

**Document:** Addendum No. 12 to Final EIR 575 and Addendum No. 3 to Final Supplemental EIR 597

**Project Name:** **Addendum No. 12 to Final EIR 575 for the Prima Deshecha General Development Plan (SCH #199041035) and Addendum No. 3 to Final Supplemental EIR 597 for the Second Amendment to the Prima Deshecha Landfill General Development Plan (SCH #199904135) – Update to Anticipated Emissions for Landfill Gas Collection System**

**OC Waste & Recycling**

**Log #:** 703

### **Subject and Purpose of Addendum**

The Prima Deshecha Landfill is a Class III municipal solid waste landfill owned by the County of Orange and operated by OC Waste & Recycling (OCWR). The landfill site is located in the City of San Juan Capistrano, City of San Clemente and unincorporated Orange County. The street address for the landfill is 32250 Avenida La Pata, San Juan Capistrano, 92675. On November 6, 2001, the Orange County Board of Supervisors approved Final EIR No. 575 (State Clearinghouse #199041035) for the implementation of the Prima Deshecha General Development Plan. On June 19, 2007, the Orange County Board of Supervisors approved Final Supplemental EIR No. 597 (State Clearinghouse #199904135) for the Second Amendment to the 2001 Prima Deshecha General Development Plan.

The project analyzed in Final EIR No. 575 included the following elements:

- Final EIR No. 575 (FEIR 575) analyzed the General Development Plan (GDP) for the Prima Deshecha site which includes a landfill element, circulation element and a recreation element. In order to provide for all three elements, the Prima property is divided into five zones. Zone 1 and Zone 4 are reserved for landfill development, Zone 2 uses are reserved for recreational trails, Zone 3 is reserved for habitat mitigation and Zone 5 is reserved for the La Pata Avenue Gap Closure project. The La Pata Avenue Gap Closure project was completed in 2016.
- For the landfill element of the Prima Deshecha GDP, FEIR 575 analyzed a total design capacity of approximately 53.1 million cubic yards for the Zone 1 landfill development area on 271 acres at a maximum design elevation of 600 feet above mean sea level (AMSL). In addition, for the Zone 4 landfill development area, FEIR 575 analyzed a total design capacity of approximately 118.5 million cubic yards on 409 acres at a maximum design elevation of 1,010 feet AMSL. The Solid Waste Facility Permit for the landfill operation allows for a maximum daily permitted tonnage of 4,000 tons per day.

In addition, on June 19, 2007, the Orange County Board of Supervisors approved Final EIR No. 597 for the Second Amendment to the Prima Deshecha General Development Plan. The project

analyzed in Prima Final Supplemental EIR No. 597 included the following project description elements:

- Increased the grading disturbance and landfill excavation limits for both the Zone 1 and Zone 4 landfills to allow for future landslide remediation projects; no change to the landfill development plan, landfill depth of waste, or landfill final elevations that were analyzed in Final EIR No. 575.
- Re-design of future desilting basins for the Zone 4 landfilling area.
- The significance conclusion of the air quality section included in Final EIR No. 575 was changed from less than significant with mitigation to unavoidable significant adverse impact, to reflect that both the worst-case daily construction and operational emissions from a 4,000 TPD landfill that were analyzed in Final EIR No. 575 would exceed both the daily construction and operational emissions thresholds of significance included in SCAQMD's CEQA Air Quality Handbook.
- More clearly defined biological mitigation to provide compensatory mitigation for the biological impacts associated with the future Zone 4 landfill development.

The purpose of Addendum No. 12 to Final EIR No. 575 and Addendum No. 3 to Final Supplemental EIR No. 597 is to allow the following and analyze whether further environmental review is necessary for this project revision:

- OCWR plans to modify the landfill gas (LFG) collection system at the Prima Deshecha Landfill by adding an additional flare to manage landfill gas when the existing landfill gas to energy (GTE) facility at the site ceases to operate in 2022. The new flare will be a Low NO<sub>x</sub> flare, and eventually the existing flare will also be replaced with this technology, resulting in two new low NO<sub>x</sub> flares. FEIR 575 indicated the GTE facility was operated by a 3<sup>rd</sup> party operator under a lease with the County and anticipated that this operator would own the rights to the LFG from the landfill for at least 20 years. The current GTE facility will cease to operate in 2022 when the term of this lease with the current operator ends. OCWR plans to develop a new renewable energy option at the site in the future, which will manage a portion of the LFG. When the new GTE facility is brought into operation, the flares and the GTE will not operate at full capacity simultaneously and there will be a proportional reduction in emissions from the flare operation at that time which is not anticipated to exceed the updated emissions provided in this addendum. Additional CEQA analysis will be conducted for the new GTE operation as needed.

As a result of the addition of a new flare, updated modeling of anticipated criteria pollutant emissions for the LFG collection system has been prepared. The updated anticipated emissions assume full time operation of the flares until a new renewable energy facility is implemented. As a result, SO<sub>x</sub> emissions are anticipated to be greater than was originally anticipated in EIR 575, but will nonetheless remain below the SCAQMD significance threshold and therefore do not result in any change to the

significance conclusions in EIR 575 or SEIR 597 or any new or worsened environmental impacts.

This Addendum documents the updates to the anticipated emissions for the LFG collection system at the Prima Deshecha Landfill and confirms that these changes will not result in a new significant environmental impact under CEQA.

### **Standards for Preparing an Addendum**

California Code of Regulations Title 14 (“CEQA Guidelines”), Section 15164 “Addendum to an EIR or Negative Declaration”, states the following:

- (a) The lead agency or a responsible agency shall prepare an addendum to a previously certified EIR if some changes or additions are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent EIR have occurred.
- (c) An addendum need not be circulated for public review but can be included in or attached to the final EIR or adopted negative declaration.
- (d) The decision-making body shall consider the addendum with the final EIR or adopted negative declaration prior to making a decision on the project.
- (e) A brief explanation of the of the decision not to prepare a subsequent EIR pursuant to Section 15162 should be included in an addendum to an EIR, the lead agency’s required findings on the project, or elsewhere in the record. The explanation must be supported by substantial evidence.

CEQA Guidelines Section 15162(a) “Subsequent EIRs and Negative Declarations”, states the following:

- (a) When an EIR has been certified or negative declaration adopted for a project, no subsequent EIR shall be prepared for that project unless the lead agency determines, on the basis of substantial evidence in the light of the whole record, one or more of the following:
  - (1) Substantial changes are proposed in the project which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects;
  - (2) Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects; or

(3) New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified as complete or the negative declaration was adopted, shows any of the following:

(A) The project will have one or more significant effects not discussed in the previous EIR or negative declaration;

(B) Significant effects previously examined will be substantially more severe than shown in the previous EIR;

(C) Mitigation measures or alternatives previously found not to be feasible would in fact be feasible and would substantially reduce one or more significant effects of the project, but the project proponents decline to adopt the mitigation measure or alternative; or

(D) Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure or alternative.”

