County were based on an evaluation of the actual waste placed and air space utilization achieved in Area 7 in combination with forecasted future waste receipts based on projected population growth and recycling rates.

Year	Input Units *(Mg/year)*	Calculated Units *(short tons/year)*
2019	478,216	526,038
2020	856,656	942,321
2021	886,430	975,073
2022	917,386	1,009,125
2023	944,790	1,039,269
2024	971,483	1,068,632
2025	995,639	1,095,203
2026	1,015,340	1,116,874
2027	1,035,468	1,139,015
2028	1,050,882	1,155,970
2029	173,330	190,663

The 2019 value represents 375,741 tons of waste that is projected to be placed in currently active Area 5,6,7 (and, thereby, filling the existing landfill capacity) and then 526,038 tons of waste that would be placed in Area 8 after Area 5,6,7 reaches interim capacity. In 2026, after 467,905 tons of waste is placed in Area 8, Area 8 will have reached its interim capacity. However, the filling of Area 8 will then allow Area 5,6,7 to be topped off to final top deck surface and placement of this waste will allow Area 8 to be topped off to final top deck surface.

- LandGEM was used to estimate total landfill gas, methane, carbon dioxide, and nonmethane organic compounds.

LandGEM (taken from user guide: https://www3.epa.gov/ttncatc1/dir1/landgem-v302-guide.pdf):

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

where
QCH4 = annual methane generation in the year of the calculation (m3/year)
i = 1 year time increment
n = (year of the calculation) - (initial year of waste acceptance)
j = 0.1 year time increment
k = methane generation rate (year-1)
Lo = potential methane generation capacity (m3/Mg)
Mi = mass of waste accepted in the ith year (Mg)
tij = age of the jth section of waste mass Mi accepted in the ith year (decimal years, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convention landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

- The following values were used in the LandGEM 3.02 model:
  - Lo, methane generation Capacity potential = 100 m^3/Mg
  - NMOC, Concentration = 4000 ppmv hexane – this concentration was requested to be used by the Agency – Subpart XXX requires the use of 4,000 ppm NMOC only for Tier 1 NMOC reporting purposes. EPA does not recommend using this value for purposes other than preparing Tier 1 NMOC reports for NSPS purposes. This is also consistent with Condition IV.A(a) on Page 48 of the facility's current Title V permit. However; emissions were calculated using this value and NMOCs are still below PSD thresholds (see Title V / PSD section of worksheet)
  - k, methane generation rate = 0.057 yr-1
    - The current calculation methodology of 40 Code of Federal Regulations (CFR) Part 98 (Greenhouse Gas Reporting Rule) for landfills specifies the use of this value for landfills with precipitation greater than 40 inches per year (see

https://ccdsupport.com/confluence/download/attachments/63996073/Equation%20HH-1%20Calculation%20Spreadsheet.xls?version=2&modificationDate=1490103941000&api=v2, Table HH-1). As shown in Attachment 1, the annual average precipitation in the CHRLF area is 57.25 inches as measured from 1981 to 2010.

- Percent methane = 50 percent
- Collection efficiency
  - 90 percent (Conservative CHRLF design, per historic annual greenhouse gas reports).
- Flare or Engine Destruction Efficiency
  - 97.2% (AP-42, lowest typical efficiency listed for flares or engines used at BEW)

Unless noted, these values are considered "Inventory Conventional" values based on the guidance document provided by EPA in "Municipal Solid Waste Landfill New Source Performance Standards (NSPS) and Emissions Guidelines (EG) – Questions and Answers" document, November 1998
Page 30 (or Document page 22) outlines when a source should use what values:

- The NSPS-dictated values (Lo = 170 and k=0.05) should be used for NSPS-related NMOC calculations (i.e., Tier 1, Tier 2 and Tier 3) to determine whether or not a collection system is required.
- The AP-42 values (Lo – 100 for CHRL based on its type and location) should be used for permitting purposes (including PSD and Title V) and inventory purposes.


msw_landfqa.pdf

King County estimated waste tonnage forecasting as follows:

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2019	478,216	526,038	0	0
2020	856,656	942,321	478,216	526,038
2021	886,430	975,073	1,334,872	1,468,359
2022	917,386	1,009,125	2,221,302	2,443,432
2023	944,790	1,039,269	3,138,689	3,452,557
2024	971,483	1,068,632	4,083,479	4,491,827
2025	995,639	1,095,203	5,054,962	5,560,458
2026	1,015,340	1,116,874	6,050,601	6,655,661
2027	1,035,468	1,139,015	7,065,941	7,772,535
2028	1,050,882	1,155,970	8,101,409	8,911,550
2029	173,330	190,663	9,152,291	10,067,520
2030	0	0	9,325,621	10,258,183

Waste in place remains the same after 2029 and the model calculates emissions until 2159.

Below is a print out of LandGEM with a summary of the inputs used for Area 8 which were verified:

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**2019**	
Landfill Closure Year (with 80-year limit)	**2029**	
Actual Closure Year (without limit)	***2029***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity	**10,258,183**	*short tons*

MODEL PARAMETERS

Methane Generation Rate, k	**0.057**	*year^{-1}*
Potential Methane Generation Capacity, L_o	**100**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2019	478,216	526,038	0	0
2020	856,656	942,321	478,216	526,038
2021	886,430	975,073	1,334,872	1,468,359
2022	917,386	1,009,125	2,221,302	2,443,432
2023	944,790	1,039,269	3,138,689	3,452,557
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2026	1,015,340	1,116,874	6,050,601	6,655,661
2027	1,035,468	1,139,015	7,065,941	7,772,535
2028	1,050,882	1,155,970	8,101,409	8,911,550
2029	173,330	190,663	9,152,291	10,067,520

Based on the above parameters and the pollutant concentrations (default values) total LFG, CO2, Non-Methane Organic Compounds (NMOC) and Methane emission were calculated through the year 2159. See the "supporting documents" section of this worksheet for print outs from LandGEM for each of the pollutants.

Leachate emissions from Area 8:
Emissions generated from aeration of the leachate that will be produced by Area 8 in the leachate ponds were calculated using estimated historic peak daily and annual average leachate production and historic leachate analytical data, as follows:

- For each leachate TAP with an analytical result above the detection limit (except ammonia, as discussed below), the average leachate pond influent concentration value was used to calculate emissions assuming that the concentration of the TAP was not diluted during high rain events and that 100% of the TAP in the leachate is released to the atmosphere.
- For each leachate TAP with an analytical result below the detection limit (except acrolein, as discussed below), the reported detection limit for the leachate influent was used to calculate emissions assuming that the concentration of the TAP was not diluted during high rain events and that 100% of the TAP in the leachate is released to the atmosphere.

CHRL has historical data for the landfill leachate TAP from June 2010 to June 2015 which was the basis for the emission calculations for the new Area 8 landfill leachate production. It is assumed that similar TAP generation will result from the expansion of Area 8. This assumption is a conservative estimate since some of the analytical data shows non-detect for pollutants, but they are included in the analysis anyways to ensure no ASIL are exceeded. (See Ambient Toxic Impact Analysis section below for more details). All leachate sampling was presented in the worksheet below, under the tab “Leachate Ecology TAP”

b.
KC_Area8_NOC_TAP

The following estimated Area 8 leachate flow information was used:

CHRL Area 8 Development
Quarterly Average Daily Flow

Quarter	Average Daily Flow (gal)	Notes
Nov - Jan	220,000	Peak day flow for period is 2,170,000 gallons
Feb - Apr	50,000	Peak day flow for period is 330,000 gallons
May - July	20,000	Peak day flow for period is 20,000 gallons
Aug - Oct	20,000	Peak day flow for period is 32,000 gallons

NOTES:
1. Average daily flows based on active Area 8 with footprint of 33 acres and average precipitation for the project site.
2. Precipitation data used to calculate leachate generation is the data set used during the Area 8 Design Phase.

For each TAP with a daily averaging period under WAC 173-460-150, the maximum daily flow value of 2,170,000 gallons was used to calculate daily emissions. For each TAP with an annual averaging period, the quarterly average daily flow values were averaged to result in an annual average daily flow, multiplied by 365 days per year, and used to calculate annual emissions.

Ammonia Refined Calculation

Based on a study of the fate of ammonia in wastewater ponds (see Water Science & Technology publication in Attachment 3) only about 2% of the total ammonia removed from wastewater during storage in ponds is expected to be released to the air as ammonia. Review of the leachate analytical results indicates that the concentration of ammonia contained in both the leachate pond influent and effluent is correlated to the flow of each. The peak daily flow of 2.17 MGD was used to calculate the amount of ammonia in both the influent and the effluent and the total concentration of ammonia removed from the leachate was calculated as the difference between the two (i.e., influent minus effluent). This value, in combination with the peak daily flow and 2% ammonia loss to the air factor, was used to calculate the ammonia emissions of the leachate ponds used in the TAP evaluation. Records of the amount of ammonia concentration in the leachate pond stream will be required in the permit.

Acrolein Refined Calculation

Preliminary calculations for acrolein using the conservative approach described in the second bullet above resulted in exceedances of both the small quantity emission rate (SQER) and acceptable screening impact level (ASIL) values. As with ammonia, the concentration of acrolein in the leachate is expected to correlate to the amount of leachate produced during high rain events. However, unlike ammonia that is detected in all historic analytical results, acrolein is below the method detection limit in all leachate samples analyzed (both influent and effluent). As such, developing a correlation curve as described above for ammonia is not possible for acrolein.

Based on the fact that the concentration of acrolein is below detection limit at all sampling events, including those at low flow conditions, indicates that the maximum concentration of acrolein that could occur would be just under the detection limit (10 µg/liter) at the lowest leachate influent flow during a sampling event (0.0754 MGD that occurred during the sampling event dated September 7, 2011). Assuming a linear dilution of acrolein with increasing leachate production, the diluted acrolein concentration corresponding to the peak daily flow of 2.17 MGD is 0.347 µg/liter. This value was used, in combination with the peak daily flow, to calculate the acrolein emissions of the leachate ponds used in the TAP evaluation.

