# APPENDIX C

# REVISED FINAL AIR QUALITY AND GREENHOUSE GAS TECHNICAL REPORT

AECOM Environment

Prepared for:
County of Santa Barbara
Department of Public Works
Resource Recovery and Waste Management

Prepared by:
AECOM
Camarillo, California

60282626-01
~~July 2014~~ **October 2015**

# **Revised** Air Quality and Greenhouse Gas Technical Report

## Tajiguas Landfill Resource Recovery Project
## Santa Barbara County, California

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# **Revised** Air Quality and Greenhouse Gas Technical Report

# Tajiguas Landfill Resource Recovery Project Santa Barbara County, California

and


Prepared By Sean Wazlaw, Steve L. Heisler, PhD, QEP, Mary Kaplan and Michael Conrardy

Reviewed By Sara J. Head, QEP

# Summary of Revisions from Previous July 2014 Report

Upon release of the Draft Environmental Impact Report (EIR) in August 2014, further design engineering refinements and other changes have been made to the Tajiguas Resource Recovery Project (TRRP). These changes for the most part reflect refinements needed to meet the permitting requirements of the Santa Barbara County Air Pollution Control District and other agencies. These changes are considered to be minor from an air quality and greenhouse gas perspective, and do not change any of the significance findings contained within this report. The following revisions to the sources and assumptions were analyzed and incorporated into this Air Quality and Greenhouse Gas Technical Report:

- The list of off-road equipment to be operated for the TRRP has been revised as follows:
  - Materials Recovery Facility (MRF) Building
    - Two Caterpillar 980 M Loaders - 386 horsepower (hp)
    - One Caterpillar 938 K Loader - 169 hp
    - Three Caterpillar 2P-6000 Forklifts - 61 hp
    - One Tennant 800 Sweeper - 65 hp
    - One Caterpillar M322D Material Handler - 173 hp
  - Anaerobic Digestion (AD) Facility Building
    - Two Caterpillar 938 M Loaders - 169 hp
  - MRF and AD Facility Perimeter Road
    - One Tennant M30 Scrubber-Sweeper - 41 hp
  - Composting Area
    - One Caterpillar 938 K Loader - 169 hp
    - One Vermeer CT1010 TX Windrow Turner - 215 hp
    - Note that compost screening will be performed with electrically powered equipment instead of diesel-fueled equipment.
- The anticipated percentages of food and green waste to be processed in the anaerobic digesters has been revised to reflect 48.1 percent food waste and 51.9 percent green waste, based on recent sampling of organic municipal solid waste (MSW) in Santa Barbara County.
- Digestate screening prior to addition to the composting windrows has been eliminated.
- The flare nitrogen oxides ($NO_x$) emission factor has been increased to 0.08 pounds per million British thermal units (lb/MMBtu), based on input from the anticipated flare vendor (John Zink).

- The material moisture content used to calculate fugitive particulate matter emissions from material transfers was decreased to 4.8 percent, which is the maximum moisture content of materials used to develop the fugitive particulate matter emission factor equation for material transfers in AP-42 Section 13.2.4 (November 2006). This is a conservative assumption, since the material moisture content is anticipated to be 40 to 50 percent, which will lead to substantially lower fugitive particulate matter emissions.
- The assumption related to when maximum biogas flaring will occur has been revised to reflect only one combined heat and power (CHP) engine being out of service instead of both engines being out of service at the same time. This change is based on experience of the anaerobic digestion system vendor (Bekon) with historical operations of similar systems in Europe, in which both CHP engines have never been down at the same time.
- Minor revisions were made to the facility, layout, building dimensions, and stack locations.
- Reconfiguration of the CHP engines exhaust locations were made to reflect exhaust through a separate stack for each engine instead of a common stack.
- A rolling bed dryer (RBD), which will dry paper processed by the Materials Recovery Facility (MRF) with heat for the RBD operation provided by the CHP engines' exhaust, has been added. Both CHP engines will exhaust completely through the RBD when it is operating. The RBD is anticipated to operate 16 hours per day, six days per week.
- The flare stack parameters (i.e., location, height, and stack sizing) have been revised, which resulted in reduced $NO_x$ impacts.
- The MRF (tipping floor) biofilter was modified from a point source to a ground level area source that is 70 feet wide, 90 feet long, and nine feet deep at ground level.
- Modifications of the Anaerobic Digestion (AD) Facility biofilter exhaust locations and dimensions are as follows:
    - The two MRF/AD Facility exhaust filters are each 60 feet wide, 70 feet long, nine feet deep and located on top of the AD building.
    - The two biofilters are located side by side and total 66 feet wide, 108 feet long, and nine feet deep. These biofilters are also located on top of the AD building.
- Revisions of which biofilters discharge the MRF and AD Facility off-road equipment emissions to the atmosphere. The emissions from the equipment will be exhausted as follows:
    - The Cat 2P-6000 Forklift emissions will exhaust through the two biofilters on the north side of the AD Facility roof.
    - Emissions from the rest of the equipment operating inside the MRF will exhaust through the tipping floor biofilter.

  - Emissions from the equipment operating inside the AD Facility will exhaust through the two biofilters on the south side of the AD Facility roof.

- The locations of the landfill operations clear diesel, red diesel and gasoline tanks have been revised. They will be relocated to the east side of the landfill near the maintenance building.
- A new 150 kilowatt emergency diesel generator will be installed as part of the Project. It is assumed that it will operate 30 minutes per week for testing for a total of 50 hours/year. In order to minimize impacts, the testing would be limited to the daytime, only occurring between 10 am and 4 pm.
- A new sub-skid diesel storage tank will be installed with the emergency generator listed above.
- Natural gas or propane co-firing with biogas in the combined heat and power (CHP) engines has been added. The supplemental fuel during certain scenarios, i.e., start-up, Selective Catalytic Reduction (SCR) catalyst control system "burn-in[1]", and as a supplemental fuel during normal operations, if necessary, is anticipated to be propane unless a natural gas grid pipeline connection is developed to the Project. The CHP engines will be fueled with biogas or with a mixture of biogas and natural gas/propane as follows:
  - During normal operation with both engines operating, the engines will be fueled with a mixture of approximately 86.5 percent biogas and 13.5 percent natural gas.
  - When only one engine is operating, it will only be fueled with biogas.
  - During engine start-up and SCR catalyst burn-in, the engine will only be fueled with natural gas/propane, and only one engine will start up at a time.

Revisions made to this version of this Air Quality and Greenhouse Gas Technical Report compared to the version in the Draft EIR (Appendix C) are shown in a redline format, i.e., added or replacement text is shown in **bold underline**, and deleted/replaced text is shown as ~~strikethrough~~.

