

**Title V Status  
Evaluation Report  
Palo Alto Water Quality Control Plant, Site #A0617  
Palo Alto Landfill, Site #A2721**

April 28, 2020

*The potential to emit calculation in this evaluation report demonstrates that the potential to emit for the contiguous facilities, Palo Alto Water Quality Control Plant and the Palo Alto Landfill, does not exceed the major source thresholds for Title V applicability. Furthermore, the Palo Alto Water Quality Control Plant is no longer a designated facility per 40 CFR 60, Subpart M and the Palo Alto Landfill is no longer a designated facility per 40 CFR 60, Subpart Cc. Therefore, the Title V permit application for the Palo Alto Water Quality Control Plant is cancelled and the Title V operating permit for the Palo Alto Landfill is cancelled. A synthetic minor operating permit is not required because the potential to emit is below major source thresholds.*

## **BACKGROUND**

### Palo Alto Water Quality Control Plant, Site #A0617

Palo Alto Water Quality Control Plant (RWQCP), Site #A0617, submitted Application #26107 on March 10, 2014 for a Major Facility Review Permit. The application was submitted in compliance with the then newly promulgated Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Sewage Sludge Incineration Units and the subsequent Federal Plan Requirements for Sewage Sludge Incineration Units Constructed on or Before October 14, 2010, also referred to as 40 CFR 60.5245 and 40 CFR 62.16035. The Major Facility Review Permit was not finalized nor was it issued.

The Palo Alto RWQCP officially discontinued use of its sewage sludge incinerators (S-1 and S-2) on September 13, 2019, as well as the associated abatement devices (A-20 to A-23). This equipment was permanently removed from operation by capping all auxiliary fuel lines to the sources. As a result, the facility is no longer subject to the Title V permitting requirements of 40 CFR 62.15855. According to 40 CFR 62.15855 a facility is subject to Title V requirements if the facility operates a sewage sludge incineration (SSI) unit commenced construction on or before October 14, 2010. A letter dated September 13, 2019 from the Palo Alto RWQCP to the District requested withdrawal of the facility's Title V Major Facility Review Application (Application #26107).

This evaluation also sets out to demonstrate that the Palo Alto RWQCP does not trigger any requirements for a Major Facility Review permit due to the magnitude of its emissions.

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Palo Alto Landfill, Site #A2721, is subject to the Operating Permit requirements of Title V of the federal Clean Air Act, Part 70 of Volume 40 of the Code of Federal Regulations (CFR). According to the Emission Guidelines for Municipal Solid Waste Landfills (40 CFR Part 60, Subpart Cc), Site #A2721 is a designated facility because it has a design capacity greater than or equal to 2.5 million megagrams (Mg). The landfill has a maximum design capacity of 5.29 million Mg. Therefore, the facility is required to obtain an operating permit under Part 70.

Site #A2721 also previously triggered the New Source Performance Standards (NSPS) requirements to install and operate a landfill gas collection system (GCCS) because the non-methane organic compounds (NMOC) emissions were previously calculated to be over 50 Mg. A GCCS was installed at the facility in 1989.

According to 40 CFR 60.752(b)(2)(v), the GCCS at closed landfills may be capped or removed provided all of the conditions of paragraphs 60.752(b)(2)(v) (A), (B), and (C) are met. 40 CFR 60.752(b)(2)(v) states the following:

- (A) The landfill shall be a closed landfill as defined in 60.751 of this subpart. A closure report shall be submitted to the Administrator as provided in 60.757(d);
- (B) The collection and control system shall have been in operation a minimum of 15 years; and
- (C) Following the procedures specified in 60.754(b) of this subpart, the calculated NMOC gas produced by the landfill shall be less than 34 megagrams per year on three successive test dates. The test dates shall be no less than 90 days apart and no more than 180 days apart.

Site #A2721 currently meets all of the above conditions stated in 60.752(b)(2)(c) (A), (B), and (C). The site is a closed landfill as defined in 40 CFR 60.751. The site officially ceased waste acceptance and disposal operations in July 2011 and achieved final closure status in November 2015. The facility's GCCS was installed in 1989 and, therefore, has been in operation for a least 15 years. Tier 2 NMOC sampling was conducted on October 23, 2018, January 29, 2019, and May 17, 2019.

As required by the Regulation, the test dates were no less than 90 days apart and no more than 180 days apart. The NMOC emissions were 3.91 Mg/yr, 3.89 Mg/yr, and 7.28 Mg/yr - demonstrating that the NMOC gas produced is less than 34 Mg/yr on three successive test dates. The calculations are based on the equation outlined in 40 CFR 60.35f(b):

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$$M_{\text{NMOC}} = 1.89 \times 10^{-3} Q_{\text{LFG}} C_{\text{NMOC}} \quad (\text{Equation 1})$$

Where:

$M_{\text{NMOC}}$  = Mass emission rate of NMOC, megagrams per year;

$Q_{\text{LFG}}$  = Flow rate of landfill gas, cubic meters per minute;

$C_{\text{NMOC}}$  = NMOC concentration, parts per million by volume as hexane

A LandGEM model was used to calculate the landfill gas generation rate based on site-specific inputs. A copy of the LANDFEM model can be found in Attachment 2.