This approach is considered conservatively high for a number of reasons. First, all analytical results for acrolein sampling at the facility are below the detection limit. Second, there is no indication that acrolein even exists in the leachate – it is simply a compound for which analysis has been performed. USEPA's Fifth Edition AP-42 chapter for landfills (both the draft and final chapters) does not contain information regarding the concentration of acrolein in landfill gas. This is either because there is no acrolein in the landfill gas or because the levels were low enough to be below detection limit or otherwise considered to not be of concern. No acrolein in the landfill gas would indicate that no acrolein is present in the waste mass of a landfill to leach into the leachate. Further, a January 2000 EPA document (available at https://www.epa.gov/sites/production/files/2015-11/documents/landfills-eg_dd_2000.pdf) indicates that acrolein was never detected (see Table 6-8 on page 6-39) in the leachate of the landfills sampled as part of the development of that document.

Annual SQER TAPs Table:

Average Annual Leachate Production: 28,287,500 gal

TAP	CAS #	Area 8 Emissions (lb/yr)			173-460 Thresholds (lb/yr)			
		Total Area 8 LFG	Leachate Pond	Facility Total	De Minimis	*De Minimis Exceeded?*	SQER	*SQER Exceeded?*
1,1,1,2-Tetrachloroethane	630-20-6		0.05	0.05	1.3	NO		
1,1,2,2-Tetrachloroethane	79-34-5	172.4	0.05	172.4	0.165	YES	3.3	***YES***
1,1,2-Trichloroethane	79-00-5		0.05	0.05	0.6	NO		
1,1-Dichloroethane	75-34-3	222	1	223	6	YES	120	***YES***
1,2-Dibromo-3-chloropropane	96-12-8		0.236	0.236	0.00505	YES	0.101	***YES***
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.18	0.05	0.22	0.135	YES	2.71	***NO***
1,2-Dichloroethane	107-06-2	37.88	1.61	39.50	0.369	YES	7.39	***YES***
1,2-Dichloropropane	78-87-5	19.0	0.05	19.0	0.959	YES	19.2	***NO***
1,4-Dichlorobenzene	106-46-7	28.8	0.9	29.7	0.872	YES	17.4	***YES***
Acetonitrile	75-05-8		35	35	576	NO		
Acrylonitrile	107-13-1	312	0.02	312.121	0.0331	YES	0.662	***YES***
Allyl Chloride (3-Chloropropene)	107-05-1		6.6	7	1.6	YES	32	***NO***
Benzene	71-43-2	139	1.6	140.18	0.331	YES	6.62	***YES***
Bromodichloromethane	75-27-4	474	0.05	474.23	0.259	YES	5.18	***YES***
Bromoform	75-25-2		0.05	0.05	8.72	NO		
Carbon Tetrachloride	56-23-5	0.57	0.05	0.62	0.228	YES	4.57	***NO***
Chlorodibromomethane	124-48-1		0.047	0.047	0.355	NO		
Chloroform	67-66-3	3.34	3.20	6.54	0.417	YES	8.35	***NO***
Dichloromethane (Methylene Chloride)	75-09-2	1110	6	1116	9.59	YES	192	***YES***
Ethylbenzene	100-41-4	455.9	1.6	457.5	3.84	YES	76.8	***YES***
Perchloroethylene (Tetrachloroethene)	127-18-4	572.9	2.0	574.8	1.62	YES	32.4	***YES***
Trichloroethylene (Trichloroethene)	79-01-6	343.5	5.4	348.9	4.8	YES	95.9	***YES***
Vinyl Chloride	75-01-4	425.99	5.34	431.32	0.123	YES	2.46	***YES***
Aldrin	309-00-2		0.006	0.0059	0.00196	YES	0.0391	***NO***
Dieldrin	60-57-1		0.024	0.0236	0.00208	YES	0.0416	***NO***
alpha-Hexachlorocyclohexane (Alpha BHC)	319-84-6		0.006	0.0059	0.0125	NO		
Beta-hexachlorocyclohexane (Beta BHC)	319-85-7		0.083	0.083	0.0224	YES	0.447	***NO***
gamma-Hexachlorocyclohexane (Lindane)	58-89-9		0.006	0.006	0.031	NO		
Chlordane (Alpha)	57-74-9		0.006	0.0059	0.0282	NO		
DDD (4,4'-)	72-54-8		0.024	0.024	0.139	NO		
DDE (4,4'-)	72-55-9		0.024	0.0236	0.0988	NO		
DDT (4,4'-)	50-29-3		0.024	0.0236	0.0988	NO		
Heptachlor	76-44-8		0.006	0.0059	0.000738	YES	0.0148	***NO***
Heptachlor Epoxide	1024-57-3		0.006	0.0059	0.00369	YES	0.0739	***NO***
Toxaphene	8001-35-2		0.590	0.590	0.0282	YES	0.564	***YES***

24-hour SQER TAPs table:

Peak Daily Leachate Production: 2,170,000 gal
2.17 MGD (million gallons per day)

TAP	CAS #	Area 8 Emissions (lb/24-hr)			173-460 Thresholds (lb/24-hr)			
		Total Area 8 LFG	Leachate Pond	Facility Total	De Minimis	*De Minimis Exceeded?*	SQER	*SQER Exceeded?*
1,1,1-Trichloroethane	71-55-6	0.16	0.043	0.21	6.57	NO		
1,1-Dichloroethene	75-35-4	0.05	0.0036	0.05	1.31	NO		
1,2,3-Trichloropropane	96-18-4		0.0036	0.0036	0.0121	NO		
Acrolein [1]	107-02-8		0.0002	0.000218	0.000394	NO		
Ammonia [2, 3]	7664-41-7		12.80	12.80	0.465	YES	9.31	***YES***
Carbon Disulfide	75-15-0	0.11	0.261	0.37	5.26	NO		
Chlorobenzene	108-90-7	0.07	0.453	0.52	6.57	NO		
Chlorodifluoromethane	75-45-6	0.3		0.3	328	NO		
Ethyl Chloride	75-00-3	0.21	0.580	0.8	197	NO		
Hexane	110-54-3	1.45		1.45	4.60	NO		
Hydrogen sulfide	7783-06-4	17.62		17.616	0.0131	YES	0.263	***YES***
Mercury (total)	7439-97-6	0.0012	0.0018	0.0030	0.000591	YES	0.0118	***NO***
Methyl Bromide (Bromomethane)	74-83-9		0.634	0.634	0.0629	YES	0.657	***NO***
Methyl Chloride (Chloromethane)	74-87-3	0.155	0.242	0.397	0.591	NO		
Methyl Ethyl Ketone (2-Butanone)	78-93-3	1.3	92.0	93	32.9	YES	657	***NO***
Methyl Isobutyl Ketone (4-Methyl-2-pentanone)	108-10-1	0.5	1.0	1.5	19.7	NO		
Methyl Methacrylate	80-62-6		0.10	0.10	4.60	NO		
Styrene	100-42-5		0.046	0.05	5.91	NO		
Toluene	108-88-3	9.2	0.53	9.7	32.9	NO		
trans-1,2-Dichloroethene	156-60-5	0.69	0.49	1.18	5.30	NO		
Vinyl Acetate	108-05-4		0.0036	0.00	1.31	NO		
Total Xylene [4]	1330-20-7	3.26	0.39	3.6	1.45	YES	29.0	***NO***

1-hour SQER TAPs table:

TAP	CAS #	Area 8 Emissions (lb/hr)			173-460 Thresholds			
		Total Area 8 LFG	Leachate Pond	Facility Total	De Minimis	*De Minimis Exceeded?*	SQER	*SQER Exceeded?*
Isopropyl Alcohol (2-Propanol)	67-63-0	0.23		0.23	0.35	NO		

Potential Emissions:

Based on the information and assumptions above, the following uncontrolled emissions were generated from LandGEM from the year 2029 (highest emission year due to the highest rate of waste acceptance occurring in 2028) from the landfill. See the attachments to this worksheet for each yearly output for all pollutants of concern (Methane, CO_2, NMOC, and LFG) also linked at the end of this section

CO2	82,050	Tons/year
Landfill Gas	111,954	Tons/year
NMOC	1,285	Tons/year
Methane	29,904	Tons/year

AP-42 states that Landfill Gas Control Systems range in effectiveness in collecting the LFG from 50% to 95% with the average at 75%, recommended by EPA for emission inventory purposes. The lower collection efficiencies are experienced at landfills with a large number of open cells, no liners, shallow soil covers, poor collection system and cap maintenance programs and/or a large number of cells without gas collection. The higher collection efficiencies may be achieved at closed sites employing good liners, extensive geomembrane-clay composite caps in conjunction with well-engineered gas collection systems, and aggressive operation and maintenance of the cap and collection system. Sites complying with 40 CFR 60 Subpart WWW or 40 CFR subpart XXX are typically more efficient due to the requirements of a landfill gas collection and control system and design plan.

For the purposes of calculating NMOCs that leave as fugitive emissions it is reasonable to consider that Cedar Hills area 8 is representative of the average landfill prior to the promulgation of Subpart WWW or XXX that has added the controls and monitoring required by the subpart. Then, for conservative site wide emission estimates, it can be assumed that the older sections of the landfill are collecting 85% of the LFG for destruction by the LFG flare system. Areas V, VI, VII and now VIII are the only gas collection systems going into an engineered landfill cell designed under §Subpart WWW or XXX. They are the only sections of the landfill to be assumed will successfully collect 90% or more of its LFG production.