### **Changes to Final EIR No. 575 and Final Supplemental EIR No. 597**

Changes to Prima FEIR 575, Section 4.9.3.1 Potential Impacts – Landfill Component – Combined Mobile and Non-Mobile Source Emissions, Table 4.9-13 Combined Daily Air Pollution Emissions (in pounds), page 4.9-27 are required, as shown in redline/strikeout text below:

**Table 4.9-13  
Combined Daily Air Pollution Emissions  
(in pounds)**

<b>Scenario/Source</b>	<b>CO</b>	<b>ROG</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>
1999 Existing Conditions					
Mobile Sources	251	42	408	31	27
LGF Combustion (ERF)	526	93	183	10	175
Fugitive LFG	---	889	---	---	---
Total	777	1,024	591	41	202
Short-Range (2005)					
Mobile Sources	336	50	545	39	34
LFG Combustion (ERF)	860	152	300	15	286
Fugitive LFG	---	1,456	---	---	---
Total	1,196	1,658	845	54	320
Long-Range (2020) <sup>2</sup>					
Mobile Sources	310	37	404	39	34
LFG Combustion (ERF)	979	173	341	<del>17</del> 98.09	325
LFG Combustion (Flare)	82	13	99	<del>14</del>	22
Fugitive LFG	---	2,803	---	---	---
Total	1,371	3,026	844	<del>70</del> 137.09	381

Increase from Existing Conditions					
Short-Range	419 <sup>1</sup>	634 <sup>1</sup>	254 <sup>1</sup>	13 <sup>1</sup>	118 <sup>1</sup>
Long-Range	594 <sup>1</sup>	2,002 <sup>1</sup>	253 <sup>1</sup>	29 <sup>1</sup>	179 <sup>1</sup>
<b>SCAQMD Significant Threshold</b>	<b>550</b>	<b>55</b>	<b>55</b>	<b>150</b>	<b>150</b>
<sup>1</sup> Potentially significant by SCAQMD standards (CEQA Air Quality Handbook, 1993).					
<sup>2</sup> Assume 3,750 CFM combusted in ERF (permitted level); remainder is burned in a new permitted flare.					
SOURCE: Giroux & Associates, 1999.					

Changes to Final Supplemental EIR No. 597, Section 5.4.1 Existing Conditions - Existing Air Quality, Table 5.4-4 Forecast (2020) Daily Pollutant Emissions Inventory At Prima Deshecha Landfill (4,000 TPD), page 5-26 are required, as shown in redline/strikeout text below:

**Table 5.4-4**  
**FORECAST (2020) DAILY POLLUTANT EMISSIONS INVENTORY AT PRIMA DESHECHA LANDFILL (4,000 TPD)**

	Pollutant Emissions (lbs/day)				
	CO	ROG	NOx	PM10	SOx
Mobile Source Emissions	310	37	404	34	39
Energy Recovery Facility	979	173	341	325	<del>47</del> 98.09
LFG Combustion	82	13	99	22	<del>14</del>
Uncaptured LFG Surface Emissions	--	2,803	--	--	--
<b>TOTAL</b>	<b>1,371</b>	<b>3,026</b>	<b>844</b>	<b>381</b>	<del>70</del> <b>137.09</b>
SCAQMD Significance Threshold	550	55	55	150	150
Significant?	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>NO</b>
Source: Giroux & Associates 1999 (FEIRS 575, Table 4.9-13)					

### **Analysis Confirming that an Addendum is the Appropriate CEQA Document for Proposed Project**

The project makes only minor changes to the project as originally approved by the County of Orange on November 6, 2001 and on June 19, 2007. No new environmental conditions or circumstances have occurred that would make the analysis included within Final EIR No. 575 (EIR 575) and Final Supplemental EIR No. 597 (SEIR 597) invalid, and all adopted mitigation measures remain enforceable.

Included below is an analysis of why an Addendum is the appropriate CEQA documentation for the update to the anticipated emissions assumptions for the landfill gas collection system at the Prima Deshecha Landfill. The analysis summarizes the conclusions for air quality as analyzed in EIR 575 and SEIR 597 and whether there would be a change in the significance conclusion as a result of the changes. On the basis of substantial evidence in light of the whole record, the update to anticipated emissions for the landfill gas collection system and flare at the Prima Deshecha Landfill does not create any new significant impacts, nor would it result in the substantial worsening of any significant impacts to aesthetics, biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, public services, transportation and traffic, utilities and service systems, or

cumulative impacts as already analyzed in EIR 575 and SEIR 597. The update is therefore in compliance with CEQA Guidelines Section 15162 and 15164 and therefore a Subsequent EIR is not required. All feasible mitigation measures previously identified and adopted in EIR 575 and SEIR 597 that are relevant to the effects of updating the anticipated emissions for the landfill gas collection system at the Prima Deshecha Landfill will be undertaken.

#### Air Quality/Greenhouse Gas Emissions

EIR 575 found that after the incorporation of mitigation measures, implementation of the General Development Plan for the Prima Deshecha Landfill through buildout of the Zone 1 and Zone 4 landfill development areas, would not result in any significant impacts to air quality. This significance conclusion was changed in SEIR No. 597, which determined that the landfill expansion would result in an unavoidable significant adverse impact to air quality, both for construction and operational emissions, even after the incorporation of mitigation measures, since construction and operation emissions from the landfill operation would exceed the thresholds of significance for daily construction and operational emissions included in the SCAQMD CEQA Air Quality Handbook. EIR 575 and SEIR 597 determined that the landfill operation would result in emissions above the SCAQMD significance thresholds for CO, ROG, PM<sub>10</sub>, and NO<sub>x</sub>. An analysis of greenhouse gas (GHG) emissions was not required when EIR 575 was certified in 2001 or when SEIR 597 was certified in 2007.

Features accommodated by the GDP for continued development of the landfill include modifications to the landfill gas control flare station and EIR 575 and SEIR 597 anticipated that additional flares may be installed as capacity requirements dictate. A LFG collection system is a required Mitigation Measure for the landfill project (MM-4.9-3 in EIR 575 - IWMD shall design, construct and operate new landfill areas in Zones 1 and 4 with LFG systems to maximize the collection of LFG. The LFG systems will include continuous monitoring of the LFG collection system to maximize efficient collection of LFG generated in these areas).

OCWR plans to modify the landfill gas (LFG) collection system at the Prima Deshecha Landfill by adding an additional flare to manage landfill gas when the existing landfill gas to energy (GTE) facility at the site ceases to operate in 2022. The new flare will be a Low NO<sub>x</sub> flare, and eventually the existing flare will also be replaced with this technology, resulting in two new low NO<sub>x</sub> flares. EIR 575 indicated the GTE facility was operated by a 3<sup>rd</sup> party operator under a lease with the County and anticipated that this operator would own the rights to the LFG from the landfill for at least 20 years. The current GTE facility will cease to operate in 2022 when the term of this lease with the current operator ends. OCWR plans to develop a new renewable energy option at the site in the future, which will manage a portion of the LFG. When the new GTE facility is brought into operation, the flares and the GTE will not operate at full capacity simultaneously and there will be a proportional reduction in emissions from the flare operation at that time which is not anticipated to exceed the updated emissions provided in this addendum. Additional CEQA analysis will be conducted for the new GTE operation as needed.