[1] The SCR catalyst system will need to be replaced about once every two years, and it takes about 120 hours to break in (burn off) the protective coating on the new SCR replacement catalyst

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# Contents

## List of Tables

# List of Figures

## List of Attachments

# List of Abbreviations

| | |
|---|---|
| °F | degrees Fahrenheit |
| $\mu g/m^3$ | micrograms per cubic meter |
| AB | Assembly Bill |
| AD | Anaerobic Digestion |
| ADF | Anaerobic Digestion Facility |
| AIG | AERMOD Implementation Guide |
| a.m. | Morning |
| APCD | Air Pollution Control District |
| AQAP | Air Quality Attainment Plan |
| AQIA | Air Quality Impact Assessment |
| AQMD | Air Quality Management District |
| AQMP | Air Quality Management Plan |
| ARB | California Air Resources Board |
| Avg. | Average |
| BAAQMD | Bay Area Air Quality Management District |
| BACT | Best Available Control Technology |
| BAU | business as usual |
| Bkgrnd. | Background |
| BPIP | Building Profile Input Processor |
| BUB | Braunschweiger Umwelt-Biotechnologie GmbH |
| CAA | Clean Air Act |
| CAAQS | California Ambient Air Quality Standards |
| CalEEMod | California Emissions Estimator Model |
| CalEPA | California Environmental Protection Agency |
| CalRecycle | California Department of Resources Recycling and Recovery |
| Caltrans | California Department of Transportation |
| CAP | Climate Action Plan |
| CAPCOA | California Air Pollution Control Officers Association |
| CATEF | California Air Toxic Emission Factors |
| CCAA | California Clean Air Act |
| CCAR | California Climate Action Registry |

| | |
|---|---|
| CCR | California Code of Regulations |
| C&D | Construction & Demolition |
| CEC | California Energy Commission |
| CEQA | California Environmental Quality Act |
| CFC | Chlorofluorocarbon |
| CFR | Code of Federal Regulations |
| $CH_4$ | Methane |
| CHP | combined heat and power |
| CNG | compressed natural gas |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| $CO_2e$ | carbon dioxide equivalent |
| Conc. | Concentration |
| CSSR | commingled source separated recyclables |
| DOC | degradable organic carbon |
| DPM | diesel particulate matter |
| ECAP | Energy and Climate Action Plan |
| e.g. | for example |
| EIR | Environmental Impact Report |
| EO | Executive Order |
| EPA | U.S. Environmental Protection Agency |
| ft | feet |
| $ft^2$ | square feet |
| Gal | Gallons |
| GAQM | Guidelines on Air Quality Models |
| g/bhp-hr | grams per brake-horsepower-hour |
| GE | General Electric |
| GEP | good engineering practice |
| GHG | greenhouse gas |
| GLC | ground level concentration |
| g/mile | grams per mile |
| GWP | Global Warming Potential |

| | |
|---|---|
| $H_2S$ | hydrogen sulfide |
| HAP | hazardous air pollutant |
| HARP | Hotspots Analysis Reporting Program (model) |
| $H_B$ | height of the structure |
| HDV | heavy duty vehicle |
| HFC | Hydrofluorocarbon |
| $H_{GEP}$ | GEP height |
| HI | hazard index |
| hp | horsepower |
| hr | hour |
| HRA | Health Risk Assessment |
| IAQM | Institute of Air Quality Management |
| IC | internal combustion |
| i.e. | that is |
| IPCC | Intergovernmental Panel on Climate Change |
| ISCST3 | Industrial Source Complex – Short Term Model version 3 |
| IWMF | Integrated Waste Management Facility |
| kW | Kilowatt |
| lb | pound(s) |
| l/kg-day | liters of air per kilogram per day |
| lb/MMcf | pound per million cubic feet |
| LDV | light duty vehicle |
| LFC | Las Flores Canyon |
| LFG | landfill gas |
| LNG | liquefied natural gas |
| LPG | liquefied petroleum gas |
| m | meter |
| $m^3$ | cubic meters |
| MEIR | maximum exposed individual resident |
| MEIW | maximum exposed individual worker |
| $\mu g/m^3$ | micrograms per cubic meter |
| mg/kg-day | milligrams per kilogram per day |

| | |
|---|---|
| min. | minute |
| MMBtu | million British thermal units |
| MMcf | million cubic feet |
| MND | Mitigated Negative Declaration |
| MRF | Materials Recovery Facility |
| MSW | municipal solid waste |
| MT | metric tons |
| $mtCO_2e$ | metric tons of carbon dioxide equivalents |
| Mustang | Mustang Renewable Energy |
| MWh | megawatt hour |
| N/A | Not Applicable |
| NA | Not Available |
| $N_2O$ | nitrous oxide |
| NAAQS | National Ambient Air Quality Standards |
| NASA | National Aeronautics and Space Administration |
| NESHAP | National Emission Standards for Hazardous Air Pollutants |
| $NO_2$ | nitrogen dioxide |
| NOAA | National Oceanic and Atmospheric Administration |
| $NO_x$ | oxides of nitrogen |
| N/R | Not Reported |
| NSPS | New Source Performance Standards |
| NSR | New Source Review |
| $O_3$ | Ozone |
| OAQPS | EPA Office of Air Quality Planning and Standards |
| OEHHA | California Office of Environmental Health Hazard Assessment |
| OIMP | Odor Impact Minimization Plan |
| OLM | Ozone Limiting Method |
| OU | odor units |
| $OU/m^3$ | odor units per cubic meter |
| Pb | Lead |
| PF | Public Facilities |
| p.m. | past morning |

| | |
|---|---|
| PM10 | Respirable Particulate Matter |
| PM2.5 | Fine Particulate Matter |
| PMI | Point of Maximum Impact |
| ppb | parts per billion |
| ppm | parts per million |
| ppmv | parts per million by volume |
| ppmw | parts per million by weight |
| Project | Tajiguas Resource Recovery Project |
| PVMRM | Plume Volume Molar Ratio Method |
| PSD | Prevention of Significant Deterioration |
| **RBD** | **rolling bed dryer** |
| RRWMD | Resource Recovery and Waste Management Division |
| REL | reference exposure levels |
| ROC | reactive organic compound |
| RRP | Resource Recovery Project |
| SB | Senate Bill |
| SBCAG | Santa Barbara County Association of Governments |
| SBCAPCD | Santa Barbara County Air Pollution Control District |
| SCAQMD | South Coast Air Quality Management District |
| SCCAB | South Central Coast Air Basin |
| SCE | Southern California Edison |
| scf | standard cubic feet |
| SCH | California State Clearinghouse |
| SCR | selective catalytic reduction |
| SCRTS | South Coast Recycling and Transfer Station |
| sec. | Second |
| $SF_6$ | sulfur hexafluoride |
| SIP | State Implementation Plan |
| SJVAPCD | San Joaquin Valley Air Pollution Control District |
| SLAMS | State and Local Air Monitoring Station |
| $SO_2$ | sulfur dioxide |
| $SO_x$ | sulfur oxides |

| | |
|---|---|
| SRP | Scientific Review Panel |
| SSOW | source separated organic (food and green) waste |
| SVLRC | Simi Valley Landfill and Recycling Center |
| TAC | toxic air contaminant |
| TOG | total organic gases |
| TRRP | Tajiguas Resource Recovery Project |
| UCSB | University of California at Santa Barbara |
| U.S. | United States |
| VCAPCD | Ventura County Air Pollution Control District |
| Vendor | Mustang Renewable Energy |
| VMT | vehicle miles traveled |
| VOC | volatile organic compounds |
| VRP | Visibility Reducing Particles |
| WARM | Waste Reduction Model |
| WRAP | Western Regional Air Partnership |
| WWTP | wastewater treatment plant |

# 1.0 Introduction

## 1.1 Proposed Project

The County of Santa Barbara proposes to modify the operation of the Tajiguas Landfill to add a Resource Recovery Project (TRRP or Project) at the existing Tajiguas Landfill property located in the Santa Barbara County portion of the South Central Coast Air Basin.  The TRRP would be constructed and operated by the County's selected vendor, Mustang Renewable Energy (Mustang).  The TRRP would include a Materials Recovery Facility (to recover recyclable materials from the municipal solid waste (MSW) delivered to the landfill), a Dry Fermentation Anaerobic Digestion Facility (to process organic waste recovered from the Materials Recovery Facility and/or received at the site as source separated organic waste into biogas and digestate), an Energy Facility that would use the biogas from the Anaerobic Digestion Facility to produce electricity and a composting area to process (cure) the digestate into soil amendments/compost.  As an optional element, the project could also include the processing of commingled source separated recyclables (CSSR).  During both construction and operation of the Project, criteria pollutant and greenhouse gas (GHG) emissions would be generated due to equipment and vehicle use.  The purpose of this technical study is to analyze the potential air quality and GHG impacts that could occur during construction and operation of the Project. In addition, an analysis of potential health risks associated with emissions of toxic air contaminants (TACs) and an analysis of odorous substances is provided.