Then worst case uncontrolled (fugitive) landfill gases contributed by Area VIII during it maximum emission year of 2029 would be: 10% of 111,954 tons or **11,954 tons/yr**

The total NMOC in 2029 was estimated to be 1,285 tons/year, and the requirement from 40 CFR 60 Subpart XXX will be to control the collected NMOC by at least 98%. Based on 90% collection, the 2029 PTE is 129 tons of NMOC/year of fugitive emissions plus 23 tons of NMOC/year not controlled (i.e., the 2% of the collected NMOC that is not destroyed) for a total PTE of **152 tons of NMOC/year.** Landfill gas TAP emissions from Area 8 are outlined below using LandGEM

Collection Efficiency:	90%	From GHG report
Control Efficiency:	97.2%	Fifth Edition AP-42, Table 2.4-3 (11/98), lowest typical control efficiency for flares or IC engines.
LFG Generated (acfm):	5476	From Area 8 LandGEM, 2029 (Year with highest flow
Flare H_2S Emission Factor (lb/10^6 acf LFG):	2.2	Calculated [1]
Fugitive H_2S Emission Factor (lb/10^6 cfm LFG):	0.088	Calculated [2]

		Area 8 Emission Rates			
		Landfill Gas TAP - short tons/year			
TAP	CAS #	LandGEM Calculated Amount Generated	LFG Not Collected	LFG Collected Not Destroyed	Total Area 8 Emissions
1,1,1-Trichloroethane	71-55-6	0.24	0.02	0.006	0.03
1,1,2,2-Tetrachloroethane	79-34-5	0.69	0.07	0.02	0.09
1,1-Dichloroethane	75-34-3	0.89	0.09	0.02	0.11
1,1-Dichloroethene	75-35-4	0.07	0.007	0.002	0.009
1,2-Dibromoethane (ethylene dibromide)	106-93-4	0.0007	0.00007	0.00002	0.00009
1,2-Dichloroethane	107-06-2	0.15	0.02	0.004	0.02
1,2-Dichloropropane	78-87-5	0.08	0.008	0.002	0.009
Acrylonitrile	107-13-1	1.25	0.12	0.03	0.16
Benzene	71-43-2	0.55	0.06	0.01	0.07
Bromodichloromethane	75-27-4	1.89	0.19	0.05	0.24
Carbon disulfide	75-15-0	0.16	0.016	0.004	0.02
Carbon tetrachloride	56-23-5	0.002	0.0002	0.00006	0.0003
Chlorobenzene	108-90-7	0.10	0.010	0.003	0.01
Chlorodifluoromethane	75-45-6	0.42	0.04	0.011	0.05
Chloroform	67-66-3	0.01	0.001	0.0003	0.002
Chloromethane	74-87-3	0.23	0.02	0.006	0.03
Dichlorobenzene	106-46-7	0.12	0.012	0.003	0.01
Dichloromethane	75-09-2	4.43	0.44	0.11	0.56
Ethyl Chloride (Chloroethane)	75-00-3	0.31	0.03	0.008	0.04
Ethylbenzene	100-41-4	1.82	0.18	0.05	0.23
Isopropyl Alcohol (2-Propanol)	67-63-0	11.21	1.12	0.28	1.40
Hexane	110-54-3	2.12	0.21	0.05	0.27
Hydrogen sulfide	7783-06-4	127.07	0.013	3.20	3.21
Mercury (total)	7439-97-6	0.0002	0.00002	0.0002	0.0002
Methyl ethyl ketone	78-93-3	1.91	0.19	0.05	0.24
Methyl isobutyl ketone	108-10-1	0.71	0.07	0.02	0.09
Perchloroethylene	127-18-4	2.29	0.23	0.06	0.29
Toluene	108-88-3	13.40	1.34	0.34	1.68
t-1,2-Dichloroethene	156-60-5	1.01	0.10	0.03	0.13
Trichloroethylene	79-01-6	1.37	0.14	0.03	0.17
Vinyl chloride	75-01-4	1.70	0.17	0.04	0.21
Xylenes	1330-20-7	4.75	0.48	0.12	0.59

In December of 2018 King County staff conducted spot sampling of H2S concentrations on Area 7 of the landfill. This sampling demonstrated that the vast majority of H2S in the generated landfill gas is oxidized as the gas passes through the waste mass and daily cover layers as it migrates to the surface. This finding is consistent with a study performed at the Riverbend Landfill in McMinnville, OR (see "Push Pull Gas Test Landfill Cover H2S.pdf") which demonstrated that 99% of the H2S in the generated landfill gas was removed by the time the gas exited the cover. Each of the measured values was 5 ppb or less. To be conservative, a value of 1 ppm was used to estimate the fugitive H2S emissions. (Landfill Gas Not Collected) (see BACT section, Push Pull Gas test pdf)

Actual Emissions:

Actual Emissions (landfill gas) from this landfill expansion will be controlled by either being routed to the Bio Energy Washington Facility for conversion into useable pipeline natural gas, or through the flare station at BEW or Cedar Hills landfill. For conservative purposes, Cedar Hills has assumed all the LFG will be routed to the flares on site, so potential emissions of landfill gas generation discussed above are equal to actual emissions even if the gas is routed to BEW (the worst case scenario is the year 2029, but actual emissions will vary each year due to the amount of waste accepted). As discussed above, 10% of the landfill gas is assumed not collected per year as the gas collection and control system is not able to capture 100% of the emissions to route them to the flare or BEW.

The leachate pond potential emissions are also considered actual emissions since there is no control device being proposed for this pond and the highest year of emissions were calculated in the potential emissions section.

The leachate production and landfill size are restrictive and will serve as a means of verifying that potential emissions are not exceeded. Meaning that the size of the Area 8 landfill expansion was used to estimate all the emissions presented above. As long as the size of Area 8 is limited in the permit, total emissions from the project should not exceed the potential to emit.

Emissions from the flare while combusting landfill gas were not included in this worksheet since the flares are not being "physically modified" as part of this NOC project. These flares are already covered under separate NOCs.

The Emission calculation spreadsheet from the landfill is on file with the Agency. The LandGEM calculation emission spreadsheet is large and cannot be linked within this document.

Reporting Source Status:

This source is an Air Operating Permit with the potential to emit emissions well above the reporting thresholds found in **Regulation 1, Section 7.09**

> **Emission Reporting.** An emission report shall be required from each owner or operator of an operating permit source, listing those air contaminants emitted during the previous calendar year that equal or exceed the following (tons/year):
>
> Carbon monoxide (CO) emissions 25
> Facility combined total of all toxic air
> contaminant (TAC) emissions 6
> Any single toxic air contaminant (TAC) emissions (excluding
> lead, but including lead compounds) 2
> Nitrogen oxide (NOx) emissions 25
> Particulate matter (PM10) emissions 25

Particulate matter (PM2.5) emissions 25
Sulfur oxide (SOx) emissions 25
Volatile organic compounds (VOC) emissions 25
Lead 0.5

Their reporting statue will not change with this NOC application, Cedar Hills Landfill is an AOP source and will continue to submit emission inventories as well as any deviation reports from emission limits. Actual emissions will vary each year due to the changing waste acceptance over the next 10 years.

G. OPERATING PERMIT or PSD

Air Operating Permit Applicability
A major source, as defined in chapter 173-401 WAC, is required to get an air operating permit under Regulation 1 Article 7 of the Puget Sound clean air agency. A major source is defined as one of the following:

(a) any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit, in the aggregate, ten tons per year (tpy) or more of any hazardous air pollutant which has been listed pursuant to section 112(b) of the FCAA, or twenty-five tpy or more of any combination of such hazardous air pollutants; or

(b) A major stationary source that directly emits or has the potential to emit, one hundred tpy(tons per year) or more of any air pollutant subject to regulation (including any major source of fugitive emissions of any such pollutant); or
Note: Fugitive emissions are only counted for categorical sources listed in (b) of 173-401 WAC (29)
(c) A major source as defined in Part D of Title I of the FCAA.

None of the areas in Puget Sound Clean Air Agency jurisdiction are designated non-attainment, therefore section (c) outlined above has limited applicability.

Cedar Hills Regional Landfill is already a major source with a Title V permit. This NOC does not contravene any requirements in the existing AOP and is considered and off-permit change.

Prevention of Significant Deterioration (PSD):
A proposed project is only subject to PSD permitting if the facility or the project has the potential to emit 100 tpy of a regulated air pollutant and is included in the list of source categories identified below or if the facility or proposed project has the potential to emit 250 tpy of a regulated air pollutant and the type of facility is not listed below. If the facility is over either of these thresholds prior to the modification, significant modifications to the facility are subject to PSD.

28 Source Categories	
Coal cleaning plants with thermal dryers	Charcoal production plants
Portland cement plants	Kraft pulp mills
Iron and steel mills	Primary zinc smelters
Primary copper smelters	Primary aluminum ore reduction plants
Hydrofluoric acid plants	Municipal incinerator capable of charging more than 250 tons of refuse per day
Nitric acid plants	Sulfuric acid plants
Lime plants	Petroleum refineries
Coke oven batteries	Phosphate rock processing plants
Carbon black plants (furnace process)	Sulfur recovery plants
Fuel conversion plants	Primary lead smelters
Secondary metal production plants	Sintering plants
Fossil fuel boilers (or combination thereof) totaling more than 250 MMBtu/hr heat input	Chemical process plants (does not include ethanol production facilities that produce ethanol by natural fermentation, included in NAICS codes 325193 or 312140)
Fossil fuel fired steam electric plants of more than 250 MMBtu/hr heat input	Petroleum storage transfer units, total storage capacity over 300,000 barrels
Taconite ore processing plants	Glass fiber processing plants

CHRLF submitted a spreadsheet (see below CHLRF PTE 013019.xlxs) in which the PTE for the existing facility is calculated. The PTE for the existing facility was calculated based on the maximum design (and permitted) landfill gas flow capacity of each flare, an NMOC concentration of 4,000 ppm (as discussed above), and a combination of AP-42 and historic stack test results. As shown, the PTE of each PSD-regulated pollutant is currently below the PSD major source threshold of 250 tons per year. Following is a summary of the basis for each emission factor used in the PTE calculation:

d. CHRLF PTE 013019.xlsx

- $PM/PM_{10}/PM_{2.5}$ – No historic test data exists for particulate matter from the flares. Therefore, the particulate matter emission factor from AP-42 Section 2.4 (draft 10/08) were used.
- SO_2 – AP-42 does not contain an emission factor for flare emissions of SO_2. Therefore, an emission factor was derived from stack testing performed on the flares in 2006 and 2013 (both data were submitted with the application and on file with the Agency) by using the highest single run result from both sets of testing.

- NO_x – AP-42 contains an emission factor for flare emissions of NOx. However, the AP-42 emission factor is lower than all of the single run results from the 2006 and 2013 testing. Therefore, an emission factor was derived from the stack testing by using the highest single run result from both sets of testing.
- CO – AP-42 contains an emission factor for flare emissions of CO. There is currently both a current final and subsequent draft chapter for landfills. The CO emission factor in the current final section is unrealistically high based on the 2006 and 2013 testing. The draft AP-42 emission factor is higher than all of the single run results from the 2006 and 2013 testing. Therefore, the CO emission factor from the draft AP-42 section was used in the PTE calculation.
- VOC – The draft AP-42 section indicates that VOC is 99.7% of the total NMOC value, versus the 39% value indicated in the current final AP-42 section. To calculate a conservatively high PTE, the value from the draft AP-42 section was used.
- NMOC – As stated above, the PTE was calculated based on a NMOC concentration of 4,000 ppm. This approach is counter to Condition IV.A(a) on Page 48 of the current facility's Title V permit. However, the 4,000 ppm value was used because it does not change the existing facility's status for PSD applicability purposes and this was requested as part of this Permit Action.