As a result of the addition of a new flare, updated modeling of anticipated criteria pollutant emissions has been prepared (Appendix A). The updated anticipated emissions assume full time operation of the flares until a new renewable energy facility is implemented. As a result, SO<sub>x</sub>

emissions are anticipated to be greater than was originally anticipated in EIR 575, but will nonetheless remain below the SCAQMD significance threshold (Table 1). Per EIR 575 and SEIR 597, an air quality impact was determined to be significant if it exceeded the standards set by SCAQMD. As the updates to the anticipated SO<sub>x</sub> emissions will continue to be below the SCAQMD threshold, the impacts will continue not to be significant and a new significant impact will not occur. Based on the updated modeling, other criteria pollutants (CO, ROG, PM<sub>10</sub>, and NO<sub>x</sub>) will be reduced below what was anticipated in EIR 575, though SEIR 597 determined that there would be significant impacts to air quality for these pollutants, and as such, the updates will not result in a change to this significance conclusion.

Units	Potential Emissions (lbs/day)				
	NO <sub>x</sub>	CO	SO <sub>x</sub>	PM	VOC/ROG
Proposed Low NO <sub>x</sub> Flares Emissions (2 New Flares)	144.00	345.60	98.09	90.09	31.07
Mobile Source Emissions per EIR 575 & SEIR 597	404	310	39	34	37
Total for New Flares Scenario	<b>548</b>	<b>655.60</b>	<b>137.09</b>	<b>124.09</b>	<b>68.07</b>
Emissions Anticipated for LFG & LFGTE in EIR 575 & SEIR 597	440.00	1,061.00	28.00	347.00	186.00
Total Emissions Anticipated in EIR 575 & SEIR 597 (Mobile & All LFG Sources)	844.00	1,371.00	70.00	381.00	3,026.00
SCAQMD Significance Thresholds	<b>55.00</b>	<b>550.00</b>	<b>150.00</b>	<b>150.00</b>	<b>55.00</b>

Table 1. Comparison of updated anticipated emissions to anticipated emissions in EIR 575 & SEIR 597 and to SCAQMD significance thresholds.

Regarding odors, EIR 575 found that after the incorporation of mitigation measures, implementation of the General Development Plan for the Prima Deshecha Landfill through buildout of the Zone 1 and Zone 4 landfill development areas, would not result in any significant impacts to odors. The update to the anticipated emissions for the landfill gas collection system at the Prima Deshecha Landfill will not result in any significant odor impacts. On the basis of substantial evidence in light of the whole record, the update to the anticipated emissions for the landfill gas collection system at the Prima Deshecha Landfill will not result in any changes to this significance conclusion.

All mitigation measures established under EIR 575 and SEIR 597 continue to be implemented at the landfill. However, Final SEIR 597 updated the significance conclusion from EIR 575, to indicate that the development of the landfill as outlined in the 2001 General Development Plan as amended would result in unavoidable significant adverse impacts to air quality. The updates to the anticipated emissions for the landfill gas collection system at the Prima Deshecha Landfill do not result in a change to this significance conclusion. On the basis of substantial evidence in light of the whole record, the update to the anticipated emissions for the landfill gas collection system

at the Prima Deshecha Landfill will not result in any changes to this significance conclusion. The project is therefore in compliance with CEQA Guidelines Section 15162 and 15164 and therefore a Subsequent EIR is not required.

### **Basis for Addendum**

*The addendum will result a minor update to the anticipated emissions for the landfill gas collection system at the Prima Deshecha Landfill. These changes will not result in any new significant environmental impacts for the Zone 1 and Zone 4 landfill development areas as analyzed in Final EIR No. 575 and Final SEIR No. 597. The project is therefore in compliance with CEQA Guidelines Section 15162 and 15164 and therefore a Subsequent EIR is not required.*

*On the basis of substantial evidence in light of the whole record, and as discussed in the environmental analysis included above, the update to the anticipated emissions for the landfill gas collection system at the Prima Deshecha Landfill site will not result in any changes to the significance conclusions contained in Final EIR No. 575 and Final SEIR No. 597 or result in a substantial increase in the severity of the significant environmental impacts previously identified in Final EIR No. 575 and Final SEIR No. 597; therefore, in compliance with Section 15162 and 15164 of the CEQA Guidelines, the preparation of a Subsequent EIR is not required.*

## **Appendix A**



# MEMO

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**To:** Orange County Waste and Recycling

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**Cc:** Paul Stout, P.E.  
Caleb Moore, P.E.  
Alex Newell, P.E.

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**From:** Maria Bowen

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**Date:** March 3, 2021

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**Subject:** Prima Deshecha Landfill Proposed Flare Estimate Emissions Review

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This memo summarizes the flare emission estimates that were compiled for the air permit application for an Authority to Construct/Permit to Operate (ATC/PTO) to be submitted to the South Coast Air Quality Management District (SCAQMD) for one new state-of-the-art Low Nitrogen Oxide (NOx) Enclosed Ground Flare (Flare). The proposed Flare is planned to be installed and operated at Prima Deshecha Landfill (Prima) in San Juan Capistrano, California owned by Orange County Waste and Recycling (OCWR).

The application only includes one proposed low NOx Flare yet OCWR plans to install a second low NOx Flare in the near future as an existing flare does not comply with the SCAQMD Rule 1118.1 (Control of Gaseous Emissions from Non-Refinery Flares). The existing flare is intended to be replaced at the time of installation of the second low NOx flare so that adequate capacity is maintained and additional future capacity for landfill gas (LFG) destruction is provided. Therefore, the flare emissions for the second proposed low NOx Flare emissions are included within the ATC/PTO Air Application and are included within this memo. Additionally, between the time of the operation of the first proposed Flare and the second proposed Flare, the existing flare is projected to operate as a back-up to the first proposed Flare operating approximately 20 percent of the year, which emissions estimates are included below.

## 1.0 EMISSION CALCULATION INPUTS

The following Emission Factors were utilized for the emissions estimates:

- NO<sub>x</sub> - 0.025 pounds per million metric British Thermal Units (lb/MMBtu) typical of low NOx Flare,
- Carbon Monoxide (CO) - 0.06 lb/MMBtu typical of low NOx Flare,
- Volatile Organic Compounds (VOC) – Conservatively, Tetra Tech has utilized 100 percent of the non-methane organic compounds (NMOC). As the most recent source tests have demonstrated NMOCs below that of the United States Environmental Protection Agency (USEPA) AP-42 value of 595 parts per million by volume (ppmv), Tetra Tech has conservatively utilized the default from AP-42 (595 ppmv);
- Sulfur Dioxide (SO<sub>2</sub>) – Conservatively estimated at a concentration of 40 ppmv for the Hydrogen Sulfide (H<sub>2</sub>S) concentration, and accounts for the operation of the proposed H<sub>2</sub>S Scrubbing System; and
- Particle Matter (PM<sub>10</sub>) - The low NOx flare is based on AP-42 values listed in USEPA Table 2.4-5 of AP-42 (11/98). Per USEPA AP-42, the PM10 emission factor equals 1.5E-05 pounds per dry standard cubic feet as methane (lb/dscf CH<sub>4</sub>).