The modeled landfill gas generation for 2019,  $1.322\text{E}+07$  m<sup>3</sup>/yr, (this value is converted to m<sup>3</sup>/min by dividing by 525,600 min/year) and the NMOC concentration determined from the 10-23-18 sampling event, 82.5 ppm, are used to calculate  $M_{\text{NMOC}}$  (Mg/year) as follows:

$$\begin{aligned} M_{\text{NMOC}} (\text{Mg/year}) &= 1.89\text{E}-03 \times (1.322 \text{E}+07 / 525,600) \times 82.5 \\ M_{\text{NMOC}} &= 3.92 \text{ Mg/yr} \end{aligned}$$

The NMOC concentration determined from the 1-29-19 sampling event, 82.37 ppm, is used to calculate  $M_{\text{NMOC}}$  (Mg/year) as follows:

$$\begin{aligned} M_{\text{NMOC}} (\text{Mg/year}) &= 1.89\text{E}-03 \times (1.322 \text{E}+07 / 525,600) \times 82.37 \\ M_{\text{NMOC}} &= 3.89 \text{ Mg/yr} \end{aligned}$$

The NMOC concentration determined from the 5-17-19 sampling event, 153.7 ppm, is used to calculate  $M_{\text{NMOC}}$  (Mg/year) as follows:

$$\begin{aligned} M_{\text{NMOC}} (\text{Mg/year}) &= 1.89\text{E}-03 \times (1.322 \text{E}+07 / 525,600) \times 153.7 \\ M_{\text{NMOC}} &= 7.28 \text{ Mg/yr} \end{aligned}$$

According to Part d of the definition for a designated facility, a landfill is no longer subject to Title V requirements if the landfill is closed and meets the conditions for control system removal.

This evaluation also sets out to demonstrate that the Palo Alto Landfill does not trigger the requirements for a Major Facility Review permit due to the magnitude of its emissions.

Contiguous Facilities, Site #A0617 and Site #A2721

Palo Alto RWQCP, Site #A0617, and Palo Alto Landfill, Site #A2721, are considered contiguous facilities. The facilities are contiguous for the following reasons: (1) both plants are owned by the City of Palo Alto; (2) the first two digits of the SIC codes for both facilities are “49.”; and, (3) the

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City of Palo Alto Landfill provided the Palo Alto RWQP with landfill gas to combust in the two sewage sludge incinerators. Based on the definition of facility in District Regulation 2, Rule 1, Section 213, both plants form part of one facility. For the purposes of District Regulation 2, Rule 6, Major Facility Review, the potential to emit from both facilities will be analyzed as one.

District Regulation 2, Rule 6, Section 212 defines a major facility as a facility that has the potential to emit 100 tons per year or more of any regulated air pollutant or the potential to emit 10 tons per year or more of a single hazardous air pollutant or 25 tons per year or more of a combination of hazardous air pollutants.

Site #A2721 has a Major Facility Review permit that was issued on December 4, 2003, revised on April 9, 2004, October 13, 2004, August 2, 2006, August 28, 2007, and January 13, 2016, and renewed on June 4, 2012 and June 11, 2018. However, the facility was not determined to be a major facility as defined by Regulation 2-6-212. Instead, Site #A2721 was subject to Major Facility Review because it was subject to the emission guidelines of 40 CFR 60, Subpart Cc, as discussed previously.

Similarly, Site #A0617 was not determined to be a major facility as defined by Regulation 2-6-212. As stated above, Site #A0617 was required to obtain a Major Facility Review Permit under 40 CFR 60.5245 and 40 CFR 62.16035.

In addition, the City of Palo Alto owns a number of facilities in Palo Alto that contain emergency generators and gas stations. Of these, one (Site #B4941) has a SIC code that shares the first two digits of the SIC code and is within 3 miles of the landfill. This site is not part of the A0617/A2721 facility because it is not contiguous, but since it is within 3 miles of the facility, the emissions from B4941 must be included in the potential to emit per Regulation 2-2-215.3.

A potential to emit determination for both facilities is discussed in the sections below. It shows that the combined facility is not major as defined by District Regulation 2-6-212.

## **SOURCES COVERED**

### Palo Alto Water Quality Control Plant, Site #A0617

The permitted equipment at Site #A0617 is listed below. There are no exempt sources at this facility.

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Source	Description	Additional Information
S-6	Storage Tanks (2 Units), Lime	n/a
S-36	Emergency Diesel Generator	1195 hp
S-100	Municipal Wastewater Treatment Plant	3.3 MM gal/hr
S-110	Preliminary Treatment	3.3 MM gal/hr
S-120	Primary Treatment	3.3 MM gal/hr
S-130	Secondary Treatment	3.3 MM gal/hr
S-140	Secondary Clarifiers	3.3 MM gal/hr
S-150	Tertiary Treatment	3.3 MM gal/hr
S-160	Disinfection, Ultraviolet and Hypochlorite	3.3 MM gal/hr
S-170	Sludge Handling Process Including Blended Tank	3.3 MM gal/hr
S-4614	Emergency Diesel IC Engine Generator	764 hp
S-4640	Emergency Diesel IC Engine Generator	1103 hp
S-4641	Emergency Standby Diesel Generator Set	1141 hp
S-4642	Emergency Standby Diesel Generator Set	757 hp
S-4643	Emergency Standby Diesel Generator Set	757 hp
S-4644	Emergency Standby Diesel Generator Set	757 hp
S-4645	Emergency Standby Diesel Generator Set	757 hp
A-6	Lime System Bay Filter	Ringelmann 1 for < 3 min/hr
A-7	Baghouse	Ringelmann 1 for < 3 min/hr
A-8	Baghouse	Ringelmann 1 for < 3 min/hr
A-11	Soil Bed Filter	Abating S-110
A-13	Fixed Film Reactor #1	Abating S-130

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Source	Description	Additional Information
A-14	Fixed Film Reactor #1	Abating S-130
A-15	Fixed Film Reactor #2	Abating S-130
A-19	Fixed Film Reactor #2	Abating S-130
A-24	Biotower	Abating S-170
A-25	Activated Carbon Adsorber, 2500 scfm	Abating S-170
A-34	Dust Collector/Reclaimed Filter Bag	Abating S-110

Palo Alto Landfill, Site #A2721

The permitted equipment at this facility is listed below. There are no exempt sources at this facility.