Note that the uncollected LFG is not included in this analysis. This is because that portion of the landfill is considered fugitive (consistent with EPA policy for landfills and uncollected landfill gas) and the facility is not considered a categorical source that is required to include fugitive emissions in a PSD major source applicability determination. The NOx emissions are particularly close to the 250 ton per year threshold, but are not currently exceeding.

H. AMBIENT TOXICS IMPACT ANALYSIS

Agency Regulation 3, Section 2.07 is the review of new Toxic Air Contaminants Sources. This rule requires that new sources that emit toxic air contaminants undergo a review of toxic air contaminant emissions. Definitions and procedures contained in Chapter 173-460 WAC and adopted by reference in Regulation I, Section 6.01(a) apply to these sources as well.

First tier review involves comparing the emissions of each toxic air contaminant discharged to atmosphere to the SQER listed in WAC 173-460-150; or, the dispersion modeling, using TSCREEN, can be used to demonstrate that the predicted concentration of each contaminant is below the corresponding ASIL listed in WAC 173-460-150. The applicant can also submit a more comprehensive evaluation including the use of other EPA guideline models and more accurate emission estimation techniques to demonstrate that the predicted concentration of each contaminant is below the corresponding ASIL listed in WAC 173-460-150 in all areas where the general public has access.

Second and Third tier Reviews, if ambient concentrations predicted from first tier review are not below the ASIL listed in WAC 173-460-150, the applicant shall submit a petition to the Department of Ecology requesting a second tier or third tier review, and must receive Ecology's recommendation of approval for either the second or third tier petition. Second tier petition shall follow the procedures in WAC 173-460-090, and third tier petitions shall follow the procedures in WAC 173-460-100.

Analysis:

TAP emissions from the landfill gas generation were combined with the leachate emissions for comparison to the WAC SQER review thresholds. The TAP emissions consist of the sum of the uncollected fugitive landfill gas emissions, the collected landfill gas that is not destroyed in a flare or engine, and the leachate emissions. These emissions were summed and the result compared to the applicable WAC 173-460-150 SQER thresholds and are summarized in Tables 1 through 3 below. Each TAP with emissions that exceeded their respective SQER thresholds were modeled for comparison to their ASIL.

Compounds with 1-Hour De Minimis and SQER Thresholds

		Area 8 Emissions (lb/hr)			173-460 Thresholds			
TAP	CAS #	Total Area 8 LFG	Leachate Pond	Facility Total	De Minimis	*De Minimis Exceeded?*	SQER	*SQER Exceeded?*
Isopropyl Alcohol (2-Propanol)	67-63-0	0.32		0.32	0.35	NO		

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Compounds with 24-Hour De Minimis and SQER Thresholds

Peak Daily Leachate Production: 2,170,000 gal
2.17 MGD (million gallons per day)

TAP	CAS #	Area 8 Emissions (lb/24-hr)			173-460 Thresholds (lb/24-hr)			
		Total Area 8 LFG	Leachate Pond	Facility Total	De Minimis	*De Minimis Exceeded?*	SQER	*SQER Exceeded?*
1,1,1-Trichloroethane	71-55-6	0.16	0.043	0.21	6.57	NO		
1,1-Dichloroethene	75-35-4	0.05	0.0036	0.05	1.31	NO		
1,2,3-Trichloropropane	96-18-4		0.0036	0.0036	0.0121	NO		
Acrolein [1]	107-02-8		0.0002	0.000218	0.000394	NO		
Ammonia [2, 3]	7664-41-7		12.80	12.80	0.465	YES	9.31	***YES***
Carbon Disulfide	75-15-0	0.11	0.261	0.37	5.26	NO		
Chlorobenzene	108-90-7	0.07	0.453	0.52	6.57	NO		
Chlorodifluoromethane	75-45-6	0.3		0.3	328	NO		
Ethyl Chloride	75-00-3	0.21	0.580	0.8	197	NO		
Hexane	110-54-3	1.45		1.45	4.60	NO		
Hydrogen sulfide	7783-06-4	17.62		17.616	0.0131	YES	0.263	***YES***
Mercury (total)	7439-97-6	0.0012	0.0018	0.0030	0.000591	YES	0.0118	***NO***
Methyl Bromide (Bromomethane)	74-83-9		0.634	0.634	0.0629	YES	0.657	***NO***
Methyl Chloride (Chloromethane)	74-87-3	0.155	0.242	0.397	0.591	NO		
Methyl Ethyl Ketone (2-Butanone)	78-93-3	1.3	92.0	93	32.9	YES	657	***NO***
Methyl Isobutyl Ketone (4-Methyl-2-pentanone)	108-10-1	0.5	1.0	1.5	19.7	NO		
Methyl Methacrylate	80-62-6		0.10	0.10	4.60	NO		
Styrene	100-42-5		0.046	0.05	5.91	NO		
Toluene	108-88-3	9.2	0.53	9.7	32.9	NO		
trans-1,2-Dichloroethene	156-60-5	0.69	0.49	1.18	5.30	NO		
Vinyl Acetate	108-05-4		0.0036	0.00	1.31	NO		
Total Xylene [4]	1330-20-7	3.26	0.39	3.6	1.45	YES	29.0	***NO***

Compounds with Annual De Minimis and SQER Thresholds

Average Annual Leachate Production: 28,287,500 gal

TAP	CAS #	Area 8 Emissions (lb/yr)			173-460 Thresholds (lb/yr)			
		Total Area 8 LFG	Leachate Pond	Facility Total	De Minimis	*De Minimis Exceeded?*	SQER	*SQER Exceeded?*
1,1,1,2-Tetrachloroethane	630-20-6		0.05	0.05	1.3	NO		
1,1,2,2-Tetrachloroethane	79-34-5	172.4	0.05	172.4	0.165	YES	3.3	***YES***
1,1,2-Trichloroethane	79-00-5		0.05	0.05	0.6	NO		
1,1-Dichloroethane	75-34-3	222	1	223	6	YES	120	***YES***
1,2-Dibromo-3-chloropropane	96-12-8		0.236	0.236	0.00505	YES	0.101	***YES***
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.18	0.05	0.22	0.135	YES	2.71	***NO***
1,2-Dichloroethane	107-06-2	37.88	1.61	39.50	0.369	YES	7.39	***YES***
1,2-Dichloropropane	78-87-5	19.0	0.05	19.0	0.959	YES	19.2	***NO***
1,4-Dichlorobenzene	106-46-7	28.8	0.9	29.7	0.872	YES	17.4	***YES***
Acetonitrile	75-05-8		35	35	576	NO		
Acrylonitrile	107-13-1	312	0.02	312.121	0.0331	YES	0.662	***YES***
Allyl Chloride (3-Chloropropene)	107-05-1		6.6	7	1.6	YES	32	***NO***
Benzene	71-43-2	139	1.6	140.18	0.331	YES	6.62	***YES***
Bromodichloromethane	75-27-4	474	0.05	474.23	0.259	YES	5.18	***YES***
Bromoform	75-25-2		0.05	0.05	8.72	NO		
Carbon Tetrachloride	56-23-5	0.57	0.05	0.62	0.228	YES	4.57	***NO***
Chlorodibromomethane	124-48-1		0.047	0.047	0.355	NO		
Chloroform	67-66-3	3.34	3.20	6.54	0.417	YES	8.35	***NO***
Dichloromethane (Methylene Chloride)	75-09-2	1110	6	1116	9.59	YES	192	***YES***
Ethylbenzene	100-41-4	455.9	1.6	457.5	3.84	YES	76.8	***YES***
Perchloroethylene (Tetrachloroethene)	127-18-4	572.9	2.0	574.8	1.62	YES	32.4	***YES***
Trichloroethylene (Trichloroethene)	79-01-6	343.5	5.4	348.9	4.8	YES	95.9	***YES***
Vinyl Chloride	75-01-4	425.99	5.34	431.32	0.123	YES	2.46	***YES***
Aldrin	309-00-2		0.006	0.0059	0.00196	YES	0.0391	***NO***
Dieldrin	60-57-1		0.024	0.0236	0.00208	YES	0.0416	***NO***
alpha-Hexachlorocyclohexane (Alpha BHC)	319-84-6		0.006	0.0059	0.0125	NO		
Beta-hexachlorocyclohexane (Beta BHC)	319-85-7		0.083	0.083	0.0224	YES	0.447	***NO***
gamma-Hexachlorocyclohexane (Lindane)	58-89-9		0.006	0.006	0.031	NO		
Chlordane (Alpha)	57-74-9		0.006	0.0059	0.0282	NO		
DDD (4,4'-)	72-54-8		0.024	0.024	0.139	NO		
DDE (4,4'-)	72-55-9		0.024	0.0236	0.0988	NO		
DDT (4,4'-)	50-29-3		0.024	0.0236	0.0988	NO		
Heptachlor	76-44-8		0.006	0.0059	0.000738	YES	0.0148	***NO***
Heptachlor Epoxide	1024-57-3		0.006	0.0059	0.00369	YES	0.0739	***NO***
Toxaphene	8001-35-2		0.590	0.590	0.0282	YES	0.564	***YES***

There are 14 TAP that exceed their annual SQER and 2 that exceed their 24-hour SQERs. The 1-hr TAP did not exceed its respective SQER (2-propanol).