The emissions and impacts discussions in this report are divided into six sections, as follows:

- Project Overview
- Setting
- Thresholds of Significance
- Methodology for Evaluating Air Quality Impacts
- Impact Assessment Results
- Evaluation of Alternatives

The content and methodologies presented in this technical report are based on the following guidance documents:  Santa Barbara County's *Environmental Thresholds and Guidelines Manual* (2008) and *Guidelines for Implementation of the California Environmental Quality Act of 1970* (2010), the Santa Barbara County Air Pollution Control District's (SBCAPCD's) *Scope and Content of Air Quality Sections in Environmental Documents* (2011a) and *Modeling Guidelines for Health Risk Assessments* (APCD Form -15i) (2014a), and U.S. Environmental Protection Agency's (EPA's) *Guidelines on Air Quality Models* (GAQM) (EPA, 2008).

Key data and assumptions used in the analysis that were provided by the Project vendor are included in Attachment A.

## 1.2 Previous Permitted Project

The Tajiguas Landfill is a fully permitted Class III municipal solid waste landfill. Assessments of air emissions associated with the currently permitted Tajiguas Landfill have been conducted in the prior Environmental Impact Reports (EIRs) prepared for the Tajiguas Landfill. Prior EIRs prepared for the existing Tajiguas Landfill include: The Tajiguas Landfill Expansion Project EIR (01-EIR-05)[2], December 5, 2006 Addendum, and Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project Subsequent EIR (08EIR-00000-00007). The analysis of air emissions for the existing Tajiguas Landfill contained in the aforementioned prior EIRs are herein incorporated by reference.

The Final EIR for the Tajiguas Landfill Expansion Project 01-EIR-05 (Section 3.6.3.2.3, pages 3.6-14 to 3.6-16, Section 3.6.5 pages 3.6-20 to 3.6-21 and Section 3.11.3.3, pages 3.11-19 to 3-11-28) identified the following air quality impacts:

- The average daily off-site mobile sources of nitrogen oxides ($NO_x$) emissions were identified as a significant and unavoidable impact (Class I).
- The 1-hour nitrogen dioxide ($NO_2$) air quality standard would be exceeded and was identified as a significant and unavoidable impact (Class I).
- The 24-hour air quality standard for Respirable Particulate Matter (PM10) would be exceeded and was identified a significant and unavoidable impact (Class I).
- The maximum modeled carcinogenic health risk at the project boundary was calculated to be 15 in-one-million, and was identified as a significant and unavoidable impact (Class I).
- The potential chronic and acute non-carcinogenic health risks along the project boundary and at residences was identified as an adverse but less than significant air quality impact (Class III).
- Odors generated by transportation of the MSW and due to landfill gas were identified as a significant but mitigable nuisance impact (Class II) but a less than significant air quality impact (Class III).
- Dust generated by Landfill operations was identified as a significant but mitigable nuisance impact (Class II) but a less than significant air quality impact (Class III).

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[2] The EIR for the Tajiguas Landfill Expansion Project (01-EIR-05) is comprised of the Final EIR dated July 2002, the Draft EIR dated October 2001, and the Draft EIR Technical Studies dated October 2001.

The Final Subsequent EIR for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project (Section 4.3.2, pages 4.3-7 to 4.3-15) identified the following air quality and GHG impacts.

- Construction emissions were determined to be adverse but less than significant (Class III).
- Landfill $NO_x$ and reactive organic compounds (ROC) emissions would continue to exceed 25 pounds per day; therefore, operation of the Landfill would continue to represent a considerable contribution to a significant cumulative air quality impact (Class I).
- GHG emissions were estimated based on the emissions inventory prepared for the Tajiguas Landfill Expansion Project EIR. It was determined that the proposed Landfill reconfiguration would result in lower on-site GHG because the total amount of earthwork and associated equipment emissions would be reduced by 1.3 million cubic yards.

The existing landfill is fully permitted and operates under the following air quality permits issued by the Santa Barbara County Air Pollution Control District (SBCAPCD):

- Permit to Operate No. 9788-R3
- Part 70 Operating Permit No. 9788-R3

## 1.3 Summary of Findings

This technical report concludes that impacts related to criteria pollutants and health risks will be insignificant; impacts to climate change will be beneficial due to a reduction in GHG emissions; and impacts related to odors will be less than significant.

A summary of the air quality impacts from the currently permitted Tajiguas Landfill Project and from the proposed TRRP are provided in Table 1-1.

**Table 1-1 Summary of Impacts: Permitted Landfill and Proposed TRRP**

| Impact Category | Currently Permitted Landfill | Proposed TRRP[1] |
|---|---|---|
| **Criteria Pollutant Emissions** | | |
| Construction Emissions | Less than significant for all criteria pollutants | Less than significant for all criteria pollutants |
| **Operation Emissions and Modeled Impacts** | | |
| Maximum Daily (On-site and Off-site Sources) | Significant and unavoidable impacts for $NO_x$, ROC and Carbon Monoxide (CO) | Less than significant for all criteria pollutants |
| Off-site Mobile Emissions Only | Significant and unavoidable impact for $NO_x$; less than significant for ROC and CO | Less than significant for all criteria pollutants |
| National Ambient Air Quality Standards (NAAQS)[2] | Less than significant for all criteria pollutants | Less than significant for all criteria pollutants |
| California Ambient Air Quality Standards (CAAQS) | Significant and unavoidable impacts for 1-hour $NO_2$ and 24-hour PM10; less than significant for all other criteria pollutants | Less than significant for all criteria pollutants |
| **Health Risk Assessment** | | |
| Carcinogenic Health Risk | Significant and unavoidable at site boundary | Less than significant |
| Chronic and Acute Non-Carcinogenic Health Risk | Less than significant | Less than significant |
| **Greenhouse Gases** | | |
| Contribution to Global Climate Change | Less than significant | Less than significant for new sources, beneficial due to reductions in landfill related emissions. |
| **Odours** | | |
| Off-site Odors | Less than significant with mitigation | Less than significant |

1 Impacts for the TRRP would be slightly greater with the optional collected commingled source separated recyclables (CSSR) component; however, the magnitude of impacts would be the same with or without the CSSR component.

2 The Tajiguas Landfill Expansion Project was not subject to the EPA's most recent 1-hour $NO_2$ NAAQS, which went into effect in April, 2010, as well as other standards (see Section 3.1.3.1).

# 2.0 Project Overview

The County of Santa Barbara proposes to modify the operation of the Tajiguas Landfill Project[3] to add a Resource Recovery Project that would process MSW from the communities currently served by the Tajiguas Landfill. The Resource Recovery Project, described below, would be designed and constructed to modify the processing of MSW that is currently being delivered to the Tajiguas Landfill for burial from unincorporated areas of the south coast of Santa Barbara, Santa Ynez and New Cuyama Valleys, and the cities of Santa Barbara, Goleta, Buellton and Solvang. The facility would also be designed to process source separated organic (food and green) waste (SSOW) from the region's existing and future recycling programs. Additionally, as an *optional project element*, the Resource Recovery Project could include the infrastructure to process currently collected CSSR.