The following assumptions were made for the flare operations:

- Flare sized for 120 MMBTU per hour (MMBTU/Hr), approximately 4,000 standard cubic feet per minute (SCFM);

- Operation of the Flare estimated at 24 hours a day, seven days a week, 52 weeks a year;
- Operating temperature 1,600 degrees Fahrenheit (°F); and
- Stack Height of 50 feet, inside diameter of 12.5 feet.

The following assumptions were utilized for the LFG composition routed to the flare:

- Methane content: 50 percent;
  - Methane heating value: 1,000 British thermal units per standard cubic feet (BTU/scf);
- Moisture: eight percent;
- H<sub>2</sub>S concentration: 40 ppmv, as estimated with the operation of the H<sub>2</sub>S Scrubbing System which will utilize a granular media to remove the H<sub>2</sub>S from the LFG prior to going to the flare(s); and
- LFG temperature: 120°F.

## 2.0 EMISSION RESULTS

Source	Units	Maximum Potential Emissions <sup>1</sup>				
		NO <sub>x</sub>	CO	SO <sub>2</sub>	PM <sup>3</sup>	VOC <sup>2</sup>
Proposed Low NO <sub>x</sub> Flare Emissions (One New Flare)	lbs/hr	3.00	7.20	2.04	1.88	0.65
	lbs/day	72.00	172.80	49.04	45.04	15.53
	TPY	13.14	31.54	8.95	8.22	2.84
Proposed Low NO <sub>x</sub> Flare and Existing Flare Emissions (Two Flares)	lbs/hr	4.35	13.73	2.43	2.71	0.77
	lbs/day	104.40	329.40	58.24	65.02	18.45
	TPY	19.05	60.12	10.63	11.87	2.96
Proposed Low NO <sub>x</sub> Flares Emissions (Two New Flares)	lbs/hr	6.00	14.40	4.09	3.75	1.29
	lbs/day	144.00	345.60	98.09	90.09	31.07
	TPY	26.28	63.07	17.90	16.44	5.67

<sup>1</sup>Based on assumptions listed in Section 1.

<sup>2</sup>VOC Emissions based on 100 percent VOC within 595 ppmv NMOC (as hexane) LFG; assuming 98 percent emission control.

<sup>3</sup>PM<sub>2.5</sub> is assumed equivalent to PM<sub>10</sub> for combustion sources.

Lbs/hr – pounds per hour lbs/day – pounds per day TPY – tons per year

## 3.0 EMISSIONS REVIEW

The estimated emissions from the two proposed flares have been assessed against the SCAQMD Air Quality Significance Thresholds below:

	Potential Emissions (lbs/day)				
	NO <sub>x</sub>	CO	SO <sub>2</sub>	PM <sup>3</sup>	VOC <sup>2</sup>
Proposed Low NO <sub>x</sub> Flares Emissions (Two New Flares)	144.00	345.60	98.09	90.09	31.07
SCAQMD Significance Thresholds <sup>1</sup>	55.00	550.00	150.00	150.00	55.00
Significant?	Yes	No	No	No	No

<sup>1</sup>SCAQMD Air Quality Significance Thresholds per the operation mass daily thresholds for the proposed equipment.

<sup>2</sup>VOC Emissions based on 100 percent VOC within 595 ppmv NMOC (as hexane) LFG; assuming 98 percent emission control.

<sup>3</sup>PM<sub>2.5</sub> is assumed equivalent to PM<sub>10</sub> for combustion sources.

For the two proposed flares, only NO<sub>x</sub> is anticipated to exceed the significance threshold, yet with further evaluation, the proposed NO<sub>x</sub> emissions shall not exceed the thresholds of the site-specific environmental impact reviews.

Environmental Impact Report (EIR) No. 575 (SCH No. 199041035) and Supplemental Environmental Impact Report (SEIR) No. 597 (SCH No. 199904135) for Prima were completed in 2001 and 2007, respectively. Within EIR 575 and SEIR 597, air emission forecasts were provided for the 2020 potentials to emit (PTE) from the LFG to Energy (LFGTE) facility and the combustion of the LFG onsite in Table 4.9-13 of the EIR and Table 5.4.4 of the SEIR. Anticipated emissions were the same in both EIR 575 and SEIR 597. As the proposed flares shall operate once the LFGTE facility ceases operation in October 2022, the SEIR 597 thresholds below are based on the combined PTEs from the LFG combustion and the LFGTE facility. Emissions anticipated from mobile sources in the EIR and SEIR are also included to demonstrate the total sitewide emission change based on operation of the proposed flares.

Below is a review of the proposed flares emissions and total sitewide emissions which have been evaluated against the EIR 575 and SEIR 597:

	Potential Emissions (lbs/day)				
	NO <sub>x</sub>	CO	SO <sub>2</sub>	PM <sup>2</sup>	VOC <sup>1</sup>
Proposed Low NO <sub>x</sub> Flares Emissions (Two New Flares)	144.00	345.60	98.09	90.09	31.07
Mobile Source Emissions per EIR 597	404.00	310.00	39.00	34.00	37.00
<b>Total Emissions for Proposed Flares and Mobile Sources</b>	<b>548.00</b>	<b>655.60</b>	<b>137.09</b>	<b>124.09</b>	<b>68.07</b>
Emissions Anticipated for LFG Combustion & LFGTE in SEIR 597	440.00	1,061.00	28.00	347.00	186.00
Total Emissions Anticipated in SEIR 597 (Mobile & All LFG Sources <sup>3</sup> )	844.00	1,371.00	70.00	381.00	3,026.00

<sup>1</sup>VOC Emissions based on 100 percent VOC within 595 ppmv NMOC (as hexane) LFG; assuming 98 percent emission control.

<sup>2</sup>PM<sub>2.5</sub> is assumed equivalent to PM<sub>10</sub> for combustion sources.

<sup>3</sup>Additional sources include uncaptured LFG surface emissions with VOCs.

As demonstrated above, only the SOx emissions from the two proposed flares exceeds the emissions anticipated in SEIR 597, yet the estimated emissions from the proposed operation of the two flares remains below the SCAQMD Significance Threshold as demonstrated above, therefore no further emission evaluations shall be necessary for the proposed flares. All other criteria pollutants remain within the emissions levels as anticipated in EIR 575 and SEIR 597.