S-1	Palo Alto Landfill equipped with Gas Collection System	Inactive Class III Solid Waste Disposal Site
A-10	Landfill Gas Flare	9.0 MM BTU/hour

**EMISSION CALCULATIONS**

Palo Alto Water Quality Control Plant, Site #A0617

All emissions from Site #A0617 are from liquid and semi-liquid wastewater processes and combustion emissions from the eight emergency diesel generators located at the facility. Liquid sources include grit removal, primary sedimentation, fixed film reactors, activated sludge aeration basins, secondary clarification, dual media filters, ultraviolet disinfection, and sludge dewatering. Average dry weather wastewater effluent flow capacity is estimated at 20 million gallons per day (mgd) and design capacity is 39 mgd. Peak wet weather wastewater effluent flow design capacity is 80 mgd.

All of the engines are emergency stationary diesel emergency generators. Per Air District policy, Calculating Potential to Emit for Emergency Backup Power Generators, emissions resulting from emergency use of 100 hours per year must be accounted for when determining the potential to emit (PTE). This is in addition to the permitted limit for reliability-related and testing operations of 50 hours per year.

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The primary pollutants from internal combustion engines are oxides of nitrogen (NO<sub>x</sub>), hydrocarbon and other organic compounds (POC), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), and diesel exhaust particulate matter (PM). In calculating these emissions, emission factor data from EPA AP-42 was used.

The total site-wide potential to emit (PTE) are summarized in the table below and compared to the Title V permit limits. As shown below the site-wide PTE is less than the Regulation 2-6-212 major facility limits.

Total Site-Wide Emissions from Site # A0617

	Title V Limit tons/year	Potential to Emit tons/year
CO	100.0	1.739
NO <sub>x</sub>	100.0	6.926
SO <sub>2</sub>	100.0	0.014
PM <sub>10</sub>	100.0	0.288
PM <sub>2.5</sub>	100.0	0.288
POC	100.0	10.775
HAPs <sup>(1)</sup>	25.0 / 10.0	4.01 / 0.641
H <sub>2</sub> S	100.0	0.225

(1)The total HAP PTE is less than both the total HAP limit of 25.0 tons/year and the single HAP limit of 10.0 tons/year. The largest expected single HAP is methylene chloride at 0.641 tons/year.

**NO<sub>x</sub> Emissions:**

The combustion of diesel fuel produces emissions of NO<sub>x</sub>. Emission factors from AP-42, Volume 1, Chapter 3, Table 3.4-1 were used in calculating the potential to emit for NO<sub>x</sub> from S-4614, S-4640, S-4641, S-4642, S-4643, S-4644, and S-4645. Potential to emit emissions for S-36 were calculated using vendor provided EPA Certified Emissions Data for non-road compression ignition engines. One pound equates to 453.592 grams.

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NO<sub>x</sub> Emissions from Combustion Sources at Site #A0617

Source	Engine Size bhp	Emission Factor g/bhp-our	Usage hours/year	Emissions NO <sub>x</sub> tons/year
S-36	1195	4.2	150	0.830
S-4614	764	10.9	150	1.377
S-4640	1103	10.9	150	1.988
S-4641	1141	3.6	150	0.679
S-4642	757	4.1	150	0.513
S-4643	757	4.1	150	0.513
S-4644	757	4.1	150	0.513
S-4645	757	4.1	150	0.513
Total	--	--	--	6.926

CO Emissions:

The combustion of diesel fuel produces emissions of CO. Emission factors from AP-42, Volume 1, Chapter 3, Table 3.4-1 were used in calculating the potential to emit for CO from S-4614, S-4640, S-4641, S-4642, S-4643, S-4644, and S-4645. Potential to emit emissions for S-36 were calculated using vendor provided EPA Certified Emissions Data for non-road compression ignition engines.

CO Emissions from Combustion Sources at Site #A0617

Source	Engine Size bhp	Emission Factor g/bhp-hour	Usage hours/year	Emissions CO tons/year
S-36	1195	0.42	150	0.083
S-4614	764	2.5	150	0.316
S-4640	1103	2.5	150	0.456
S-4641	1141	2.5	150	0.472
S-4642	757	0.82	150	0.103
S-4643	757	0.82	150	0.103
S-4644	757	0.82	150	0.103
S-4645	757	0.82	150	0.103
Total	--	--	--	1.739



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SO<sub>2</sub> Emissions:

The combustion of diesel fuel produces emissions of SO<sub>2</sub>. Emissions of SO<sub>2</sub> were calculated based on the maximum allowable sulfur content (0.0015 wt% S) of diesel fuel in California with the assumption that all the sulfur present will be converted to SO<sub>2</sub> during the combustion process. The potential to emit calculation for SO<sub>2</sub> from S-4614, S-4640, S-4641, S-4642, S-4643, S-4644, and S-4645 are based on a theoretical 150 hours of operation per year and the weight of diesel fuel which is roughly 7.02 lb/gal.