The Resource Recovery Project would modify current waste management operations at the Tajiguas Landfill by the addition of a Materials Recovery Facility (MRF), Dry Fermentation Anaerobic Digestion (AD) Facility, including an Energy Facility, and a composting area to process digestate into soil amendments/compost.

As an *optional element*, the Project could also process up to 130 tons/day CSSR or 40,000 tons/year CSSR (see Table 2-1). With the inclusion of this optional element, the total processing capacity of the MRF would be approximately 290,000 tons/year (250,000 tons/year MSW + 40,000 tons/year CSSR). Processing of CSSR would increase the production of marketable recyclables by up to 36,000 tons/year (126,000 tons/year overall), producing up to an additional 4,000 tons/year (13 tons/day) of residue which would be disposed of in the Landfill.

A summary of Project components is provided in Table 2-1 and a comparison between existing and proposed operations is provided in Table 2-2.

Based on current waste disposal rates, the Tajiguas Landfill may reach its permitted disposal capacity (23.3 million cubic yards) in approximately year 2026. With the additional diversion provided by the proposed Tajiguas Landfill Project modification (operation of the Resource Recovery Project), the permitted disposal capacity (which would not be modified as a part of the Project) would not be expected to be reached until approximately year 2036, extending the Landfill life by approximately 10 years.

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[3] The Tajiguas Landfill Project consists of the Tajiguas Landfill Expansion Project approved in 2002 and the Tajiguas Landfill Reconfiguration Project approved in 2009.

**Table 2-1 Summary of Project Elements**

| Project Element | Associated Facilities | Project Element Capacity (max) | Operational Parameters[1] |
|---|---|---|---|
| | | **MRF** | |
| Base Project MRF | Processing building – **56,000** ~~60,000~~ square feet (ft$^2$), includes **24,800** ~~14,000~~ ft$^2$ tipping floor, **41,700** ~~31,000~~ ft$^2$ waste processing and recyclable storage, **1,200** ~~1,300~~ ft$^2$ load out/waste transfer, **6,829** ~~7,200~~ ft$^2$ office/administration /employee/control room areas, and **1,508** ~~2,400~~ ft$^2$ visitors center | MSW – 800 tons/day<br>250,000 tons/year | 24 hours/day, 6 days/week, 311 days/year; (2 shifts with 24 employees/shift and 1 shift with 7 employees/shift) |
| | Optional Baled Recyclable Storage buildings (detached) – 6,400 ft$^2$ | | |
| | Bio-filter - **6,300** ~~4,000~~ ft$^2$ | | |
| | Wastewater treatment facility - 300 ft$^2$ | | |
| MRF with Optional CSSR Processing | Additional waste processing area – 10,000 ft$^2$ | CSSR – 130 tons/day, 40,000 tons/year | 7 a.m. – 1:30 p.m., 6.5 hours/day, 6 days/week, 311 days/year; 20 employees/shift, 1 shift |
| **Rolling Bed Dryer (RBD)** | **Located between the MRF and AD Processing Buildings, dry paper processed by the MRF with heat for the RBD operation provided by the CHP engines.** | | **7 a.m. – 11:30 p.m., 16 hours/day, 6 days/week,** |
| | | **AD Facility** | |
| AD Facility | Processing building - 63,000 ft$^2$, including 16 digesters, two roof top biofilters, and **545,700** ~~300,000~~ gallon percolate storage | Organic waste from MSW and SSOW – 240 tons/day, 73,600 tons/year | Days receiving material - 311 days/year of AD facility Operation - 24 hours/day, 365 days/year; 3 employees/shift, 1 shift (employees present 6 days/week) |
| | Composting area – 6.2 acres | Digestate – 200 tons/day, 60,000 tons/year | Days receiving material – 208 days/year of operation - 7 a.m. – 4 p.m., 6 days/week; 1 employee/shift |

**Table 2-1 Summary of Project Elements**

| Project Element | Associated Facilities | Project Element Capacity (max) | Operational Parameters[1] |
|---|---|---|---|
| Energy Facility & AD Control Room | Building attached to AD Facility – 2,900 $ft^2$ housing two 1,537 horsepower (hp) combined heat and power (CHP) engines | 7.6-10.4 million kilowatt (kW)-hours/year | 24 hours/day, 365 days/year |

[1] Waste receipt would occur during the currently permitted operating hours of 7 a.m. to 5 p.m., Monday and Tuesday and 7 a.m. to 4 p.m., Wednesday through Saturday.

**Table 2-2 Comparison of Permitted and Proposed Project Components**

| Project Element | 2009 Solid Waste Facility Permit | Proposed Project |
|---|---|---|
| Total Permitted Area | 357 acres total / 118 acres for disposal | 357 acres total / 118 acres for disposal (approximately 6 acres for Resource Recovery Project Facility, up to 5 acres for the composting areas, 0.26 acres for water storage facilities) |
| Waste Type | MSW, Construction & Demolition, Recyclables, Green-waste | MSW, Construction & Demolition, Commingled Source Separated Recyclables[1], Source Separated Organic Waste (green-waste, food-waste or mixed green and food-waste) |
| Hours of Operations at the Landfill | Waste Receipt and Disposal Operations: Monday-Tuesday: 7 a.m. – 5 p.m.; Wednesday-Saturday: 7 a.m. – 4 p.m.<br>Cover, Compaction, Construction & Maintenance: Monday-Saturday: 6 a.m. – 6 p.m.<br>Construction Only: Monday-Saturday: 6 a.m. – 8 p.m.; Sunday: 7 a.m. – 6 p.m.<br>Special Occurrences: closed on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. Maximum total of 20 Sundays per year. | No change |

**Table 2-2 Comparison of Permitted and Proposed Project Components**

| Project Element | 2009 Solid Waste Facility Permit | Proposed Project |
|---|---|---|
| Hours of Operations at the MRF | Not Applicable (N/A) | Handling and Processing of Waste:<br>24 hours/day, 311 days/year, 6 days/week<br>Waste Receipt:<br>Monday-Tuesday: 7 a.m. – 5 p.m.;<br>Wednesday-Saturday: 7 a.m. – 4 p.m.<br>Transport of Recyclables: 24 hours/day, 6 days/week (Monday – Saturday) |
| Hours of Operations at the AD & Energy Facility | N/A | Days Receiving Material: 311 days/year<br>Operation of the AD Facility: 24 hours/day, 365 days/year |
| Hours of Operations at the Composting Area | N/A | Composting Operations:<br>7 a.m. – 4 p.m., 6 days/week<br>Transport of Finished Compost:<br>7 a.m. to 5 p.m., 6 days/week |
| Hours of Operations at the Chipping and Grinding Operation | Monday-Tuesday: 7 a.m. – 5 p.m.<br>Wednesday-Saturday: 7 a.m. – 4 p.m. | No Change |
| Maximum/Peak Daily Tonnage (at landfill entry scale) | 1,500 tons/day, includes 145 tons/day green-waste | 1,500 tons/day, includes up to 210 tons/day SSOW (green-waste, food-waste or combined food- and green-waste) |
| Facility Design Capacity | 23,300,000 cubic yards (landfill) | Landfill: 23,300,000 cubic yards (no change)<br>MRF: 800 – 930[1] tons/day<br>AD Facility: 240 tons/day<br>Composting Area: 200 tons/day |
| Maximum/Peak Traffic | 184 waste haul vehicles/day (does not include an additional 50 vehicles/day miscellaneous traffic) | No change to maximum/peak traffic of 234 vehicles/day. Vehicle composition to include waste haul trucks, recyclable and compost transport vehicles, and miscellaneous traffic. |
| Maximum Permitted Elevation of Landfill | 620 feet above mean sea level | No change |
| Total Permitted Disposal Footprint of Landfill | 118 acres | No change |

**Table 2-2 Comparison of Permitted and Proposed Project Components**

| Project Element | 2009 Solid Waste Facility Permit | Proposed Project |
|---|---|---|
| Estimated Landfill Closure Year | 2023[2] | 2036 |
| Site Activities & Operations | Landfill and Chipping/Grinding Operation | Landfill, Chipping/Grinding Operation, MRF, AD Facility, Composting Area, and Energy Facility |

[1] With optional CSSR Project element

[2] Estimated closure year listed in the 2009 Solid Waste Facility Permit. Based on current waste disposal rates and revised calculations regarding remaining capacity, the Landfill is now expected to be at capacity in 2026 and not 2023.