Emission Unit	Description	LFG Flow (scfm)	Calculated Emissions										
			Criteria Pollutants						HAP		GHG		
			CO (lb/hr)	NO <sub>x</sub> (lb/hr)	PM <sub>10</sub> (lb/hr)	PM <sub>2.5</sub> (lb/hr)	SO <sub>2</sub> (lb/hr)	VOC (lb/hr)	HAP (T) (lb/hr)	HAP (S) (lb/hr)	CO <sub>2</sub> (lb/hr)	CH <sub>4</sub> (lb/hr)	N <sub>2</sub> O (lb/hr)
			(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
1	Enclosed Flare	4,000	7.20	3.00	1.88	1.88	2.04	0.65	1.10	0.97	27,697	0.85	0.17
			31.54	13.14	8.22	8.22	8.95	2.84	4.80	4.24	121,313	3.71	0.73

Emission Unit	Description	LFG Flow (scfm)	Calculated Emissions										
			Criteria Pollutants						HAP		GHG		
			CO (lb/hr)	NO <sub>x</sub> (lb/hr)	PM <sub>10</sub> (lb/hr)	PM <sub>2.5</sub> (lb/hr)	SO <sub>2</sub> (lb/hr)	VOC (lb/hr)	HAP (T) (lb/hr)	HAP (S) (lb/hr)	CO <sub>2</sub> (lb/hr)	CH <sub>4</sub> (lb/hr)	N <sub>2</sub> O (lb/hr)
			(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
1	Existing Flare @ 20% capacity	750	6.53	1.35	0.83	0.83	0.38	0.12	1.10	0.97	5,193	0.16	0.03
			28.58	5.91	3.65	3.65	1.68	0.12	4.80	4.24	66,132	0.70	0.14

Emission Unit	Description	LFG Flow (scfm)	Calculated Emissions										
			Criteria Pollutants						HAP		GHG		
			CO (lb/hr)	NO <sub>x</sub> (lb/hr)	PM <sub>10</sub> (lb/hr)	PM <sub>2.5</sub> (lb/hr)	SO <sub>2</sub> (lb/hr)	VOC (lb/hr)	HAP (T) (lb/hr)	HAP (S) (lb/hr)	CO <sub>2</sub> (lb/hr)	CH <sub>4</sub> (lb/hr)	N <sub>2</sub> O (lb/hr)
			(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
1	Enclosed Flare + Existing Flare @ 20% capacity	4,750	13.73	4.35	2.71	2.71	2.43	0.77	2.19	1.94	32890.24	1.01	0.20
			60.12	19.05	11.87	11.87	10.63	2.96	9.60	8.48	187444.68	4.40	0.87

Emission Unit	Description	LFG Flow (scfm)	Calculated Emissions										
			Criteria Pollutants						HAP		GHG		
			CO (lb/hr)	NO <sub>x</sub> (lb/hr)	PM <sub>10</sub> (lb/hr)	PM <sub>2.5</sub> (lb/hr)	SO <sub>2</sub> (lb/hr)	VOC (lb/hr)	HAP (T) (lb/hr)	HAP (S) (lb/hr)	CO <sub>2</sub> (lb/hr)	CH <sub>4</sub> (lb/hr)	N <sub>2</sub> O (lb/hr)
			(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
1	Two New Enclosed Flare	8,000	14.40	6.00	3.75	3.75	4.09	1.29	2.19	1.94	55394.08	1.69	0.33
			63.07	26.28	16.44	16.44	17.90	5.67	9.60	8.48	242626.07	7.42	1.46

Proposed Fuel and Equipment

Enclosed Flare

Flare Permit Application  
San Juan Capistrano, California  
Prima Deshecha Landfill**Standard Conditions and Assumptions****Value**

Standard Temperature.....	60 deg F
Standard Temperature [absolute].....	520 R
Standard Pressure.....	1 atm
Universal Gas Constant.....	0.7302 atm-ft <sup>3</sup> /lb-mol-R

**Combustion Parameters (1)****Value**

Excess Air for Combustion at 1,400 deg F.....	2.30%
Excess Air for Combustion at 1,600 deg F.....	1.78%
Excess Air for Combustion at 1,800 deg F.....	1.40%
Excess Air for Combustion at 2,000 deg F.....	1.08%
Methane Combustion Constant.....	9.53 ft <sup>3</sup> air/ft <sup>3</sup> CH <sub>4</sub>

**Gas Information****Value**

Methane Heating Value [HHV].....	1000 Btu/scf
LFG Moisture (1).....	8%
LFG Methane Content (1).....	50%
LFG Heating Value.....	500 Btu/scf
LFG Temperature (2).....	120 deg F

**Operating Schedule****Value**

Hours Per Day (3).....	24 hr/day
Days Per Year (3).....	365 day/yr
Hours Per Year.....	8760 hr/yr

**Fuel Information****Value**

LFG Inlet Flow [wet] (4).....	4,000 scfm
LFG Inlet Flow [dry].....	3,680 scfm
Methane Inlet Flow [dry] LFG.....	1,840 scfm
Heat Input.....	120.0 MMBtu/hr

**Physical and Exhaust Parameters****Value**

Base Elevation (5).....	100 ft
Tip Height (6).....	50 ft
Tip Diameter (6).....	12.5 ft
Design Temperature (6).....	1,600 deg F
Design Temperature [absolute].....	2,060 R
Excess Air (7).....	178%
Exhaust Flow [standard].....	56,987 scfm
Exhaust Flow [actual].....	225,861 acfm
Exhaust Velocity.....	30.7 ft/s

<sup>1</sup>Typical<sup>2</sup> AP42 5th Ed., Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources, Page 2.4-5, Nov. 1998 Use AP 42 value if LFG temp not known<sup>3</sup> Site Specific<sup>4</sup> Equipment rating<sup>5</sup> USGS topographic map or mapping software<sup>6</sup> Manufacturer<sup>7</sup> Function of design flame temperature

<b><u>CO, CO<sub>2</sub>, NO<sub>x</sub>, and PM Emission Factors</u></b>	<b><u>Value</u></b>
CO (1).....	0.06 lb/MMBtu
Combustion CO <sub>2</sub> (2).....	52.07 kg/MMBtu
"Pass-Through" CO <sub>2</sub> .....	(3)
CH <sub>4</sub> (2).....	3.20E-03 kg/MMBtu
N <sub>2</sub> O (2).....	6.30E-04 kg/MMBtu
NO <sub>x</sub> (1).....	0.025 lb/MMBtu
PM <sub>10</sub> (4).....	1.7E-05 lb/dscf CH <sub>4</sub>
PM <sub>2.5</sub> (4,5).....	1.7E-05 lb/dscf CH <sub>4</sub>
Formaldehyde (6).....	7.5E-05 lb/MMBTU

<b><u>Sulfur to SO<sub>2</sub></u></b>	<b><u>Value</u></b>
Sulfur conversion to SO <sub>2</sub> (7).....	100%
Total Sulfur Compound Concentration in LFG (10).....	50.43 ppmv

<b><u>NMOC and VOC in LFG</u></b>	<b><u>Value</u></b>
Flare Control Efficiency (1).....	98%
NMOC Concentration (8).....	595 ppmv
VOC Fraction in LFG (8).....	100%
VOC Concentration.....	595 ppmv