Preliminary modeling of the pollutants that exceeded the annual SQER showed that 4 of the pollutants (1,1,1,2-Tetrachloroethane, Acrylonitrile, Bromodichloromethane, and Vinyl Chloride) would exceed the ASIL values based on their LandGEM default concentration values (see modeling protocol at the end of this section):

Compounds with Annual ASILs That Exceeded SQER

TAP	CAS #	Model ID	Landfill Gas Emissions: Fugitive (g/s)	LFG Collected, Not Destroyed*: CHRLF Flare (g/s)	BEW Flare (g/s)	BEW Engine (g/s)	Leachate Pond Emissions (g/s)	Leachate Pond Emissions (per pond) (g/s)	Modeled Facility Impact ($\mu g/m^3$)	173-460 ASIL ($\mu g/m3$)	Exceeded?
1,1,2,2-Tetrachloroethane	79-34-5	ANNA	1.98E-03	4.99E-04	4.99E-04	4.99E-04	6.79E-07	3.40E-07	0.0420	0.0172	***YES***
1,1-Dichloroethane	75-34-3	ANNB	2.55E-03	6.42E-04	6.42E-04	6.42E-04	2.06E-05	1.03E-05	0.054	0.625	***NO***
1,2-Dibromo-3-chloropropane	96-12-8	ANNC					3.40E-06	1.70E-06	0.000240	0.000526	***NO***
1,2-Dichloroethane	107-06-2	ANND	4.35E-04	1.10E-04	1.10E-04	1.10E-04	2.32E-05	1.16E-05	0.0094	0.0385	***NO***
1,4-Dichlorobenzene	106-46-7	ANNE	3.31E-04	8.34E-05	8.34E-05	8.34E-05	1.28E-05	6.40E-06	0.0071	0.0909	***NO***
Acrylonitrile	107-13-1	ANNF	3.59E-03	9.04E-04	9.04E-04	9.04E-04	2.38E-07	1.19E-07	0.07596	0.00345	***YES***
Benzene	71-43-2	ANNG	1.59E-03	4.01E-04	4.01E-04	4.01E-04	2.33E-05	1.16E-05	0.0339	0.0345	***NO***
Bromodichloromethane	75-27-4	ANNH	5.45E-03	1.37E-03	1.37E-03	1.37E-03	6.79E-07	3.40E-07	0.115	0.027	***YES***
Dichloromethane (Methylene Chloride)	75-09-2	ANNI	1.28E-02	3.21E-03	3.21E-03	3.21E-03	8.88E-05	4.44E-05	0	1	***NO***
Ethylbenzene	100-41-4	ANNJ	5.24E-03	1.32E-03	1.32E-03	1.32E-03	2.27E-05	1.14E-05	0.1	0.4	***NO***
Perchloroethylene (Tetrachloroethene)	127-18-4	ANNK	6.58E-03	1.66E-03	1.66E-03	1.66E-03	2.84E-05	1.42E-05	0.140	0.169	***NO***
Trichloroethylene (Trichloroethene)	79-01-6	ANNL	3.95E-03	9.94E-04	9.94E-04	9.94E-04	7.81E-05	3.90E-05	0.1	0.5	***NO***
Vinyl Chloride	75-01-4	ANNM	4.89E-03	1.23E-03	1.23E-03	1.23E-03	7.67E-05	3.84E-05	0.1043	0.0128	***YES***
Toxaphene	8001-35-2	ANNN					8.49E-06	4.24E-06	0.00059	0.00294	***NO***

Because the impacts were primarily due to the Area 8 landfill gas emissions and not the leachate system, the emission calculations for these four TAP were refined using historic analytical results of landfill gas testing performed at CHRLF flare inlets in 2007, 2009, and 2013 (. The maximum concentration (or detection limit, as applicable) from this testing for each TAP was used in conjunction with the LandGEM calculated maximum annual landfill gas flow rate to refine the emission calculations for each of these four TAPs. These values were summed with the leachate emissions for comparison to the TAP evaluation criteria of WAC 173-460-150, and used as the basis for the emission rates in refined modeled for each TAP.

j. VOC Test Results Data_CHRLF_2007.p

e. SummaryTestResults_

k. Overall Summary Values_2009.xlsx

Average Annual Leachate Production: 28,287,500 gal

TAP	CAS #	Area 8 Emissions (lb/yr): Total Area 8 LFG	Leachate Pond	Facility Total	173-460 Thresholds (lb/yr): De Minimis	*De Minimis Exceeded?*	SQER	*SQER Exceeded?*
1,1,2,2-Tetrachloroethane	79-34-5	< 9.97	0.05	< 10.01	0.165	YES	3.3	***YES***
Acrylonitrile	107-13-1	< 12.530	0.017	< 12.546	0.0331	YES	0.662	***YES***
Bromodichloromethane	75-27-4	< 9.67	0.05	< 9.72	0.259	YES	5.18	***YES***
Vinyl Chloride	75-01-4	40.49	5.34	45.83	0.123	YES	2.46	***YES***

TAP	CAS #	Model ID	Landfill Gas Emissions: Fugitive (g/s)	LFG Collected, Not Destroyed*: CHRLF Flare (g/s)	BEW Flare (g/s)	BEW Engine (g/s)	Leachate Pond Emissions (g/s)	Leachate Pond Emissions (per pond) (g/s)	Modeled Facility Impact ($\mu g/m^3$)	173-460 ASIL ($\mu g/m3$)	Exceeded?
1,1,2,2-Tetrachloroethane	79-34-5	ANNAS	< 1.14E-04	< 2.88E-05	< 2.88E-05	< 2.88E-05	6.79E-07	3.40E-07	< 0.002	0.135	***NO***
Acrylonitrile	107-13-1	ANNBS	< 1.44E-04	< 3.63E-05	< 3.63E-05	< 3.63E-05	2.38E-07	1.19E-07	< 0.00305	0.00345	***NO***
Bromodichloromethane	75-27-4	ANNCS	< 1.11E-04	< 2.80E-05	< 2.80E-05	< 2.80E-05	6.79E-07	3.40E-07	< 0.002	0.027	***NO***
Vinyl Chloride	75-01-4	ANNDS	4.65E-04	1.17E-04	1.17E-04	1.17E-04	7.67E-05	3.84E-05	0.0104	0.0128	***NO***

* The collected landfill gas can be sent to the CHRLF flares, BEW flare, BEW engines, or processed into pipeline quality natural gas. This analysis conservatively assumed that all of the landfill gas that was collected is routed to all devices.

Using the refined values from the performance tests in 2007, 2009, and 2013, the facility passed the model for each of the four pollutants outlined above. The data submitted from the 2007 (see

"VOC Test Results Data_CHRLF_2007.pdf"), 2009 ("Overall Summary Values_2009.xlsx"), and 2013 ("2013-05-24_First Quarter 2013 Flare Source Testing_Summary Report.pdf") performance test was linked above and verified for accuracy. The full test report for the 2013 test was submitted to the Agency.

See the attached spreadsheets for further details:


b.
KC_Area8_NOC_TAP


c.
KC_Area8_NOC_TAP

(Attachment b includes all pollutants; attachment c is for the 4 pollutants which exceeded the ASIL using LandGEM default values)

All modeling files used in AERMOD described below are available upon request to the Agency.

Modeling Protocol (italicized text is taken from supplemental modeling information submitted by applicant):

Model Selection, Options, and Assumptions
The current version of the USEPA-approved AERMOD dispersion model (version 18081) was used to estimate pollutant concentrations. Bee-Line Software's BEEST version of the AERMOD model was used in the dispersion analysis. The model was run with the regulatory default options recommended in the current version of USEPA's "Guideline on Air Quality Models" (40 CFR 51, Appendix W, May 22, 2017) and the following methodology:

- *Rural dispersion coefficients were used because the land use within the area circumscribed by a three kilometer radius around the facility is greater than 50 percent rural (i.e., non-urban).*
- *Locations of all buildings and emission sources were determined using a combination of facility information and Google Earth.*
- *A building downwash analysis using the current BPIPPRIME (version 04274) was conducted and incorporated into the modeling analysis to account for potential effluent downwash due to facility structures.*
- *The source and receptor coordinates used in this analysis are based on the NAD83 Universal Transverse Mercator (UTM) Zone 10 coordinate system.*

AERMOD is capable of producing concentration predictions for various averaging times. Separate model runs were set up and executed for the 24-hour and annual averaging periods. The resulting modeled impacts were compared to Ecology's current ASILs in WAC 173-460-150.

Meteorological Data

The meteorological data used for this analysis consisted of the most recent currently available five years, 2013-2017, of surface (including 1-minute date) and upper air meteorological data. The meteorological data stations were chosen because they were the closest to the project location and best represented site characteristics. The surface data was downloaded from the National Climatic Data Center's (NCDC) Integrated Surface Database (ISD) archived data database for the Renton airport station (Station No. 727934-94248). The surface data are in ISHD format and have an 8-hour time adjustment applied to correct the data from Greenwich Mean Time to Pacific. The location and elevation were extracted from the ISHD file (47.493N, 122.21W, 9 m). In addition, upper air (mixing height) data were obtained for the Quillayute State Airport station from the National Oceanic and Atmospheric Administration's (NOAA) Earth System Research Laboratory (ESRL) Radiosonde Database (Station No. 94240-72797). The upper air data were in FSL format, also with an 8-hour time adjust applied. The location was extracted from the FSL file (47.95N, 124.55W). Lastly, monthly 1-minute ASOS wind data were obtained from the NCDC for the Renton surface station.

AERSURFACE (Version 13016) was run for 12 equal sized sectors for each month of the year. The input surface data file was from the National Land Cover Database (NLCD) for the state of Washington. Moisture was determined separately for each year based on Seattle area 30 year climate data. The 30 year data were sorted from dry to wet and each of the years being processed was compared to the data set based on the yearly precipitation. If the year being processed fell within the lowest 9 years it was classified as dry, if the year fell in the middle 12 it was classified as average, and if the year fell in the top 9 it was classified as wet. The years determined to be wet were 2014, 2015, 2016, and 2017; only 2013 was dry. The climatological data set was from the Western Regional Climate Center for the Seattle Tacoma International Airport. Other AERSURFACE inputs were:

- *Surface station location (47.493N, 122.214W, NAD83)*
- *Default seasons of Winter (12, 1, 2), Spring (3, 4, 5), Summer (6, 7, 8), and Autumn (9, 10, 11).*
- *No continuous snow cover*
- *At an airport*
- *Not arid*

These data were processed using AERMET software (version 18081) and AERMINUTE (Version 15272) using a 0.5 m/s threshold wind speed to address missing and calm conditions. The profile base elevation of 9 meters was used, which is the same elevation as the surface meteorological data weather station.

Receptors

Receptors were placed at 50-meter intervals along the landfill's property boundary. From the property boundaries, a network of rectangular receptor grids of decreasing densities was placed: 100-meter spacing out to 2 kilometers; then 250-meter spacing out to 5 kilometers; and finally, 500-meter spacing out to 8 kilometers. Receptor elevation information was generated using the current AERMAP processor (18081) and 1/3 arc second NED data obtained for the area (from https://landfire.gov/) covered by the receptor grids.