The Resource Recovery Project facilities would be located approximately 3,200 feet north of U.S. Highway 101 on the existing Tajiguas Landfill Operations Deck, an approximately 6-acre site that currently houses the Landfill administrative office, two crew trailers, engineering trailer, hazardous material storage, electronic-waste storage, equipment storage and parking, employee parking, maintenance facility and two fuel storage tanks. The composting area is proposed to be located on the top deck of the Landfill. The top deck would be closed and a final landfill cover system installed prior to using it for the Resource Recovery Project composting area.

The Santa Barbara County Resource Recovery & Waste Management Division (RRWMD) would continue to operate the Tajiguas Landfill. Landfill operations and engineering offices would be integrated into the new Resource Recovery Project structures, but Landfill staffing would be reduced in response to the reduced amount of waste requiring burial.

In addition to the facilities listed above, a new groundwater production well would be constructed to provide water to the Project and two new advanced, self-contained commercial wastewater package treatment units would be constructed to treat the Project's domestic wastewater. The treated wastewater would be used for landscape irrigation on the slopes (non-Landfill) adjacent to the MRF and AD Facility. A new 220,000 gallon fire suppression water storage tank would be installed to provide water for the building sprinkler system, domestic and process/equipment wash down uses, landscape irrigation needs and fire hydrants. Parking would be provided for Resource Recovery Project staff, Landfill operations staff and visitors.

The MRF and AD Facility buildings would also accommodate solar photovoltaic array panels on the roofs. During construction of the Resource Recovery Project, Landfill administrative and engineering offices, maintenance, and equipment storage would be temporarily relocated to other disturbed areas of the Landfill property. Three Landfill fuel tanks (red diesel, clear diesel, gasoline) currently located on the operations deck would be temporarily relocated off of the Operations Deck and then be relocated back on to the Operations Deck following construction of the TRRP facilities.

The Resource Recovery Project's waste processing activity is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill.  Thus, the Resource Recovery Project would create a 20-year waste management solution for the community's waste (extending the life of the Tajiguas Landfill by approximately 10 years).

# 3.0 Setting

## 3.1 Existing Conditions

### 3.1.1 Regional Climatological Setting

Southern California lies in a semi-permanent, high pressure zone of the eastern Pacific region. The coastal strip is characterized by limited rainfall (i.e., approximately 17.6 inches per year), most of which occurs in the winter season, and warm, dry summers tempered by cooling sea breezes. In spring, summer and fall, the climate is dominated by marine air. Light synoptic-scale winds in the region allow marine air influence to dominate temperatures and air flow. In winter, low pressure weather systems originating in the northern Pacific Ocean bring clouds, rain and strong winds into Santa Barbara County. Inland high pressure areas also bring periods of dry, warm offshore “Santa Ana” winds during the fall. For further discussion of regional topography, meteorology, and climate, please refer to Section 3.11.1.1, pages 3.11-1 to 3.11-5, of the Tajiguas Landfill Expansion EIR (01-EIR-05), which remains valid and applicable to the proposed Project.

### 3.1.2 Site-Specific Setting

The Tajiguas Landfill is located in Cañada de la Pila, a north-to-south running canyon, oriented perpendicular to the east-west oriented Gaviota Coast. Sea breezes blowing from the ocean and land breezes from the mountains to the north of the Landfill are channeled up Cañada de la Pila. East-west winds do not exert much effect at ground-level within the Landfill because of the relatively high ridges that border the Landfill on both sides. For further discussion of site-specific topography, meteorology, and climate, please refer to Section 3.11.1.1, pages 3.11-1 to 3.11-5 of the Tajiguas Landfill Expansion EIR (01-EIR-05), which remains valid and applicable to the proposed Project.

### 3.1.3 Ambient Air Quality

Air quality in the County is directly related to emissions and regional topographic and meteorological factors. The California Air Resources Board (ARB) has divided the State into regional air basins according to topographic air drainage features. The Tajiguas Landfill is situated in the South Central Coast Air Basin (SCCAB), which encompasses the counties of Ventura, Santa Barbara and San Luis Obispo. The EPA, ARB, and the local air districts classify an area as attainment, unclassified, or nonattainment depending on whether or not the monitored ambient air quality data shows compliance, insufficient data available, or non-compliance with the ambient air quality standards, respectively. The National and California Ambient Air Quality Standards (NAAQS and CAAQS) relevant to the proposed Project are provided in Table 3-1.

**Table 3-1 Ambient Air Quality Standards**

| Pollutant | Averaging Time | California Standards[1] | Federal Standards (NAAQS)[2] | |
|---|---|---|---|---|
| | | | Primary | Secondary |
| Ozone ($O_3$) | 1-hour | 0.09 ppm (180 µg/m$^3$) | -- | -- |
| | 8-hour | 0.070 ppm (137 µg/m$^3$) | 0.07**0**~~5~~ ppm[4] (**137** ~~147~~ µg/m$^3$) | Same as primary |
| Respirable Particulate Matter (PM10) | 24-hour | 50 µg/m$^3$ | 150 µg/m$^3$ [5] | Same as primary |
| | Annual | 20 µg/m$^3$ | -- | -- |
| Fine Particulate Matter (PM2.5) | 24-hour [3] | -- | 35 µg/m$^3$ [6] | Same as primary |
| | Annual | 12 µg/m$^3$ | 12.0 µg/m$^3$ [7] | 15 µg/m$^3$ |
| Carbon Monoxide (CO) | 1-hour | 20 ppm (23 µg/m$^3$) | 35 ppm (40 mg/m$^3$) | -- |
| | 8-hour | 9.0 ppm (10 mg/m$^3$) | 9 ppm (10 mg/m$^3$) | -- |
| Nitrogen Dioxide ($NO_2$) | 1-hour | 0.18 ppm (339 µg/m$^3$) | 0.10 ppm[10] (188 µg/m$^3$) | Same as primary |
| | Annual | 0.030 ppm (57 µg/m$^3$) | 0.053 ppm[9] (100 µg/m$^3$) | Same as primary |
| Sulfur Dioxide ($SO_2$) | 1-hour | 0.25 ppm (655 µg/m$^3$) | 0.075 ppm[11] (196 µg/m$^3$) | -- |
| | 3-hour | -- | -- | 0.50 ppm (1300 µg/m$^3$) |
| | 24-hour | 0.04 ppm (105 µg/m$^3$) | 0.014 ppm (for certain areas) | -- |
| | Annual Arithmetic Mean | | 0.030 ppm (for certain areas) | |
| Lead (Pb) | 30-Day | 1.5 µg/m$^3$ | -- | -- |
| | Quarterly | --- | 1.5 µg/m$^3$ | Same as primary |
| | 3-Month | --- | 0.15 µg/m$^3$ [13] | Same as primary |

**Table 3-1 Ambient Air Quality Standards**

| Pollutant | Averaging Time | California Standards(1) | Federal Standards (NAAQS)(2) | |
|---|---|---|---|---|
| | | | Primary | Secondary |
| Sulfates | 24-hour | 25 µg/m$^3$ | -- | -- |
| Hydrogen Sulfide ($H_2S$) | 1-hour | 0.03 ppm (42 µg/m$^3$) | -- | -- |
| Visibility Reducing Particles (VRP) | 8-hour | See Note 13 | -- | -- |
| Vinyl Chloride | 24-hour | 0.01 ppm (26 µg/m$^3$) | -- | -- |

Sources: 40 Code of Federal Regulations (CFR) Part 50, 17 California Code of Regulations (CCR) §§ 70200 (See http://www.arb.ca.gov/research/aaqs/aaqs2.pdf)

Notes: ppm = parts per million; µg/m$^3$ = micrograms per cubic meter

(1) Standards for ozone, CO, $SO_2$ (1 and 24 hour), $NO_2$, PM10, PM2.5, and VRP are values that are not to be exceeded. All others are not to be equaled or exceeded.