SO<sub>2</sub> Emissions from Combustion Sources at Site #A0617

Source	Fuel Consumption Rate gal/hour	Annual Usage gal/year	Fuel wt. lb/year	Sulfur Emissions lb/year	SO <sub>2</sub> Emissions lb/year	SO <sub>2</sub> Emissions tons/year
S-36	19.2	2,880	20,217	0.30	0.6	0.0003
S-4614	36.3	18,150	127,776	1.9	3.8	0.0019
S-4640	56.0	28,000	197,120	3.0	5.9	0.00295
S-4641	54.0	27,000	190,080	2.9	5.7	0.00285
S-4642	31.3	15,650	110,176	1.7	3.3	0.00165
S-4643	31.3	15,650	110,176	1.7	3.3	0.00165
S-4644	31.3	15,650	110,176	1.7	3.3	0.00165
S-4645	31.3	15,650	110,176	1.7	3.3	0.00165
Total	--	--	--	--	--	0.014

POC Emissions:

POC emissions at Site #A0617 are calculated from S-100, Municipal Wastewater Treatment Plant, S-170, Sludge Handling Processes, and the eight emergency diesel engines.

POC emissions for the water operations at the publicly owned treatment works are calculated at S-100. Site #A0617 is rated at 3.3 million gallons per hour. The site specific POC emission factor the facility is 0.7 lb/million gallons. Given that the facility operates 24 hours/day and 365 days/year (8,760 hour/year), the potential to emit is:

$$\text{POC} = (0.7 \text{ lb/MM gal}) * (3.3 \text{ MM gal/hr}) * (8,760 \text{ hrs/year}) * (\text{ton}/2000 \text{ lb}) = 10.110 \text{ tons/year}$$

It is assumed that most of these POC emissions are lost at the beginning of the process in preliminary and primary treatment.

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Some of the POC emissions are present in the plant raw water influent and a portion of these POCs end up in the solids stream that are processed by the facility at S-170. The emissions are emitted from the odor control system stack (A-25) and the sludge dewatering and loadout facility ventilation stack (P-26) .

At this facility, the process areas, which include the blend tank, cake conveyors, and storage bins, are covered and associated air streams are collected and passed through the odor control system for treatment. Other areas with lower odor content, including the belt filter press dewatering units, are exhausted through P-26, Ventilation System.

Permit Condition #26729, set in Application #29106, limits the POC emissions from A-25 to 0.728 lbs/day. Permit condition #26729 also limits POC emissions from P-26 to 1.495 lbs/day. Assuming that emissions will be emitted 365 days/year, the potential to emit for POC from S-170 is:

$$\text{POC} = (0.728 \text{ lbs/day} + 1.495 \text{ lbs/day}) * (365 \text{ days/year}) * (\text{ton}/2000 \text{ lbs}) = 0.406 \text{ tons/year}$$

The combustion of diesel fuel also produces emissions of POC. Emission factors from AP-42, Volume 1, Chapter 3, Table 3.4-1 were used in calculating the potential to emit for POC from S-4614, S-4640, S-4641, S-4642, S-4643, S-4644, and S-4645. Potential to emit emissions for S-36 were calculated using vendor provided EPA Certified Emissions Data for non-road compression ignition engines.

POC Emissions from Combustion Sources at Site #A0617

Source	Engine Size bhp	Emission Factor g/bhp-hour	Usage hours/year	Emissions POC tons/year
S-36	1195	0.05	150	0.010
S-4614	764	0.29	150	0.037
S-4640	1103	0.29	150	0.053
S-4641	1141	0.29	150	0.055
S-4642	757	0.21	150	0.026
S-4643	757	0.21	150	0.026
S-4644	757	0.21	150	0.026
S-4645	757	0.21	150	0.026
Total	--	--	--	0.259

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PM<sub>10</sub> and PM<sub>2.5</sub> Emissions:

The combustion of diesel fuel produces emissions of PM. Emission factors from AP-42, Volume 1, Chapter 3, Table 3.4-2 were used in calculating the potential to emit for PM from S-4614 and S-4640. These factors include condensables. Emission factors from Table 2.4-1 were used in calculating the potential to emit for PM from S-4641, S-4642, S-4643, S-4644, and S-4645. It is likely that these factors do not include condensables.

Potential to emit emissions for S-36 were calculated using vendor provided EPA Certified Emissions Data for non-road compression ignition engines.

PM Emissions from Combustion Sources at Site #A0671

Source	Fuel Consumption Rate gal/hr	Fuel MM BTU/hr	Emission Factor lb/MM BTU	PM Emissions tons/year
S-4614	36.3	5.082	0.0697	0.089
S-4640	56.0	7.84	0.0697	0.137
Total	--	--	--	0.226

PM Emissions from Combustion Sources at Site #A0671

Source	Engine Size bhp	Emission Factor g/bhp-hour	Usage hours/year	Emissions PM tons/year
S-36	1195	0.04	150	0.007
S-4641	1141	0.104	150	0.019
S-4642	757	0.075	150	0.009
S-4643	757	0.075	150	0.009
S-4644	757	0.075	150	0.009
S-4645	757	0.075	150	0.009
Total	--	--	--	0.062

HAP Emissions:

The primary hazardous air pollutants emitted by wastewater treatment facilities include xylenes, methylene chloride, toluene, ethyl benzene, chloroform, tetrachloroethylene, benzene, and naphthalene. Site specific emission factors were used to determine the potential to emit of each emitted hazardous air pollutant from S-100. As a conservative estimate of emissions, it is assumed that all pollutants entering the plant will be emitted as fugitive. The following emissions are expected to be a conservative estimation of maximum emissions from the site:

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Compound	Emissions lb/day	Emissions tons/year
1,1,1-trichloroethane (with dioxane)	1.95E-01	3.56E-02
Arsenic	3.53E-06	6.44E-07
Benzene	4.05E-03	7.39E-04
Beryllium (all) pollutant	2.07E-06	3.78E-07
Cadmium	8.82E-06	1.61E-06
Chloroform	1.17E+00	2.14E-01
Chromium (hexavalent)	1.82E-07	3.32E-08
Dichlorobenzene	1.95E-01	3.56E-02
Formaldehyde	3.35E-04	6.11E-05
Hydrogen sulfide <sup>(1)</sup>	1.76E-01	3.21E-02
Lead	7.48E-06	1.37E-06
Manganese	1.17E-05	2.14E-06
Mercury	2.49E-06	4.54E-07
Methylene chloride	3.51E+00	6.41E-01
Nickel	1.43E-04	2.61E-05
Organics (other, including CH <sub>4</sub> )	1.37E+01	2.50E+00
Perchloroethylene	3.91E-01	7.14E-02
Toluene	1.37E+00	2.50E-01
Trichloroethylene	1.37E+00	2.50E-01
Xylene	3.91E-01	7.14E-02
Total	--	4.01E+00

<sup>(1)</sup>Hydrogen sulfide is not considered a HAP by the EPA. Therefore, hydrogen sulfide emissions are not included in the potential to emit for HAPs. It will be listed separately as a regulated air pollutant.

Methylene chloride emissions are the greatest at 0.641 tons/year.

H<sub>2</sub>S Emissions:

Permit Condition #26729 limits the concentration of hydrogen sulfide (H<sub>2</sub>S) in the gas at the outlet of A-25 and P-26 is less than 3.0 ppmv and 0.025 ppmv, respectively. This equates to 346.0 lb/year from A-25 and 38.6 lbs/year from P-26. The potential to emit for H<sub>2</sub>S from S-170 is

$$\text{H}_2\text{S} \quad (346 \text{ lb/year} + 38.6 \text{ lb/year}) * (\text{ton}/2000 \text{ lb}) = \quad 0.193 \text{ tons/year}$$

Total H<sub>2</sub>S emissions from A0617 are:

$$\text{H}_2\text{S} \quad 0.193 \text{ tons/year} + 0.0321 \text{ tons/year} = \quad 0.225 \text{ tons/year}$$

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All emissions from this closed landfill are either fugitive landfill gas from S-1 or derive from collected landfill gas, abated by the A-10 Landfill Gas Flare. Landfills are not one of the 28 source categories for which fugitive emissions of regulated air pollutants must be included in Title V potential to emit (PTE) determinations. Since the uncollected landfill gas emissions from S-1 are fugitive in nature, these emissions are not included in the site-wide PTE determination.

The only other source at this site is the A-10 landfill gas flare. The maximum heat input rate for A-10 is 9.0 MM BTU/hour. The PTE determination for this site is based on A-10 operating at 9.0 MM BTU/hour for 24 hours/day and 365 days/year (8,760 hours/year). The maximum annual heat input rate is 78,840 MM BTU/year. Maximum potential emissions were determined based on the emission limits and maximum emission factors specified in the original engineering evaluation for A-10 (NSR Application #22543). These factors and the associated permit condition limits are discussed in more detail below.

The total site-wide potential to emit (PTE) and current emissions, excluding fugitive emissions, are summarized in Table 1 and compared to the Title V permit limits. As shown in Table 1, the site-wide PTE is less than the Regulation 2-6-212 major facility limits.

Total Site-Wide Emissions from Site # A2721

	Title V Limit tons/year	Potential to Emit tons/year
CO	100.0	7.884
NO <sub>x</sub>	100.0	2.365
SO <sub>2</sub>	100.0	22.78
PM <sub>10</sub>	100.0	0.674
PM <sub>2.5</sub>	100.0	0.674
POC	100.0	0.667
HAPs <sup>(1)</sup>	25.0 / 10.0	16.400/ 1.140
H <sub>2</sub> S	100.0	0.608

(1)The total HAP PTE is less than both the total HAP limit of 25.0 tons/year and the single HAP limit of 10.0 tons/year. The largest expected single HAP is toluene at 1.140 tons/year.

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NO<sub>x</sub> and CO Emissions:

In accordance with the Engineering Evaluation for Application #22543, A-10 was subject to the following RACT limits: 0.06 pounds of NO<sub>x</sub> per MM BTU and 0.20 pounds of CO per MM BTU.

$$\begin{array}{lcl}
 \text{CO} & (78,840 \text{ MM BTU/year}) \cdot (0.20 \text{ lbs/MM BTU}) / (2000 \text{ lbs/ton}) & = 7.884 \text{ tons/year} \\
 \text{NO}_x & (78,840 \text{ MM BTU/year}) \cdot (0.06 \text{ lbs/MM BTU}) / (2000 \text{ lbs/ton}) & = 2.365 \text{ tons/year}
 \end{array}$$

Estimates of current CO and NO<sub>x</sub> emissions are based on Source Test #OS-5456 conducted on November 6, 2014 and approved by the Air District on January 7, 2015. This source test measured average emissions of:

0.0410 pounds of NO<sub>x</sub> per MM BTU and  
0.0241 pounds of CO per MM BTU

Given the actual emissions and the throughput limit, NO<sub>x</sub> emissions from A-10 are 1.616 tons/year and the CO emissions from A-10 are 0.950 tons/year.