Sources
As indicated in HDR's response letter, all sources that could emit the landfill gas-related TAP emissions generated by Area 8 were modeled. This includes both the uncollected (i.e., fugitive) and collected landfill gas, as well as the leachate ponds. To be conservative, 100% of the collected landfill gas was modeled as being simultaneously routed to a CHRLF flare, the BEW flare, and a BEW reciprocating engine. Although this is not physically possible, this conservative approach was taken to avoid the imposition of any permit limitations on how much gas can be routed to each device.

Fugitive TAP emissions were modeled as a POLYAREA source (with a surface area of 181,150.90 m2), named "CELL8" in the AERMOD input files, covering the Area 8 final design area plus the portions of Areas 5,6,7 that can be filled because of Area 8. CELL8 was modeled with a base elevation of 790 ft, which is the height of the Area 8 design final surface, and a release height of zero feet (i.e., surface level emissions). The TAP emission rates modeled for CELL8 correspond to the "LFG Not Collected" values in the TAP evaluation spreadsheets (note that the emission rate in the AERMOD input files are in units of gram per second per square meter, while all other emission rates are in units of gram per second).

CHRLF operates two leachate ponds located adjacent to one another. The two ponds were modeled as adjacent VOLUME sources, named "LPWEST" and "LPEAST" in the AERMOD input files, each assumed to emit 50% of the total leachate-generated TAP emissions. Each leachate pond was modeled with a base elevation of 512 ft, which is the normal lagoon operating surface level. The release height of each pond was modeled as 8 feet to reflect the difference between the normal surface elevation (512 ft) and the height of the berm surrounding the ponds (520 ft). The initial horizontal and vertical dimensions of the volume sources were calculated using the methodology contained in the AERMOD user guide and using the 8 ft difference between the normal surface elevation and the berm elevation as a basis for the initial vertical sigma-z value.

The CHRLF flare, BEW flare, and BEW engine (named "CHFLARE", BEWFLARE", and "BEWENG", respectively, in the AERMOD input files) were each modeled as a POINT source. The base elevation of each was determined using AERMAP. The TAP emission rates for each correspond to the "LFG Collected Not Destroyed" values in the TAP evaluation spreadsheet. The other parameters for the CHRLF flare were obtained from test reports, while those parameters for the BEW engine and flare were obtained from BEW's NOC application.

RESULTS
The emission rates modeled for each source, along with the maximum concentrations predicted by AERMOD, for each TAP at or beyond the property boundaries are shown in Tables 4 through 6 for the averaging period that corresponds to the applicable ASIL. Model results indicated that four TAPs (1,1,1,2- Tetrachloroethane, Acrylonitrile, Bromodichloromethane, and Vinyl Chloride) had modeled impacts above their respective ASIL's based on their LandGEM calculated emissions. Because the impacts were primarily due to the Area 8 landfill gas emissions, the emission calculations for these four TAP's were refined using historic analytical

results of landfill gas testing performed at CHRLF flare inlets in 2007, 2009, and 2013. The maximum concentration from this testing (or detection limit, as applicable) for each TAP was used in conjunction with the LandGEM calculated maximum annual landfill gas flow rate to refine the emission calculations for each of these four TAPs. These values were summed with the leachate emissions for comparison to the TAP evaluation criteria of WAC 173-460-150, as well as the basis for the emission rates that were subsequently modeled for each TAP. The results of the supplemental evaluation indicate that none of the four constituents will exceed their ASIL at any receptor at or beyond the property boundary.

I. APPLICABLE RULES & REGULATIONS

1. PUGET SOUND CLEAN AIR AGENCY REGULATIONS

SECTION 7.09(b): Owner or operators of air contaminant sources subject to Article 7 of this regulation shall develop and implement an operation and maintenance plan to ensure continuous compliance with Regulations I, II, and III. A copy of the plan shall be filed with the Control Officer upon request. The plan shall reflect good industrial practice and shall include, but not be limited to, the following:
(1) Periodic inspection of all equipment and control equipment;
(2) Monitoring and recording of equipment and control equipment performance;
(3) Prompt repair of any defective equipment or control equipment;
(4) Procedures for startup, shut down, and normal operation;
(5) The control measures to be employed to ensure compliance with Section 9.15 of this regulation; and
(6) A record of all actions required by the plan.
The plan shall be reviewed by the source owner or operator at least annually and updated to reflect any changes in good industrial practice.

SECTION 6.09: Within 30 days of completion of the installation or modification of a stationary source subject to the provisions of Article 6 of this regulation, the owner or operator or applicant shall file a Notice of Completion with the Agency. Each Notice of Completion shall be submitted on a form provided by the Agency, and shall specify the date upon which operation of the stationary source has commenced or will commence.

SECTION 9.03: (a) It shall be unlawful for any person to cause or allow the emission of any air contaminant for a period or periods aggregating more than 3 minutes in any 1 hour, which is:
(1) Darker in shade than that designated as No. 1 (20% density) on the Ringelmann Chart, as published by the United States Bureau of Mines; or
(2) Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in Section 9.03(a)(1).
(b) The density or opacity of an air contaminant shall be measured at the point of its emission, except when the point of emission cannot be readily observed, it may be measured at an observable point of the plume nearest the point of emission.

(c) This section shall not apply when the presence of uncombined water is the only reason for the failure of the emission to meet the requirements of this section.

SECTION 9.09: General Particulate Matter (PM) Standard. It shall be unlawful for any person to cause or allow the emission of particulate matter in excess of the following concentrations:
Equipment Used in a Manufacturing Process: 0.05 gr/dscf

SECTION 9.11: It shall be unlawful for any person to cause or allow the emission of any air contaminant in sufficient quantities and of such characteristics and duration as is, or is likely to be, injurious to human health, plant or animal life, or property, or which unreasonably interferes with enjoyment of life and property.

SECTION 9.13: It shall be unlawful for any person to cause or allow the installation or use of any device or use of any means designed to mask the emission of an air contaminant which causes detriment to health, safety or welfare of any person.

SECTION 9.15: It shall be unlawful for any person to cause or allow visible emissions of fugitive dust unless reasonable precautions are employed to minimize the emissions. Reasonable precautions include, but are not limited to, the following:
(1) The use of control equipment, enclosures, and wet (or chemical) suppression techniques, as practical, and curtailment during high winds;
(2) Surfacing roadways and parking areas with asphalt, concrete, or gravel;
(3) Treating temporary, low-traffic areas (e.g., construction sites) with water or chemical stabilizers, reducing vehicle speeds, constructing pavement or rip rap exit aprons, and cleaning vehicle undercarriages before they exit to prevent the track-out of mud or dirt onto paved public roadways; or
(4) Covering or wetting truck loads or allowing adequate freeboard to prevent the escape of dust-bearing materials.

REGULATION I, SECTION 9.20(a): It shall be unlawful for any person to cause or allow the operation of any features, machines or devices constituting parts of or called for by plans, specifications, or other information submitted pursuant to Article 6 of Regulation I unless such features, machines or devices are maintained in good working order.

2. WASHINGTON STATE ADMINISTRATIVE CODE

WAC 173-400-040(3): Fallout. No person shall cause or allow the emission of particulate matter from any source to be deposited beyond the property under direct control of the owner or operator of the source in sufficient quantity to interfere unreasonably with the use and enjoyment of the property upon which the material is deposited.

WAC 173-400-040(4): Fugitive emissions. The owner or operator of any emissions unit engaging in materials handling, construction, demolition or other operation which is a source of fugitive emission:

(a) If located in an attainment area and not impacting any nonattainment area, shall take reasonable precautions to prevent the release of air contaminants from the operation.

WAC173-400-111(7): Construction limitations.
(a) Approval to construct or modify a stationary source becomes invalid if construction is not commenced within eighteen months after receipt of the approval, if construction is discontinued for a period of eighteen months or more, or if construction is not completed within a reasonable time. The permitting authority may extend the eighteen-month period upon a satisfactory showing by the permittee that an extension is justified.

3. FEDERAL

40 CFR 60 SUBPART WWW

On March 12, 1996, EPA promulgated the Standards of Performance for Municipal Solid Waste Landfills (Title 40 Code of Federal Regulations Part 60 Subpart WWW). The NSPS applies to each municipal solid waste landfill that commenced construction, reconstruction, or modification, or began accepting waste, on or after May 30, 1991. The NSPS requires landfills with a design capacity equal to or greater than 2.5 million megagrams and 2.5 million cubic meters to submit Non- Methane Organic Compound (NMOC) emission reports. When the precontrolled NMOC emissions are calculated at or above 50 megagrams per year additional requirements are triggered. Ecology received a copy of the permittee's initial *Design Capacity Report* and *NMOC Report* on June 4, 1996. The initial NMOC emission rate report listed the NMOC emission rate as 74 Mg/yr using the default variable values listed in 40 CFR 60.754(a)(1)(i). This landfill is subject to the requirements of WWW.

40 CFR 60 XXX Requirements:

On July 14, 2016, EPA issued New Source Performance Standards for Municipal Solid Waste Landfills as Subpart XXX: Standards of Performance for Municipal Solid Waste Landfills that Commenced Construction, Reconstruction, or Modification after July 17. 2014.

Subpart XXX replaces the current NSPS regulating MSW landfills, Subpart WWW for those new source landfills that have commenced lateral or vertical expansion after July 17, 2014.

The first reporting deadline under Subpart XXX was November 28, 2016. Landfills were required to submit amended design capacity reports if construction of lateral or vertical expansion has commenced after July 17, 2014. Tier 1 or Tier 2 non-methane organic compound [NMOC] emissions reports also must be submitted for landfills not currently required to collect and control landfill gas (LFG). These landfills are also required to submit Title V air permit applications to obtain or renew permits under Subpart XXX by this date if the maximum design

capacity exceeds 2.5 million Megagrams (Mg) or 2.5 million cubic meters (m3). All other sources are required to submit amended design capacity reports, Tier 1 or 2 reports, and Title V air permit applications within 90 days of commencing construction that would cause the landfill to exceed this capacity. Cedar Hills landfill is already subject to NSPS WWW and was already a Title V air Permit so the only thing that needs to be submitted is the amended design capacity report for Area 8.

The relevant standards from this subpart are outlined in 60.763(b)(2)(ii)

(ii)Collection system. Install and start up a collection and control system that captures the gas generated within the landfill as required by paragraphs (b)(2)(ii)(C) or (D) and (b)(2)(iii) of this section:

(C) An active collection system must:

(1) Be designed to handle the maximum expected gas flow rate from the entire area of the landfill that warrants control over the intended use period of the gas control system equipment;

(2) Collect gas from each area, cell, or group of cells in the landfill in which the initial solid waste has been placed for a period of 5 years or more if active; or 2 years or more if closed or at final grade.