(2) Short-term standards (averaging times of 24 hours or less) for CO and $SO_2$ are not to be exceeded more than once per year.

(3) Standard attained when expected no. of days/year with maximum hourly avg. concentration above standard is equal to or less than one.

(4) **EPA revised the Federal 8-hour ozone from 0.075 to 0.070 ppm on October 1, 2015**. Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years.

(5) Not to be exceeded more than once per year on average over 3 years.

(6) 98$^{th}$ percentile, averaged over 3 years

(7) Annual mean, averaged over 3 years.

(8) 3-year average of weighted annual mean concentrations.

(9) Annual Mean

(10) Based on the 3-year average of the 98$^{th}$ percentile of the yearly distribution of 1-hour daily maximum concentrations.

(11) The 3-year average of the 99$^{th}$ percentile of the daily maximum 1-hour average must not exceed 0.075 ppm.

(12) Standard is based on rolling 3-month average.

(13) Extinction coefficient of 0.23 per kilometer -- visibility of 10 miles or more due to particles when relative humidity is less than 70 percent.

#### 3.1.3.1 Attainment Status

Santa Barbara County was designated unclassifiable/attainment for the 2008 Federal 8-hour ozone standard on April 30, 2012. **A revised Federal 8-hour ozone standard was adopted on October 1, 2015, but attainment designations related to that standard are not expected until 2017 (EPA 2015). However, this revision does not change any of the findings related to the TRRP.** (The 1-hour Federal ozone standard was revoked for Santa Barbara County). The County is also considered in attainment for the California 1-hour standard for ozone as of June, 2007. The California 8-hour ozone standard was implemented in May, 2006. The County violates the California 8-hour ozone standard and the California standard for PM10. The County is unclassifiable/attainment for the Federal PM10 and Fine Particulate Matter (PM2.5) standards and unclassified for the California PM2.5 standard (based on monitored data from 2007 to 2009).

According to Santa Barbara County's 2010 Clean Air Plan, the largest human-generated contributors to locally generated air pollution in Santa Barbara County are on-road mobile sources (cars and trucks). Other mobile sources (planes, trains, boats, off-road equipment, farm equipment), the evaporation of solvents, combustion of fossil fuels, surface cleaning and coating, prescribed burning, and petroleum production and marketing combine to make up the remainder (SBCAPCD and SBCAG, 2011). The primary sources of PM10 and PM2.5 include mineral quarries, grading, demolition, agricultural tilling, road dust, and vehicle exhaust.

Since the last air quality study was performed at Tajiguas Landfill, the following changes have occurred related to the PM2.5, $NO_2$, and $SO_2$ CAAQS and NAAQS:

PM2.5:

- In 2002, California adopted an annual PM2.5 CAAQS of 12.0 micrograms per cubic meter ($\mu g/m^3$). There is no 24-hour PM2.5 CAAQS.
- On October 17, 2006, the 24-hour PM2.5 NAAQS was lowered from 65 $\mu g/m^3$ to 35 $\mu g/m^3$.
- On December 14, 2012, EPA strengthened the PM2.5 annual NAAQS from 15 $\mu g/m^3$ to 12 $\mu g/m^3$, while retaining the 24-hour PM2.5 NAAQS of 35 $\mu g/m^3$.
- Additionally during the intervening period between the last air quality study at Tajiguas Landfill and the current study, the policy of allowing the use of PM10 as a surrogate for a PM2.5 compliance demonstration has ended.

$NO_2$:

- On February 9, 2010, the new 1-hour $NO_2$ NAAQS of 100 parts per billion (ppb) (188 $\mu g/m^3$), measured by taking the 3-year average of the 98$^{th}$ percentile daily maximum impact, was promulgated. This NAAQS became effective in April 2010.

- On February 19, 2008, the California 1-hour $NO_2$ standard was strengthened from 470 $\mu g/m^3$ (0.25 ppm) to 339 $\mu g/m^3$ (0.18 ppm) and an annual $NO_2$ standard of 57 $\mu g/m^3$ was established. The strengthened California 1-hour $NO_2$ standard was promulgated subsequent to the prior EIRs.

$SO_2$:

- On June 22, 2010, EPA published a new 1-hour $SO_2$ NAAQS of 75 ppb (196 $\mu g/m^3$), measured by taking the 3-year average of the 99$^{th}$ percentile daily maximum impact. This NAAQS became effective in August 2010.

### 3.1.3.2 Air Quality Monitoring

The air quality of Santa Barbara County is monitored by a network of 18 stations. Stations fall into two primary categories: State and Local Air Monitoring Stations (SLAMS) and Prevention of Significant Deterioration (PSD) stations.

Six SLAMS measure urban and regional air quality. Two SLAMS are operated by the ARB (Santa Barbara and Santa Maria) and four by the SBCAPCD (Lompoc, Santa Ynez, El Capitan, and Goleta). Five of these stations measure ambient concentrations of CO, ozone, $NO_x$, PM10, and $SO_2$.

Twelve PSD stations are used to determine baseline air quality and the impacts of specific operations, for example large oil and gas facilities. These stations are generally located in the vicinity of the facility for which the station(s) is required, and measure specific pollutants emitted by that facility. Most PSD stations are operated by the specific facility; four are operated by SBCAPCD. Some PSD stations have been located in distant areas to measure background concentrations of pollutants, or to measure regional pollutants, such as ozone, in areas downwind from the facility.

An air quality monitoring station is not located in the immediate vicinity of the Tajiguas Landfill. However, the Las Flores Canyon Site #1 PSD station is located approximately 4.8 miles east of the Landfill. In addition, the El Capitan Beach SLAMS station is located approximately 6.2 miles to the east-southeast of the Landfill. Table 3-2 lists the monitored maximum concentrations and number of exceedances of air quality standards at these two stations for the years 2010, 2011, and 2012. As shown in Table 3-2, ozone concentrations monitored at the Las Flores Canyon Site #1 station occasionally exceed the California 8-hour standard, while ozone concentrations are typically lower at El Capitan Beach. The concentrations of PM10 monitored at the El Capitan and Las Flores station did not exceed California or Federal standards during 2010 to 2012.