SO<sub>2</sub> Emissions:

Landfill gas contains a variety of sulfur compounds such as hydrogen sulfide, carbon disulfide, carbonyl sulfide, dimethyl sulfide, and ethyl and methyl mercaptans. The total concentration of sulfur compounds in landfill gas, or total reduced sulfur (TRS) content, is typically expressed as an equivalent concentration to hydrogen sulfide (H<sub>2</sub>S). When landfill gas is burned in A-10, the sulfur in these compounds is oxidized and forms sulfur dioxide (SO<sub>2</sub>). For SO<sub>2</sub> emission calculations, the District assumes that 100% of the inlet TRS will be converted to sulfur dioxide at a ratio of 1 mole of SO<sub>2</sub> formed per 1 mole of TRS (expressed as H<sub>2</sub>S) in landfill gas.

From the Engineering Evaluation for Application # 22543, the TRS concentration in the landfill gas was limited to 860 ppmv. This was done to ensure compliance with BAAQMD Regulation 9-1-302 for a limit of 300 ppmv of SO<sub>2</sub> in the stack gas. The calculation is as follows:

$$\begin{aligned}
 & (300 \text{ E-6 lb-mol S} / 1.0 \text{ lb-mole flue gas}) * (1.0 \text{ lb-mole SO}_2 / 1.0 \text{ lb-mole S}) * (64.059 \text{ lbs SO}_2 / \\
 & 1.0 \text{ lb-mole SO}_2) * (1.0 \text{ lb mole flue gas} / 386.765 \text{ ft}^3 \text{ flue gas}) * (11641 \text{ ft}^3 \text{ flue gas} / \text{MM BTU}) \\
 & = 0.578 \text{ lbs SO}_2 / \text{MM BTU}
 \end{aligned}$$

$$\text{SO}_2 \quad (78,840 \text{ MM BTU/year}) \cdot (0.578 \text{ lbs/MM BTU}) / (2000 \text{ lbs/ton}) \quad = \quad 22.78 \text{ tons/year}$$

Source Test #OS-5456 conducted on November 6, 2014 and approved by the Air District on January 7, 2015 demonstrated compliance with the SO<sub>2</sub> limit. According the source test, the SO<sub>2</sub> emissions

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are 0.0076 lbs/MM BTU. Given the actual emissions and the throughput limit, SO<sub>2</sub> emissions from A-10 are 0.299 tons/year.

**PM<sub>10</sub> and PM<sub>2.5</sub> Emissions:**

For Application #22543, the maximum PM<sub>10</sub> and PM<sub>2.5</sub> were calculated from the AP-42 emission factor of 17 pounds of PM per million standard cubic feet of methane. For landfill gas at 35% methane this emission factor is equivalent to a PM<sub>10</sub> and PM<sub>2.5</sub> emission rate of 0.0171 lbs/MM BTU as shown below:

$$(17 \text{ lbs PM/MM scf CH}_4) * (0.25 \text{ MM scf CH}_4/\text{MM scf LFG}) / (248.469 \text{ MM BTU/MM scf LFG}) = 0.0171 \text{ lbs PM/MM BTU}$$

$$\text{PM}_{10}/\text{PM}_{2.5} (78,840 \text{ MM BTU/year}) * (0.0171 \text{ lbs/MM BTU}) / (2000 \text{ lbs/ton}) = 0.674 \text{ tons/year}$$

**POC Emissions:**

BAAQMD Regulation 8-34-301.3 allows 30 ppmv of NMOC (as methane) at 3% O<sub>2</sub> in the flare exhaust or a minimum of 98% NMOC destruction efficiency by weight. The inlet NMOC at this site is low, the outlet concentration limit results in higher emissions. Therefore, POC emissions from A-10 are based on the outlet concentration limit. The outlet concentration limit is equivalent to an NMOC emission rate of 1.691 E-2 lbs/MM BTU as shown below:

$$(30 \text{ ppmv at } 3\% \text{ O}_2) * (20.9-0) / (20.9-3) = 35.03 \text{ ppmv of CH}_4 \text{ at } 0\% \text{ O}_2$$

$$(35.03 \text{ ft}^3 \text{ CH}_4/1\text{E}6 \text{ ft}^3 \text{ flue gas}) * (11,641 \text{ ft}^3 \text{ flue gas/ MM BTU}) / (386.765 \text{ ft}^3 \text{ CH}_4/1.0 \text{ lb-mole CH}_4) * (16.04 \text{ lbs CH}_4/1.0 \text{ lb-mole CH}_4) = 0.01691 \text{ E-2 lbs NMOC/MM BTU}$$

$$\text{POC } (78,840 \text{ MM BTU/year}) * (0.01691 \text{ lbs/MM BTU}) / (2000 \text{ lbs/ton}) = 0.667 \text{ tons/year}$$

**HAP Emissions:**

Landfill gas contains small quantities of numerous HAPs such as toluene, benzene, methylene chloride, and vinyl chloride. Landfill gas flares will have residual emissions of these HAPs. In addition, landfill gas flares emit secondary HAPs such as formaldehyde, which results from the combustion of methane, and acid gases such as hydrogen chloride and hydrogen fluoride that result from the combustion of halogenated compounds.