<b><u>GWP</u></b>	
CO <sub>2</sub> (9).....	1
CH <sub>4</sub> (9).....	21
N <sub>2</sub> O (9).....	310

<b><u>Criteria Pollutant and GHG Emissions</u></b>	<b><u>Value</u></b>
CO.....	7.20 lb/hr 31.5 tpy
NO <sub>x</sub> .....	3.00 lb/hr 13.14 tpy
PM <sub>10</sub> .....	1.88 lb/hr 8.22 tpy
PM <sub>2.5</sub> .....	1.88 lb/hr 8.22 tpy
SO <sub>2</sub> .....	2.04 lb/hr 8.95 tpy
VOC.....	0.65 lb/hr 2.84 tpy
CO <sub>2</sub> from combustion.....	13,778 lb/hr 60,346 tpy
CO <sub>2</sub> "pass through".....	13,919 lb/hr 60,967 tpy
CH <sub>4</sub> .....	0.85 lb/hr 3.71 tpy
N <sub>2</sub> O.....	0.17 lb/hr 0.730 tpy
CO <sub>2</sub> e.....	27,766 lb/hr 121,617 tpy
Formaldehyde.....	0.009 lb/hr 18.0 lb/yr 0.039 tpy

<sup>1</sup> Manufacturer's guarantee, per previously permitted Perennial<sup>2</sup> 40 CFR 98, Subpart C, Tables C-1, C-2, Rev. September 10, 2010; factors are for biogas.<sup>3</sup> "Pass-through" CO<sub>2</sub> is the naturally occurring CO<sub>2</sub> in the landfill gas that is not combusted in the flare. For this calculation it is conservatively assumed that 50% of the landfill gas is CO<sub>2</sub>.<sup>4</sup> AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources," Table 2.4-5, Nov. 1998<sup>5</sup> PM<sub>2.5</sub> is assumed to be equal to PM<sub>10</sub><sup>6</sup> Emission factor for natural gas combustion (AP-42 5th ed. Table 1.4-3, July 1998.<sup>7</sup> Assumed in order to maximize calculated SO<sub>2</sub> emissions<sup>8</sup> AP42 5th Ed., Table 2.4-2, November 1998<sup>9</sup> 40 CFR 98, Subpart A Table A-1<sup>10</sup> Site specific calculated value.

Existing Fuel and Equipment

Enclosed Flare

Flare Permit Application  
San Juan Capistrano, California  
Prima Deshecha Landfill**Standard Conditions and Assumptions****Value**

Standard Temperature.....	60 deg F
Standard Temperature [absolute].....	520 R
Standard Pressure.....	1 atm
Universal Gas Constant.....	0.7302 atm-ft <sup>3</sup> /lb-mol-R

**Combustion Parameters (1)****Value**

Excess Air for Combustion at 1,400 deg F.....	2.30%
Excess Air for Combustion at 1,600 deg F.....	1.78%
Excess Air for Combustion at 1,800 deg F.....	1.40%
Excess Air for Combustion at 2,000 deg F.....	1.08%
Methane Combustion Constant.....	9.53 ft <sup>3</sup> air/ft <sup>3</sup> CH <sub>4</sub>

**Gas Information****Value**

Methane Heating Value [HHV].....	1000 Btu/scf
LFG Moisture (1).....	8%
LFG Methane Content (1).....	50%
LFG Heating Value.....	500 Btu/scf
LFG Temperature (2).....	120 deg F

**Operating Schedule****Value**

Hours Per Day (3).....	24 hr/day
Days Per Year (3).....	365 day/yr
Hours Per Year.....	8760 hr/yr

**Fuel Information****Value**

LFG Inlet Flow [wet] (4).....	750 scfm
LFG Inlet Flow [dry].....	690 scfm
Methane Inlet Flow [dry] LFG.....	345 scfm
Heat Input.....	22.5 MMBtu/hr

**Physical and Exhaust Parameters****Value**

Base Elevation (5).....	100 ft
Tip Height (6).....	60 ft
Tip Diameter (6).....	11.0 ft
Design Temperature (6).....	1,600 deg F
Design Temperature [absolute].....	2,060 R
Excess Air (7).....	178%
Exhaust Flow [standard].....	10,685 scfm
Exhaust Flow [actual].....	42,349 acfm
Exhaust Velocity.....	7.4 ft/s

<sup>1</sup>Typical<sup>2</sup> AP42 5th Ed., Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources, Page 2.4-5, Nov. 1998 Use AP 42 value if LFG temp not known<sup>3</sup> Site Specific<sup>4</sup> Equipment rating<sup>5</sup> USGS topographic map or mapping software<sup>6</sup> Manufacturer<sup>7</sup> Function of design flame temperature

<b><u>CO, CO<sub>2</sub>, NO<sub>x</sub>, and PM Emission Factors</u></b>	<b><u>Value</u></b>
CO (1).....	0.29 lb/MMBtu
Combustion CO <sub>2</sub> (2).....	52.07 kg/MMBtu
"Pass-Through" CO <sub>2</sub> .....	(3)
CH <sub>4</sub> (2).....	3.20E-03 kg/MMBtu
N <sub>2</sub> O (2).....	6.30E-04 kg/MMBtu
NO <sub>x</sub> (1).....	0.060 lb/MMBtu
PM <sub>10</sub> (4).....	18.50 lb/mmcf
PM <sub>2.5</sub> (4,5).....	18.50 lb/mmcf
Formaldehyde (6).....	7.5E-05 lb/MMBTU

<b><u>Sulfur to SO<sub>2</sub></u></b>	<b><u>Value</u></b>
Sulfur conversion to SO <sub>2</sub> (7).....	100%
Total Sulfur Compound Concentration in LFG (10).....	50.43 ppmv

<b><u>NMOC and VOC in LFG</u></b>	<b><u>Value</u></b>
Flare Control Efficiency (1).....	98%
NMOC Concentration (8).....	595 ppmv
VOC Fraction in LFG (8).....	100%
VOC Concentration.....	595 ppmv

<b><u>GWP</u></b>	
CO <sub>2</sub> (9).....	1
CH <sub>4</sub> (9).....	21
N <sub>2</sub> O (9).....	310

<b><u>Criteria Pollutant and GHG Emissions</u></b>	<b><u>Value</u></b>
CO.....	6.53 lb/hr 28.6 tpy
NO <sub>x</sub> .....	1.35 lb/hr 5.91 tpy
PM <sub>10</sub> .....	0.83 lb/hr 3.65 tpy
PM <sub>2.5</sub> .....	0.83 lb/hr 3.65 tpy
SO <sub>2</sub> .....	0.38 lb/hr 1.68 tpy
VOC.....	0.12 lb/hr 0.12 tpy
CO <sub>2</sub> from combustion.....	2583.32 lb/hr 54700.4 tpy
CO <sub>2</sub> "pass through".....	2,610 lb/hr 11,431 tpy
CH <sub>4</sub> .....	0.16 lb/hr .70 tpy
N <sub>2</sub> O.....	0.03 lb/hr 0.137 tpy
CO <sub>2</sub> e.....	5,206 lb/hr 22,803 tpy
Formaldehyde.....	0.002 lb/hr 3.4 lb/yr 0.007 tpy

<sup>1</sup> Permitted limits, Title V Facility Permit No. F22159, Permit Conditions 19 and 20.