**Table 3-2 Air Quality Summary for Non-Attainment Pollutants in Santa Barbara County**

| Parameter | Year | | |
|---|---|---|---|
| | 2010 | 2011 | 2012 |
| **Ozone – parts per million (ppm)** | **(El Capitan Beach/Las Flores Canyon)** | | |
| Maximum 1-hour concentration monitored | 0.084/0.091 | 0.105/0.099 | 0.074/0.091 |
| Number of days exceeding CAAQS (0.09 ppm) | 0/0 | 1/1 | 0/0 |
| Maximum 8-hour concentration monitored | 0.073/0.082 | 0.077/0.090 | 0.062/0.081 |
| Number of days exceeding 8-hour NAAQS (0.075 ppm) | 0/3 | 1/1 | 0/2 |
| Number of days exceeding 8-hour CAAQS | 1/4 | 1/2 | 0/4 |
| **PM10 – micrograms per cubic meter (μg/m$^3$)** | **(El Capitan Beach/Las Flores Canyon)** | | |
| Maximum sample | 41/29 | 36/33 | 41/35 |
| Number of samples exceeding CAAQS (50 μg/m$^3$) | 0/0 | 0/0 | 0/0 |
| Number of samples exceeding NAAQS (150 μg/m$^3$) | 0/0 | 0/0 | 0/0 |

### 3.1.4 Existing Sources and Emissions at the Tajiguas Landfill

The discussions of existing sources and emissions at the Tajiguas Landfill provided in the Tajiguas Landfill Expansion EIR (01-EIR-05) for the Tajiguas Landfill Expansion Project remain valid and applicable to the proposed Project. Existing on-site sources are discussed in Section 3.11.1.3.1, pages 3.11-7 to 3.11-9 of the 01-EIR-05 and existing off-site sources are discussed in Section 3.11.1.3.2, page 3.11-10.

The following is a list of the existing on-site and off-site air emissions sources associated with the current operation of the Tajiguas Landfill.

<u>On-site sources:</u>

- Combustion products from landfill gas control system;
- Landfill gas emissions (fugitive) from the surface of the covered waste;
- Exhaust emissions from haul trucks, non-road mobile equipment and on-road vehicles for maintenance, delivery, employees, County staff and visitors;
- Fugitive dust emissions from Landfill operations, such as vehicle and non-road equipment travel on paved and unpaved roads, dozers and scrapers moving dirt in excavation and working face areas, wind erosion of disturbed soil and green waste chipping and grinding; and

- Fugitive emissions from three fuel storage tanks (clear diesel, red diesel and unleaded gasoline).

Off-site sources:

- Haul trucks;
- Delivery vehicles;
- Employee, County staff and visitor vehicles; and
- On-site service vehicles used off-site.

### 3.1.5 Projected Greenhouse Gas Emissions under Existing Conditions

While the conditions of GHG emissions at Tajiguas landfill remain consistent with 01-EIR-05, it is necessary to expand on this effort and estimate GHG emissions based on a future scenario in which no project will be undertaken to assess the true impacts of TRRP. A scenario projecting the baseline GHG emissions into the future will demonstrate the cumulative effects of waste diversion over an extended time period. To perform these projections, methodologies and equations from EPA in 40 CFR 98 Subpart HH were used. This methodology was originally derived from the Intergovernmental Panel on Climate Change (IPCC) protocols and is considered a first-order decay model.

Equation HH-1 of 40 CFR 98 Subpart HH was used to model annual methane ($CH_4$) emissions. Table HH-3 was used to calculate the collection efficiency, and this rate was multiplied by the results of Equation HH-1 to predict the total $CH_4$ collected in the future. Equation HH-6 was used to account for $CH_4$ collection, destruction efficiency, and oxidation. All variables used were taken directly from Tajiguas Landfill's 2012 report to the EPA. Projected years required the following additional assumptions:

- 188,654 metric tons (MT) of waste disposed of annually;
- Annual waste is disposed of until 2036; and
- Final emissions year of 2066

The waste disposed annually was set equal to the most recent 10 year average annual waste disposed in Tajiguas Landfill of 188,654 MT.

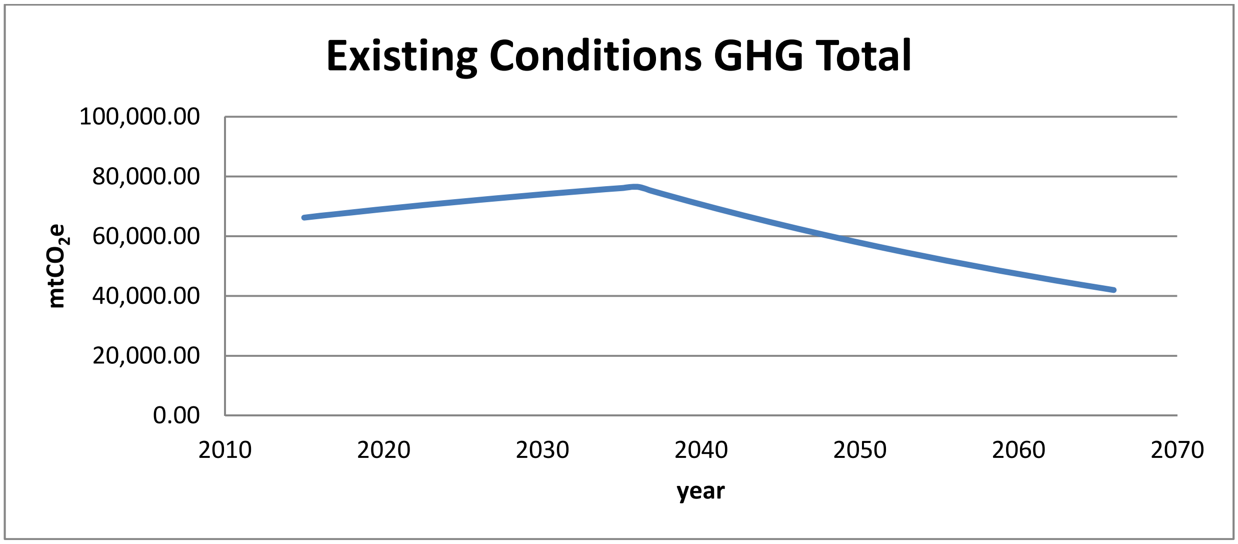
Whether or not Tajiguas Landfill is expanded after 2026, waste will continue to be generated and disposed of at another location, producing $CH_4$. The TRRP will extend the life of the Tajiguas Landfill until 2036. To develop an appropriate baseline for comparison, it was assumed that waste will be disposed of under the current conditions at Tajiguas Landfill until 2036.

The final emissions year was selected as 2066 because the EPA estimates that a landfill can produce $CH_4$ emissions from waste decomposition for up to 30 years after closure (EPA, 2010a).

Based on these inputs annual emissions were calculated and are shown in Figure 3-1.

Total GHG emissions estimated to be produced from 2015-2066 under existing conditions is 3,288,000 MT carbon dioxide equivalent ($CO_2e$), with an estimated annual average over the 52-year period of 63,231 MT $CO_2e$.

**Figure 3-1 Projected Total Greenhouse Gas Emissions for Current Tajiguas Landfill Conditions**




## 3.2 Sensitive Receptors

Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved. Sensitive population groups include children, the elderly, the acutely ill and the chronically ill, especially those with cardio-respiratory diseases.

Residential areas are also considered to be sensitive to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present. Recreational land uses are considered moderately sensitive to air pollution. Although exposure periods are generally short, exercise places a high demand on respiratory functions, which can be impaired by air pollution. In addition, noticeable air pollution can detract from the enjoyment of recreation. Industrial and commercial areas are considered the least sensitive to air pollution. Exposure periods are relatively short and intermittent, as the majority of the workers tend to stay indoors most of the time. In addition, the working population is generally the healthiest segment of the public.

The nearest population centers to the proposed Project are the cities of Solvang, approximately 7.8 miles North; and Goleta and Santa Barbara, which are approximately 18 miles and 20 miles southeast of the Project site, respectively. Approximately 0.5 miles to the south of the Project site there are several residences located along Arroyo Quemado Lane, south of the U.S. Highway 101, in unincorporated Santa Barbara County. The nearest existing residential receptor to the Project is located approximately 0.73 miles to the southeast of the Project site. A proposed residence on agricultural zoned property would be located closer, on APN 081-150-034, approximately 1,850 feet south of the proposed composting area. An additional receptor considered in the odor analysis is the Baron Ranch hiking trail, which runs in a north-south direction approximately 1,600 feet east of the site.