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Application #22543 used data collected from a September 2008 landfill gas analysis from the City of Palo Alto Landfill to determine the maximum expected HAPs from Site #A2721. The District assumed that A-10 would destroy at least 98% of each individual compound. Residual HAP emissions and secondary emissions from A-10 with a LFG throughput of 400 scfm are shown below:

	Emission Factor lbs/M scf	Emissions Tons/year
Acrylonitrile	2.744E-07	2.88E-05
Benzene	8.887E-07	9.34E-05
Carbon disulfide	9.842E-08	1.03E-05
Carbon tetrachloride	1.989E-07	2.09E-05
Chlorobenzene	5.646E-07	5.94E-05
Chloroform	1.543E-07	1.62E-05
1,2-Dichloroethane	1.279E-07	1.34E-05
1,1 Dichloroethylene	1.253E-07	1.32E-05
1,4 Dichlorobenzene	9.122E-07	9.59E-05
Ethylbenzene	7.137E-06	7.50E-04
Ethyl chloride	8.341E-08	8.77E-06
Ethylene dibromide	2.429E-07	2.55E-05
Ethylene dichloride	1.279E-07	1.34E-05
Formaldehyde	1.800E-04	1.89E-02
Hexane	2.095E-06	2.20E-04
Hydrogen fluoride	2.690E-03	2.83E-01
Hydrogen sulfide <sup>(1)</sup>	2.291E-03	2.41E-01
TRS Hydrogen sulfide	2.291E-03	2.41E-01
Methylene chloride	1.845E-07	1.94E-05
Methyl ethyl ketone	3.505E-06	3.68E-04
Perchloroethylene	4.888E-07	5.14E-05



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	Emission Factor lbs/M scf	Emissions Tons/year
1,1,2,2-Tetrachloroethane	2.17E-07	2.28E-05
Toluene	6.671E-06	7.01E-04
Trichloroethylene	2.310E-07	2.43E-05
1,1,1-trichloroethane	1.725E-07	1.81E-05
1,1,2-Trichloroethane	1.725E-07	1.81E-05
Vinyl chloride	8.080E-08	8.49E-06
Xylene	1.114E-05	1.17E-03
Total	--	5.46E-01

<sup>(1)</sup>Hydrogen sulfide is not considered a HAP by the EPA. Therefore, hydrogen sulfide emissions are not included in the potential to emit for HAPs. It will be listed separately as a regulated air pollutant.

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Landfills are also the source of fugitive HAP emission. The Air District database conservatively estimates HAP emission from A2721 by using EPA AP-42 emission factors from 1998. More recent source test data demonstrates that these emission factors are an overestimation of actual fugitive emissions by landfills in the District. Therefore, it is expected that actual fugitive HAP emission from A2721 are lower than the estimates provided in the table below. The facility reported a throughput of 4.74E+06 tons-in-place in the previous 12-months.

	Emission Factor lbs/tons-in-place	Emissions Tons/year
Benzene	1.93E-05	4.54E-02
Carbon tetrachloride	7.95E-08	1.87E-04
Ethylene dichloride	5.24E-06	1.23E-02
Hexane	7.32E-05	1.72E-01
Methyl ethyl ketone	6.60E-05	1.55E-01
Perchloroethylene	7.99E-05	1.88E-01
Toluene	4.86E-04	1.14E+00
Trichloroethylene	4.79E-05	1.13E-01
Xylene	1.66E-04	3.90E-01
Ethylbenzene	6.32E-05	1.49E-01
Vinylidene chloride	2.50E-06	5.88E-03
Chloroform	4.63E-07	1.09E-03
Methylene chloride	1.57E-04	3.69E-01
Ethyl chloride	1.04E-05	2.44E-02
Vinyl chloride	5.95E-05	1.40E-01
1,1,1-Trichloroethane	8.27E-06	1.94E-02
Organics (misc. HAPs)	5.54E-03	1.30E+01
Hydrogen sulfide <sup>(1)</sup>	1.56E-04	3.67E-01
Total	--	1.59E+01

<sup>1)</sup>Hydrogen sulfide is not considered a HAP by the EPA. Therefore, hydrogen sulfide emissions are not included in the potential to emit for HAPs. It will be listed separately as a regulated air pollutant.

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The potential to emit for HAPs emitted from A2721 are:

HAPs 1.59E+01 tons/year + 5.46E-01 tons/year = 1.64E+01 tons/year

The largest emitted HAP is toluene with 1.14 tons/year. This excludes the miscellaneous HAPs which are a combination of the lesser quantity of HAPs present in the fugitive emissions from the site.

City of Palo Alto, Site # B4941

As mentioned previously, the City of Palo Alto owns another site, Site # B494, within a three mile radius of A0617 and A2721. Therefore, the potential to emit emissions from the facility will be included in this analysis.

The facility has a single emergency diesel engine, S-1. The primary pollutants from internal combustion engines are oxides of nitrogen (NO<sub>x</sub>), hydrocarbon and other organic compounds (POC), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), and diesel exhaust particulate matter (PM). In calculating these emissions, emission factor data from EPA AP-42 was used.

Per Air District policy, Calculating Potential to Emit for Emergency Backup Power Generators, emissions resulting from emergency use of 100 hours per year must be accounted for when determining the potential to emit (PTE). This is in addition to the permitted limit for reliability-related and testing operations of 50 hours per year.

The total site-wide potential to emit (PTE) are summarized in the table below and compared to the Title V permit limits. As shown below the site-wide PTE is less than the Regulation 2-6-212 major facility limits.