(3) Collect gas at a sufficient extraction rate;

(4) Be designed to minimize off-site migration of subsurface gas.

(D) A passive collection system must:

(1) Comply with the provisions specified in paragraphs (b)(2)(ii)(C)(1), (2), and (3) of this section.

(2) Be installed with liners on the bottom and all sides in all areas in which gas is to be collected. The liners must be installed as required under 40 CFR 258.40.

(iii)Control system. Route all the collected gas to a control system that complies with the requirements in either paragraph (b)(2)(iii)(A), (B), or (C) of this section.

(A) A non-enclosed flare designed and operated in accordance with the parameters established in § 60.18 except as noted in § 60.764(e); or

(B) A control system designed and operated to reduce NMOC by 98 weight-percent, or, when an enclosed combustion device is used for control, to either 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. The reduction efficiency or parts per

million by volume must be established by an initial performance test to be completed no later than 180 days after the initial startup of the approved control system using the test methods specified in § 60.764(d). The performance test is not required for boilers and process heaters with design heat input capacities equal to or greater than 44 megawatts that burn landfill gas for compliance with this subpart.

(1) If a boiler or process heater is used as the control device, the landfill gas stream must be introduced into the flame zone.

(2) The control device must be operated within the parameter ranges established during the initial or most recent performance test. The operating parameters to be monitored are specified in § 60.766;

(C) Route the collected gas to a treatment system that processes the collected gas for subsequent sale or beneficial use such as fuel for combustion, production of vehicle fuel, production of high-Btu gas for pipeline injection, or use as a raw material in a chemical manufacturing process. Venting of treated landfill gas to the ambient air is not allowed. If the treated landfill gas cannot be routed for subsequent sale or beneficial use, then the treated landfill gas must be controlled according to either paragraph (b)(2)(iii)(A) or (B) of this section.

(D) All emissions from any atmospheric vent from the gas treatment system are subject to the requirements of paragraph (b)(2)(iii)(A) or (B) of this section. For purposes of this subpart, atmospheric vents located on the condensate storage tank are not part of the treatment system and are exempt from the requirements of paragraph (b)(2)(iii)(A) or (B) of this section.

The relevant standards for controlling landfill gas are the same in Subpart XXX as they are in Subpart WWW. Cedar Hills will comply with subpart XXX by either sending the gas to BEW which will comply with (C) above, or they will flare the gas on-site at the north flare station and comply with (B).
Under NSPS Subpart XXX a new or modified MSW landfill that exceeds the design capacity threshold must install and start up a collection and control system, which would meet the Subpart XXX requirements, within 30 months after NMOC emissions rate reach or exceed 34 Mg/yr. See 40 C.F.R. §60.762(b)(2)(ii). However; Cedar Hills Landfill is subject to the requirements of NESHAP AAAA which will require the continued use of the gas collection and control system throughout the 30 months since it is an existing source. The 30 months from which the source has to install the gas collection system under XXX, they will be required to meet the standards of WWW until XXX becomes applicable.

Significant changes from Subpart WWW to Subpart XXX that will affect Cedar Hills include enhanced monitoring and reporting for:

Wellhead parameter exceedances;
LFG treatment system operations;

Surface emissions monitoring (SEMI) events; and
Leachate recirculation activities.

Wellhead Paramaters
XXX corrective action for wellhead parameter exceedances of temperature and gauge pressure continues to be required under the following conditions: (XXX removed the previous limits for oxygen and/or nitrogen)

-Temperature at or above 55°C (131 oF); and
-Positive gauge pressure, EXCEPT under the following conditions:
A fire or increased well temperature;
Use of a geomembrane or synthetic cover; or
A decommissioned well.

If these conditions are observed, the following corrective actions must be taken:
1. Initiated corrective action within 5 days.
2. If temperature or pressure remains out of compliance after 15 days after initial exceedance, conduct a root cause analysis within 60 days of initial exceedance.
3. If temperature or pressure remains out of compliance after 60 days after initial exceedance, conduct a corrective action analysis and develop an implementation schedule within 120 days of initial exceedance.
4. If implementation of the corrective action is expected to take longer than 120 days from initial exceedance, submit the root cause and corrective action analyses, and implementation schedule timeline to the regulatory agency.

LFG treatment system: relevant parts from the rule pasted below:

§60.767 Reporting requirements (7) If the owner or operator chooses to demonstrate compliance with the emission control requirements of this subpart using a treatment system as defined in this subpart, then the owner or operator must prepare a site-specific treatment system monitoring plan as specified in §60.768(b)(5).

§60.768 Recordkeeping requirements. (5) Where an owner or operator subject to the provisions of this subpart seeks to demonstrate compliance with §60.762(b)(2)(iii) through use of a landfill gas treatment system:

(i) *Bypass records.* Records of the flow of landfill gas to, and bypass of, the treatment system.

(ii) *Site-specific treatment monitoring plan*, to include:

(A) Monitoring records of parameters that are identified in the treatment system monitoring plan and that ensure the treatment system is operating properly for each intended end use of the treated landfill gas. At a minimum, records should include records of filtration, de-

watering, and compression parameters that ensure the treatment system is operating properly for each intended end use of the treated landfill gas.

(B) Monitoring methods, frequencies, and operating ranges for each monitored operating parameter based on manufacturer's recommendations or engineering analysis for each intended end use of the treated landfill gas.

(C) Documentation of the monitoring methods and ranges, along with justification for their use.

(D) Identify who is responsible (by job title) for data collection.

(E) Processes and methods used to collect the necessary data.

(F) Description of the procedures and methods that are used for quality assurance, maintenance, and repair of all continuous monitoring systems.

Surface Emission Monitoring:
Active landfills are required to conduct quarterly surface emissions monitoring (SEM) events in areas that are required to have a gas collection and control device installed, based on the age of waste (2 year/5 year rule). XXX specifically requires monitoring of all surface penetrations, including LFG wells, but excluding survey stakes, litter fencing, edge of waste markers, flags, signs, trees, or utility poles.

Latitude and longitude of the locations of exceedances of 500 ppm are required to be recorded with a GPS unit accurate to 4 meters or less and included in the SEM report.

Reporting Leachate Recirculation:
The EPA is collecting data on "wet landfills" to inform the need for further regulation in the future. To this end, the new rule requires annual leachate recirculation reports, including:

1. Volume (gallons) of leachate and other liquids recirculated per year;
2. The surface area (acres) over which leachate and other liquids are sprayed/applied; and
3. Total waste disposed in megagrams (Mg) in areas where leachate and/or other liquids are sprayed/applied.

This reporting is required if a landfill has employed leachate recirculation or added liquids based on a Research, Development, and Demonstration permit (issued through Resource Conservation and Recovery Act, subtitle D, part 258) within the last 10 years. If applicable, the initial report will include the previous 10 years, in addition to the current reporting year. This reporting is to be performed electronically through EPA's Central Data Exchange [COX] system

Cedar Hills submitted their initial design capacity report and their NMOC Emission rate report to EPA in 11/23/2016:


New Source
Performance Standar

Some of the landGEM values used in this report are different than what was submitted in this NOC for Area 8, Cedar hills was asked to explain these differences: From Kirk Dunbar via email on 2/7/19:

> *"The 2019 value of 901,779 tons in the Subpart XXX report represents 375,741 tons of waste that is projected to be placed in currently active Area 5,6,7 (and, thereby, filling the existing landfill capacity) and 526,038 tons of waste that would be placed in Area 8 after Area 5,6,7 reaches interim capacity. The waste placed values for years 2020 through 2025 are identical between the Subpart XXX report and the October 2017 NOC submittal. In 2026, after 467,905 tons of waste are placed in Area 8, Area 8 will have reached its interim capacity. However, the filling of Area 8 will then allow Area 5,6,7 to be topped off to final top deck surface and placement of this waste will allow Area 8 to be topped off to final top deck surface.*
>
> *The additional waste placed in Area 5,6,7 as well as the final top off of Area 8 (both of which are made possible by the presence of Area 8) was included in the Subpart XXX report should have been included in the NOC analysis for Area 8. The Area 8 LandGEM (see "a. KC_Area8_landgem-v302_013019.xls") and TAP evaluations (see "b. KC_Area8_NOC_TAP Evaluation_013019.xlsm" and "c. KC_Area8_NOC_TAP Evaluation_OnSiteAnalyticalSupplement_013019.xlsm") have been revised to include this additional waste."*

40 CFR 63 Subpart AAAA:
On January 16, 2003, EPA promulgated the National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills (Title 40 Code of Federal Regulations Part 63 Subpart AAAA). The NESHAP applies to municipal solid waste landfills that have accepted waste since November 8, 1987, or has additional capacity for waste deposition, and may include a bioreactor, and meets any one of three other criteria.

The applicability criteria defines a subject landfill as one that is a major source or collocated with a major source as defined in 40 CFR 63.2 of subpart A. Specifically, major source is defined as, "a stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants…." As indicated in the emissions section, the entire Landfill has the potential to emit more than 10 tons per year each individual hazardous air pollutant or more than 25 tons per year in combination of hazardous air pollutants.

The applicability criteria also define a subject landfill as one that has a design capacity equal to or greater than 2.5 million megagrams and 2.5 million cubic meters and has estimated uncontrolled emissions equal to or greater than 50 megagrams per year NMOC. As discussed in

the emission section, CHR Landfill's estimated emissions of NMOC are currently more than 50 megagrams per year. Based upon this information, the landfill is subject to the requirements of AAAA.

Currently Subpart AAAA, 40 CFR 63.1955(a), requires compliance with NSPS Subpart WWW if the MSW landfill meets the applicability criteria of Subpart AAAA, 40 CFR 63.1935. That being the case an existing MSW landfill that undertakes a modification that will require the facility to comply with Subpart XXX may be in the position of having to comply with both NSPS Subpart XXX and NSPS Subpart WWW. Based on an EPA guidance document submitted from Region 1, EPA believes that under the NSPS program, a MSW landfill cannot be subject to one NSPS; Once a modified MSW landfill becomes subject to Subpart XXX that MSW landfill is no longer subject to the requirements of Subpart WWW.

http://www.4cleanair.org/sites/default/files/Documents/Landfill_applicability_QA.pdf

However, although the Subpart WWW will no longer apply, the landfill would still be covered by NESHAP AAAA, which refers to Subpart WWW. The landfill will have to comply with NESHAP AAAA up and beyond the Subpart XXX's 30-month window for the installation and startup of the collection and control system. The Subpart WWW requirements would still stand by the way of the NESHAP AAAA. The landfill will have to comply with, both, NESHAP AAAA and the Subpart XXX operational standards for collection and control system requirements, however, the more stringent of the two sets of requirements would apply.