<sup>2</sup> 40 CFR 98, Subpart C, Tables C-1, C-2, Rev. September 10, 2010; factors are for biogas.

<sup>3</sup> "Pass-through" CO<sub>2</sub> is the naturally occurring CO<sub>2</sub> in the landfill gas that is not combusted in the flare. For this calculation it is conservatively assumed that 50% of the landfill gas is CO<sub>2</sub>.

<sup>4</sup> Permitted limits, Title V Facility Permit No. F22159, Permit Condition 21.

<sup>5</sup> PM<sub>2.5</sub> is assumed to be equal to PM<sub>10</sub>.

<sup>6</sup> Emission factor for natural gas combustion (AP-42 5th ed. Table 1.4-3, July 1998).

<sup>7</sup> Assumed in order to maximize calculated SO<sub>2</sub> emissions

<sup>8</sup> AP42 5th Ed., Table 2.4-2, November 1998

<sup>9</sup> 40 CFR 98, Subpart A Table A-1

<sup>10</sup> Site specific calculated value.

Air Toxics

Enclosed Flare

Flare Permit Application  
San Juan Capistrano, California  
Prima Deshecha Landfill

LFG Inlet Flow = 4,000 scfm

LFG Compound	HAP	VOC	CAS	MW (lb/lb-mol)	Conc in Inlet Gas (ppmv) <sup>1</sup>	Control Efficiency (%)	Flare Emissions		F Conc in LFG (ppmv)	Br Conc in LFG (ppmv)
							(lb/hr)*	(lb/yr)*		
1,1,1 - Trichloroethane (methyl chloroform)	x	--	71-55-6	133.41	0.48	98%	8.10E-04	7.10		
1,1,2,2 - Tetrachloroethane	x	x	79-34-5	167.85	1.11	98%	2.36E-03	20.65		
1,1 - Dichloroethane (ethylidene dichloride)	x	x	75-34-3	98.96	2.35	98%	2.94E-03	25.77		
1,1 - Dichloroethene (vinylidene chloride)	x	x	75-35-4	96.94	0.201	98%	2.46E-04	2.16		
1,2 - Dichloroethane (ethylene dichloride)	x	x	107-06-2	98.96	0.407	98%	5.09E-04	4.46		
1,2 - Dichloropropane (propylene dichloride)	x	x	78-87-5	112.99	0.18	98%	2.57E-04	2.25		
2-Propanol (isopropyl alcohol)	--	x	67-63-0	60.11	50.1	98%	3.81E-02	333.70		
Acetone (2-propanone)	--	--	67-64-1	58.08	7.01	98%	5.15E-03	45.11		
Acrylonitrile (Propenenitrile)	x	x	107-13-1	53.06	6.33	98%	4.25E-03	37.22		
Benzene	x	x	71-43-2	78.12	1.91	98%	1.89E-03	16.53		
Bromodichloromethane	--	x	75-27-4	163.83	3.13	98%	6.49E-03	56.82		
Butane	--	x	106-97-8	58.12	5.03	98%	3.70E-03	32.39		
Carbon Disulfide <sup>6</sup>	x	x	75-15-0	76.14	0.1245 NA		0.00E+00	0.00		
Carbon Tetrachloride	x	x	56-23-5	153.84	0.004	98%	7.78E-06	0.07		
Carbonyl Sulfide <sup>6</sup>	x	x	463-58-1	60.07	0.05 NA		0.00E+00	0.00		
Chlorobenzene (monochlorobenzene)	x	x	108-90-7	112.56	0.254	98%	3.62E-04	3.17		
Chlorodifluoromethane (CFC-22, freon-22) <sup>2</sup>	--	--	75-45-6	86.47	1.3	100%	0.00E+00	0.00	2.60	
Chloroethane (ethyl chloride)	x	x	75-00-3	64.52	1.25	98%	1.02E-03	8.94		
Chloroform (trichloromethane)	x	x	67-66-3	119.38	0.03	98%	4.53E-05	0.40		
Chloromethane (methyl chloride)	x	x	74-87-3	50.49	1.21	98%	7.73E-04	6.77		
1,4 Dichlorobenzene (p-dichlorobenzene)	x	x	106-46-7	147	0.213	98%	3.96E-04	3.47		
Dichlorodifluoromethane (CFC-12, freon-12) <sup>2</sup>	--	--	75-71-8	120.91	15.7	100%	0.00E+00	0.00	31.40	
Dichlorofluoromethane (freon-21) <sup>2</sup>	--	--	75-43-4	102.92	2.62	100%	0.00E+00	0.00	2.62	
Dichloromethane (methylene chloride)	x	--	75-09-2	84.93	14.3	98%	1.54E-02	134.58		
Dimethyl Sulfide (methyl sulfide) <sup>6</sup>	--	x	75-18-3	62.13	6.415 NA		0.00E+00	0.00		
Ethane	--	--	74-84-0	30.07	889	98%	3.38E-01	2,962.14		
Ethanol (ethyl alcohol)	--	x	64-17-5	46.08	27.2	98%	1.59E-02	138.88		
Ethyl Mercaptan <sup>6</sup>	--	x	75-08-1	62.13	0.129 NA		0.00E+00	0.00		
Ethylbenzene	x	x	100-41-4	106.17	4.61	98%	6.19E-03	54.23		
Ethylene dibromide (1,2 dibromoethane) <sup>2</sup>	x	x	106-93-4	187.88	0.001	100%	0.00E+00	0.00		0.002
Fluorotrichloromethane (CFC-11, freon-11) <sup>2</sup>	--	--	75-69-4	137.37	0.76	100%	0.00E+00	0.00	0.76	
Hexane	x	x	110-54-3	86.18	6.57	98%	7.16E-03	62.74		
Hydrogen Sulfide <sup>6</sup>	--	--	7783-06-4	34.08	40 NA		0.00E+00	0.00		
Mercury (total)	x	--	7439-97-6	200.61	2.92E-04	0%	3.70E-05	0.32		
Methyl Ethyl Ketone (2-butanone)	--	x	78-93-3	72.11	7.09	98%	6.47E-03	56.65		
Methyl Isobutyl Ketone (hexone)	x	x	108-10-1	100.16	1.87	98%	2.37E-03	20.75		
Methyl Mercaptan <sup>6</sup>	--	x	74-93-1	48.11	3.715 NA		0.00E+00	0.00		
Pentane	--	x	109-66-0	72.15	3.29	98%	3.00E-03	26.30		
Tetrachloroethylene (perchloroethylene, -ethene)	x	--	127-18-4	165.83	3.73	98%	7.82E-03	68.54		
Propane	--	x	74-98-6	44.1	11.1	98%	6.19E-03	54.24		
Toluene (methylbenzene)	x	x	108-88-3	92.14	39.3	98%	4.58E-02	401.25		
Trichloroethylene (trichloroethene)	x	x	79-01-6	131.38	2.82	98%	4.69E-03	41.05		
t - 1,2 - Dichloroethene (1,2 dichloroethylene)	--	x	156-60-5	96.94	2.84	98%	3.48E-03	30.51		
Vinyl Chloride (chloroethylene, VCM)	x	x	75-01-4	62.50	7.34	98%	5.80E-03	50.83		
Xylenes (m, o, p)	x	x	1330-20-7	106.17	12.1	98%	1.63E-02	142.35		
Hydrogen Chloride <sup>3,4</sup>	x	--	7647-01-0	36.5	42	0%	9.69E-01	8,484.38		
Hydrogen Fluoride <sup>3,5</sup>			7664-39-3	20.0	37.38	0%	4.73E-01	4,144.07		
Hydrogen Bromide <sup>3,5</sup>			10035-10-6	80.9	0.002	0%	1.02E-04	0.90		
Total HAP							1.10	9,599.97		
Maximum Single HAP							0.97	8,484.38		
VOC							0.19	1,634.56		