Total Site-Wide Emissions from Site # B4941

	Title V Limit tons/year	Potential to Emit tons/year
CO	100.0	0.095
NO <sub>x</sub>	100.0	0.415
SO <sub>2</sub>	100.0	0.0004
PM <sub>10</sub>	100.0	0.018
PM <sub>2.5</sub>	100.0	0.018
POC	100.0	0.011

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**NO<sub>x</sub> Emissions:**

The combustion of diesel fuel produces emissions of NO<sub>x</sub>. The emission factor from AP-42, Volume 1, Chapter 3, Table 3.4-1 was used in calculating the potential to emit for NO<sub>x</sub> from S-One pound equates to 453.592 grams.

**NO<sub>x</sub> Emissions from Combustion Sources at Site #B4941**

Source	Engine Size bhp	Emission Factor g/bhp-hour	Usage hours/year	Emissions NOx tons/year
S-1	230	10.9	150	0.415

**CO Emissions:**

The combustion of diesel fuel produces emissions of CO. The emission factor from AP-42, Volume 1, Chapter 3, Table 3.4-1 was used in calculating the potential to emit for CO from S-1.

**CO Emissions from S-1**

Source	Engine Size bhp	Emission Factor g/bhp-hour	Usage hours/year	Emissions CO tons/year
S-1	230	2.5	150	0.095

**SO<sub>2</sub> Emissions:**

The combustion of diesel fuel produces emissions of SO<sub>2</sub>. Emissions of SO<sub>2</sub> were calculated based on the maximum allowable sulfur content (0.0015 wt% S) of diesel fuel in California with the assumption that all the sulfur present will be converted to SO<sub>2</sub> during the combustion process. The potential to emit calculation from S-1 is based on a theoretical 150 hours of operation per year and the weight of diesel fuel which is roughly 7.02 lb/gal.

**SO<sub>2</sub> Emissions from S-1**

Source	Fuel Consumption Rate gal/hour	Annual Usage gal/year	Fuel wt. lb/year	Sulfur Emissions lb/year	SO <sub>2</sub> Emissions lb/year	SO <sub>2</sub> Emissions tons/year
S-1	25.3	3,795	26,641	0.40	0.8	0.0004

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POC Emissions:

The combustion of diesel fuel also produces emissions of POC. The emission factor from AP-42, Volume 1, Chapter 3, Table 3.4-1 was used in calculating the potential to emit for POC from S-1.

POC Emissions from S-1

Source	Engine Size bhp	Emission Factor g/bhp-hour	Usage hours/year	Emissions POC tons/year
S-1	230	0.29	150	0.011

PM<sub>10</sub> and PM<sub>2.5</sub>

The combustion of diesel fuel produces emissions of PM. Emission factors from AP-42, Volume 1, Chapter 3, Table 3.4-2 were used in calculating the potential to emit for PM from S-1. This factor includes condensables.

PM Emissions from S-1

Source	Fuel Consumption Rate gal/hr	Fuel MM BTU/hr	Emission Factor lb/MM BTU	PM Emissions tons/year
S-1	25.3	3.47	0.0697	0.018

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**POTENTIAL TO EMIT DISCUSSION**

The potential to emit for A0617, A2721, and B4941 are discussed above. The table below compares the total potential to emit for each pollutant and compares the values to the thresholds required for a major facility operating permit. The total potential to emit for all facilities is well below the threshold limits. Therefore, a major facility review permit is not required for the contiguous facilities A0617 and A2721 as defined in Regulation 2-6-212.

Total Site-Wide Emissions from Site #A0617, #A2721, and #B4941

	Title V Limit tons/year	Potential to Emit tons/year
CO	100.0	9.718
NO <sub>x</sub>	100.0	9.706
SO <sub>2</sub>	100.0	22.794
PM <sub>10</sub>	100.0	0.980
PM <sub>2.5</sub>	100.0	0.98
POC	100.0	11.453
HAP	25.0 / 10.0	20.410 / 1.391
H <sub>2</sub> S	100.0	0.833

The total emissions of HAPs from all facilities are well below the 10 tons per year threshold for the greatest emitted HAP. The single greatest HAP from all three facilities is toluene at 1.391 tons per year.

**RECOMMENDATION**

Palo Alto RWQCP, Site #A0617, submitted Application #26107 on March 10, 2014 for a Major Facility Review Permit. The application was submitted in compliance with the Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Sewage Sludge Incineration Units and the subsequent Federal Plan Requirements for Sewage Sludge Incineration Units Constructed on or Before October 14, 2010, also referred to as 40 CFR 60.5245 and 40 CFR 62.16035. The Palo Alto RWQCP officially discontinued use of its sewage sludge incinerators (S-1 and S-2) on September 13, 2019, as well as the associated abatement devices (A-20 to A-23). Therefore, the site is no longer subject to the major facility requirements. Also, as demonstrated above, the potential to emit from the facility is well below the thresholds required for a major facility operating permit.

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Palo Alto RWQCP is no longer subject to Major Facility Review. Application #26107 is cancelled.

The District issued the initial Title V permit to Palo Alto Landfill, Site #A2721, on December 4, 2003. The facility was required to obtain a Title V permit since it was a “designated facility” under the provisions of 40 CFR 60.32(c) as a landfill with a “design capacity of 2.5 million mega grams or more, or a design capacity of 2.5 million cubic meters or more”. This facility is now a closed landfill and meets the all of the requirements set out for removal of a landfill from Title V permitting under 40 CFR Part 60.762(b).

Palo Alto Landfill is no longer subject to Major Facility Review. The District recommends canceling the Title V permit.

By: Simrun Dhoot

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Date: 4/28/2020