40 CFR 64

On October 22, 1997, EPA promulgated the Compliance Assurance Monitoring rule (Title 40 Code of Federal Regulations Part 64). This Rule requires specialized pollutant-specific monitoring for those emission units which meet the following criteria:

-The unit is located at a Title V Air Operating Permit source
-The unit is subject to an emission limitation or standard for the applicable regulated air pollutant (or surrogate thereof), other than an emission limitation or standard that is exempt.
- The unit uses a control device to achieve compliance with any such emission limitation or standard; and
- The unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as an Air Operating Permit source.

Applicability:
The emission unit considered for CAM applicability was the landfill itself. Following is a summary of how the landfill matches up with the above listed criteria:

1) CHRLF is a Title V Air Operating source.

2) CAM exempts post November 15, 1990, New Source Performance Standard emission limitations/standards from triggering CAM. While the Landfill is subject to the Landfill NSPS, Subpart WWW, the NSPS was promulgated in 1996, and thus it cannot trigger CAM

3) The Landfill has a landfill gas collection system which must be routed to a control device. The control device tied to the emission standard discussed above is an enclosed flare. However; they also comply with this standard by routing emissions to engines run by BEW.

4) While landfills can produce a significant quantity of NMOC emissions, only a portion of the NMOC emissions are collected and made available for control. This Landfill estimates that they collect 90% of the landfill gas produced. Without the landfill gas collection system and the enclosed ground flare station, this facilities pre control emissions would be well above the air operating permit thresholds.

CAM has been identified as an inapplicable requirement for the Landfill, since it is subject to WWW.

J. PUBLIC NOTICE

A notice of application was posted on the Agency's website for 15 days. No requests or responses were received during this time.

This project meets the criteria public notice under WAC 173-400-171(3)(n) of this section states *Any application or other action for which the permitting authority determines that there is significant public interest.* The agency believes there is a significant public interest in this project based on interest from both residents in the area and others who have submitted odor complaints in the area and will be going to public notice as outlined in WAC 173-400-171.

K. RECOMMENDED APPROVAL CONDITIONS

Standard Conditions:

1. Approval is hereby granted as provided in Article 6 of Regulation I of the Puget Sound Clean Air Agency to the applicant to install or establish the equipment, device or process described hereon at the installation address in accordance with the plans and specifications on file in the Engineering Division of the Puget Sound Clean Air Agency.

2. This approval does not relieve the applicant or owner of any requirement of any other governmental agency.

Specific Conditions:

3. The owner and/or operator shall comply with the applicable requirements of 40 CFR 60 Subparts A, WWW, and XXX as well as 40 CFR 63 Subpart A and AAAA. Where there is a conflict of authority between two conditions, the more stringent shall be applicable.

4. The owner and/or operator shall report actual emissions of all pollutants evaluated under this Permit, to the Agency within 30 days of the landfill accepting more than 1,155,970 tons of refuse per any 12 consecutive month periods into the Area 8 expansion.

    a. If actual emissions are above any SQER found in WAC 173-460-150 (except for the four pollutants in Permit Condition 15), the owner and/or operator shall submit a permit application to the Agency within 90 days of submitting the report of actual emissions.

5. The owner and/or operator shall install and maintain an active landfill gas collection and control system capable of meeting the design parameters 40 CFR 60.762(b)(2)(ii). This gas collection and control system shall, at a minimum, match the approved design plan submitted to the agency in the permit application.

6. The owner and/or operator shall operate the gas collection and control system located at Area 8 in accordance with the requirements of 40 CFR 60.763.

7. The owner and/or operator shall ensure that each wellhead located in the Area 8 gas collection system has at least one sample port in accordance with 40 CFR 60.756(a).

8. Landfill gas collected with the landfill gas collection and control system shall be routed to the Bio Energy (Washington) LLC Facility (BEW) or other similar landfill gas to energy facility. Any landfill gas not routed through the BEW shall be routed to the Cedar Hills flare station for processing as follows:

    a. The owner and/or operator shall ensure the flare operated under this condition achieves a minimum of 98% destruction of all non-methane organic compounds; or
    b. Reduce the outlet NMOC concentration to less than 20 ppm by volume, dry basis as hexane at 3 percent oxygen.

9. The owner and/or operator shall operate the gas collection and control system such that the H2S concentration is less than 1 ppm average above the background concentration (if any), at the surface of the Area 8 cover.

10. In order to demonstrate compliance with Permit Condition 9, the owner and/or operator shall conduct surface monitoring of the landfill cover at Area 8 once per operating year, using a portable handheld monitor capable of measuring at least 1 ppm H_2S. The surface testing

must be conducted around the perimeter of the collection area for Area 8 and along a pattern that traverses the Area 8 cover at no more than 30 meter intervals.

11. The owner and/or operator shall conduct an initial performance test on all flares that have the potential to receive area 8 landfill gases within 12 to 18 months of Area 8 receiving waste in order to verify compliance with the standards in Condition No. 8a or 8b. The flare does not need to be started up just to conduct a performance test; the owner and/or operator may wait until LFG is not routed to the landfill gas to energy facility. The test shall be conducted as close as possible to normal operation.

12. The owner and/or operator shall annually test one of the flare outlets controlling landfill gas from Area 8 for H_2S to ensure it does not exceed 2.2 lbs H_2S/ 10^6 acf LFG.

13. In order to demonstrate compliance with Permit Condition 12, the annual test should be conducted using EPA Method 15 or an alternative method approved by the agency in writing. If, after two years of annual testing, the H_2S content is found to be consistently less than or equal to Permit Condition 12 limit, the periodic testing rate can be change to once every 5 years.

14. The owner and/or operator shall test the flare in accordance with the test methods and procedures outlined in 40 CFR 60.754(d) and the applicable EPA test reference methods for NMOC.

15. The owner and/or operator shall report actual emissions of the following pollutants to the Agency within 30 days of any test result showing detected levels in the landfill gas that are higher than the following:

    a. Vinyl Chloride – 1800 ug/m3
    b. Acrylonitrile – 557 ug/m3
    c. 1,1,1,2-Tetrachloroethane – 2167 ug/m3
    d. Bromodichloromethane. – 430 ug/m3

    If actual emissions are above any SQER found in WAC 173-460-150, the owner and/or operator shall submit a permit application to the Agency within 90 days of submitting the report of actual emissions.

16. In order to demonstrate compliance with Permit Condition 15, the owner/operator shall conduct an initial characterization of the landfill gas that would go to the flare or the landfill gas-to-energy facility within 12 to 18 months of Area 8 receiving waste. The flare inlet gas shall be analyzed for, at a minimum, the compounds listed below. All concentrations shall be reported on a dry basis.

    Vinyl Chloride, Acrylonitrile, 1,1,1,2-Tetrachloroethane, and Bromodichloromethane.

The owner/operator shall conduct an additional characterization of the landfill gas in the year 2026 to ensure the limits of Permit Condition 15 are still being met.

17. The owner shall record and maintain the ammonia concentration entering the leachate collection pond from the area 8 landfill operations. The owner and/or operator shall make the records available to the Agency upon request.

18. The owner and/or operator shall submit a test notification to the Puget Sound Clean Air Agency in accordance with Section 3.07 of Regulation I before a source test is conducted.

19. The owner and/or operator shall submit a test protocol to the Agency 30 days before conducting performance tests on the flares for which compliance with Permit Condition 11 is being verified.

20. The owner and/or operator shall submit a test report to the Puget Sound Clean Air Agency in no later than 60 days after a performance test is conducted. This source test shall outline the results of the test and indicate whether the owner and/or operator failed any test.

21. The owner and/or operator shall operate the flare at an average set point temperature at or above the temperature range recorded during the most recent source test showing compliance with Condition No. 8a or 8b. The owner or operator must collect at least one measured data point for each 15-minute monitoring period in every hour the flare is receiving landfill gas. For the purposes of this condition, flare operating temperature shall be based on a rolling 3-hour average and shall only include hourly data which has at least one measured data point during three 15-minute monitoring periods during each hour. The flare operating temperature requirement does not apply to periods of start-ups, shutdowns and/or malfunctions provided that these events are not actively processing landfill gas and do not last for more than 1 hour.

22. The owner and/or operator shall report to the agency no later than 30 days after the violation is discovered all instances when either:

    a. The 3-hour rolling average flare temperature readings were below the set point.
    b. Startup, shutdown or malfunction events lasted longer than an hour and the flare was actively receiving landfill gas.

23. The owner/or operator shall develop a written start-up, shutdown, and malfunction plan according to the provisions of 40 CFR 63.6(e)(3). A copy of the plan must be maintained on site at all times.

24. The flare shall be equipped with both local and remote alarms, automatic combustion air control, and automatic gas shutoff valves.

25. The owner and/or operator shall either remove or seal in the closed position any valve that has the potential to bypass the flare. Any bypasses of the flare shall be measured and logged. The records shall be maintained on file and made available upon request of Agency personnel.

26. The owner and/or operator may test emissions from the flare at any time in order to demonstrate compliance with Condition No 8a or 8b, using the test methods specified in 40 CFR 60.754(d), following the notification procedures of Section 3.07 of Regulation I, and submitting the test report to the Agency within 60 days after the testing.

27. The owner and/or operator shall take corrective action whenever the flare temperature drops below the set point temperature determined during the most recent performance test.

28. Records demonstrating compliance with this order must be kept and maintained onsite for at least 5 years. Such records and the O&M plan shall be made available for review by the Puget Sound Clean Air Agency upon request.

L. CORRESPONDENCE AND SUPPORTING DOCUMENTS

M. REVIEWS

Inspector Name	Megan Chaplin	Date:
Second Reviewer	Carole Cenci	Date: 12/8/17, 3/29/19
Source Name	Kirk Dunbar/Ryan Asman/King County	Date:3/25/19