<sup>1</sup> AP42 5th Ed., "Compilation of Air Pollutant Emissions Factors, Vol. 1: Stationary Point and Area Sources," Table 2.4-1, Nov. 1998<sup>2</sup> Assume 100% conversion to HF or HBr.<sup>3</sup> Product of combustion<sup>4</sup> Because HCl is a production of combustion, a default ionic Cl LFG concentration of 42 ppmv is listed; AP-42, Section 2.4.4.<sup>5</sup> Assumes 100% conversion of fluorinated and bromide containing compounds into HF and HBr, respectively.<sup>6</sup> Hydrogen sulfide value per conservative assumption of H<sub>2</sub>S concentration with H<sub>2</sub>S Scrubber in operation. Emission of pollutants included within the Sulfur calculations and emissions estimates for SOX.

## Sample Calculations

## Enclosed Flare

Flare Permit Application  
San Juan Capistrano, California  
Prima Deshecha Landfill

$$R = ^\circ\text{F} + 460$$

$$\text{standard temperature} = 60\ ^\circ\text{F}$$

$$\text{standard pressure} = 1\ \text{atm}$$

$$\text{Universal gas constant (R)} = 0.7302\ \text{atm}\cdot\text{ft}^3/\text{lb}\cdot\text{mol}\cdot\text{R}$$

**Flow**

$$\text{dscfm} = \text{scfm} \cdot (1 - \% \text{moisture})$$

$$\text{acfm} = \text{scfm} \cdot (\text{actual temp}[R]) \div (\text{standard temp}[R]) \cdot \{(\text{standard press}[\text{atm}]) \div (\text{actual press}[\text{atm}])\}$$

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

$$(\text{lb/MMbtu}) \cdot (\text{MMbtu/hr}) = \text{lb/hr}$$

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

$$[(\text{scfm}) \times (60\ \text{min/hr}) \times (\text{individual ppmv}_{\text{sulfur}} \times 1\text{E-}06) \times (\text{MW SO}_2)] \div [(R \times T)] = \text{lb/hr}$$

**PM<sub>10</sub> Emissions**

$$(\text{dscfm}) \times (\text{CH}_4\ \text{component}) \times (1\text{E-}6\ \text{MMscf/scf}) \times (\text{lb PM/MMscf CH}_4) \times (60\ \text{min/hr}) = \text{lb/hr}$$

**VOC Emissions**

$$[(\text{scfm} \times 60\ \text{min/hr} \times (\text{ppmv}_{\text{compound}} \times 1\text{E-}06 \times \text{MW}_{\text{compound}})] \div (R \times T) \times (1 - \text{control efficiency}) = \text{lb/hr}$$

OR

VOCs are 39 percent of NMOC, as prescribed in AP-42

$$\text{ppmv}_{\text{VOC}} = (\text{ppmv}_{\text{NMOC}}) \times 0.39$$

flare and/or engines typically combust 98% of VOCs

$$[(\text{scfm} \times 60\ \text{min/hr} \times (\text{ppmv}_{\text{hexane}}) \times (\text{MW}_{\text{hexane}}) \div (R \times T))] \times (0.39) = \text{lb/hr}$$

**LFG Compound Emissions**

$$[(\text{scfm} \times 60\ \text{min/hr} \times \text{ppmv}_{\text{compound}} \times \text{MW}_{\text{compound}}) \div (R \times T)] \times (1 - \text{control efficiency})$$

**HCl Emissions**

$$[(\text{scfm}) \times (60\ \text{min/hr}) \times (\text{ppmv}_{\text{total Cl conc}}) \times (\text{MW}_{\text{HCl}}) \div (R \times T)] = \text{lb/hr}$$

OR

typically, 86% to 99.7% of chlorine compounds convert to HCl during combustion

$$(\text{ppmv}_{\text{compound}}) \times (\text{control efficiency}) \times (\# \text{ Cl atoms}) = \text{ppmv}_{\text{HCl}} \text{ in outlet gas from each compound}$$

$$\{\text{ppmv}_{\text{HCl}} \times \text{scfm} \times \text{MW}_{\text{HCl}}\} \div (R \times T) \times (60\ \text{min/hr}) = \text{lb/hr}$$

**Total Heat Release**

$$(\text{btu/scf}) \times (\text{scfm}) \times (60\ \text{min/hr}) \times (0.07\ (\text{cal/s})/(\text{btu/hr})) = \text{cal/s}$$

**Temperature Conversions**

$$^\circ\text{C} = (5/9) \times (^\circ\text{F} + 32),\ ^\circ\text{F} = (1.8^\circ\text{C} + 32)$$

$$^\circ\text{F} = R - 459.67,\ R = ^\circ\text{F} + 459.67,\ K = R \div 1.8,\ R = K \times 1.8,\ ^\circ\text{C} = (R \div 1.8) - 273.15,\ R = (^\circ\text{C} + 273.15)$$

**Net Heat Release**

$$\text{gross heat release} \times (1 - 0.048 \times ((\text{MW}_{\text{LFG}})^{0.5})) = \text{net heat release}$$

**Effective Stack Diameter**

$$0.001 \times [(\text{net heat release})^{0.5}] = \text{effective stack diameter}$$

Biogenic conversion factors

Enclosed Flare

Flare Permit Application  
San Juan Capistrano, California  
Prima Deshecha Landfill

## Conversion Factors:

1 mol CO <sub>2</sub> =	44.01 g
1 m <sup>3</sup> =	35.31 scf
1 m <sup>3</sup> =	1000 L
1 mol gas =	23.689 L at 60° F and 1 atm (ideal gas law)
1 Mg =	1,000,000 g
1 Mg =	1,000 kg
1 Mg =	1.1023 tons
1 hp =	2,545 Btu/hr