## 3.3 Regulatory Setting

### 3.3.1 Criteria Pollutants

#### 3.3.1.1 Federal Authority

The Federal government first adopted the Clean Air Act (CAA -- U.S. Code Section 7401) in 1963 to improve air quality and protect citizens' health and welfare, which required implementation of the NAAQS. The NAAQS are revised and changed when scientific evidence indicates a need. The CAA also requires each State to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The CAA Amendments of 1990 added requirements for states with non-attainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies.

The EPA has been charged with implementing Federal air quality programs, which includes the review and approval of all SIPs to determine conformity to the mandates of the CAA and its amendments, and to determine whether implementation of the SIPs will achieve air quality goals. If the EPA determines that a SIP is inadequate, a Federal Implementation Plan that imposes additional control measures may be prepared for the non-attainment area. Failure to submit an approvable SIP or to implement the plan within the mandated time frame may result in application of sanctions to transportation funding and stationary air pollution sources within the air basin.

Pursuant to the CAA, State and local agencies are responsible for planning for attainment and maintenance of the NAAQS. The EPA classifies air basins (i.e., distinct geographic regions) as either "attainment" or "non-attainment" for each criteria pollutant, based on whether or not the NAAQS have been achieved. Some air basins have not received sufficient analysis for certain criteria air pollutants and are designated as "unclassified" for those pollutants. The SBCAPCD and the ARB are the responsible agencies for providing attainment plans and for demonstrating attainment of these standards within the proposed Project area.

There are various Federal programs that are applicable to major sources of emissions. For regulations controlling primarily criteria pollutant emissions, the EPA has promulgated New Source Performance Standards (NSPS). Applicable Federal requirements are presented in

Table 3-3. Most of these Federal programs have been delegated to the SBCAPCD for implementation within the SCCAB.

**Table 3-3 Applicable Federal Requirements**

| Regulatory Citation | Description |
|---|---|
| 40 Code of Federal Regulations (CFR) 52 | Non-attainment New Source Review requires Best Available Control Technology and offsets. Permitting and enforcement have been delegated to the SBCAPCD. |
| 40 CFR Subpart JJJJ | NSPS for stationary spark ignition landfill/digester gas engines |

### 3.3.1.2 State Authority

The California Clean Air Act (CCAA), signed into law in 1988, requires all areas to achieve and maintain attainment with the CAAQS by the earliest possible date. The CCAA, enforced by ARB, requires that each area exceeding the CAAQS develop a plan aimed at achieving those standards. The California Health and Safety Code, Section 40914, requires air districts to design a plan that achieves an annual reduction in district-wide emissions of 5 percent or more, averaged every consecutive 3-year period. To satisfy this requirement, the local Air Pollution Control and Air Quality Management Districts (APCDs and AQMDs) are required to develop and implement air pollution reduction measures, which are described in their Air Quality Attainment or Management Plans (AQAPs or AQMPs) which are incorporated into the SIP, and outline strategies for achieving the California ambient air quality standards for criteria pollutants for which the region is classified as non-attainment.

In addition to the CCAA, ARB is the agency which:

- Establishes and enforces emission standards for motor vehicles, fuels, and consumer products;
- Establishes health-based air quality standards;
- Conducts research;
- Monitors air quality;
- Provides compliance assistance for businesses;
- Produces education and outreach programs and materials; and
- Oversees and assists local air quality districts that regulate most non-vehicular sources of air pollution.

### 3.3.1.3 Clean Air Plan

The California Clean Air Act mandates under Health and Safety Code sections 40924 and 40925 require that every three years areas update their clean air plans (i.e., the AQMP) to attain the California ozone standard. The SBCAPCD Board adopted the 2010 Clean Air Plan on January 20, 2011. The 2010 Plan provides the three-year update to the SBCAPCD's 2007 Clean Air Plan. Previous plans developed by SBCAPCD to comply with the California ozone standard include the 1991 Air Quality Attainment Plan, the 1994 Clean Air Plan, the 1998 Clean Air Plan, the 2001 Clean Air Plan and the 2004 Clean Air Plan.

The SBCAPCD prepared this 2010 Plan in partnership with Santa Barbara County Association of Government (SBCAG) and the ARB. SBCAG provided future growth projections, developed the transportation control measures, and estimated the on-road mobile source emissions. ARB provided information on statewide mobile sources and consumer product control measures. The 2010 Clean Air Plan includes a climate protection chapter, with an inventory of carbon dioxide ($CO_2$) emissions in the County. $CO_2$ is the most prevalent greenhouse gas, and the one for which the SBCAPCD has the most accurate data.

### 3.3.1.4 Local Authority

The SBCAPCD is the local agency that has primary responsibility for regulating stationary sources of air pollution situated within its jurisdictional boundaries. To this end, the SBCAPCD implements air quality programs required by State and Federal mandates, enforces rules and regulations based on air pollution laws, and educates businesses and residents about their role in protecting air quality. The SBCAPCD is also responsible for managing and permitting existing, new, and modified sources of air emissions within the County.

The applicable SBCAPCD rules and regulations for this Project include:

- **Rule 201 – Permits Required**. This rule requires an Authority to Construct and Permit to Operate before the construction or operation, respectively, of non-exempt emission sources.
- **Rule 302 – Visible Emissions**. This rule limits visible emissions from emissions sources. Pursuant to this rule, it is prohibited to discharge emissions for more than three minutes in any hour that are as dark or darker in shade as that designated as No. 1 on the Ringelmann Chart, as published by the United States Bureau of Mines. It is also prohibited to discharge emissions for more than three minutes in any hour that are of such opacity as to obscure an observer's view to a degree equal to or greater than the shade of emissions previously described.
- **Rule 303 – Nuisance**. This rule restricts emissions that would cause nuisance or injury to people or property (identical to California Health and Safety Code 41700). This rule states that a person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance

to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.

- **Rule 309 – Specific Contaminants**. This rule sets limits on the concentrations of discharges of combustion contaminants, including $SO_2$, $NO_2$, CO, and particulate matter.
- **Rule 311 – Sulfur Content of Fuels.** This rule sets limits on the sulfur concentrations of fuels.
- **Rule 333 – Control of Emissions from Reciprocating Internal Combustion Engines.** This rule establishes limits on emissions from reciprocating internal combustion engines, including emissions of $NO_x$, ROC and CO from lean-burn spark ignition engines.
- **Rule 345 – Control of Fugitive Dust from Construction and Demolition Activities.** This rule applies to any activity associated with construction or demolition of a structure or structures. Activities subject to this rule are also subject to Rule 302 (Visible Emissions) and Rule 303 (Nuisance). This rule addresses visible fugitive dust beyond the property line, truck hauling, track out/carry out and demolition. Pursuant to this rule, it is required that fugitive dust reduction methods be implemented during construction and demolition activities.
- **Rule 359 – Flares and Thermal Oxidizers.** This rule sets limits on the sulfur content of gaseous fuels burned in flares, $NO_x$ and ROC emission limits for flares, and specifies operational standards, testing requirements and recordkeeping requirements.
- **Rules 801 – 809 – New Source Review (NSR).** NSR rules apply to any applicant for a new or modified stationary source which emits or may emit any affected pollutant.

### 3.3.2 Toxic Air Contaminants

#### 3.3.2.1 Federal Authority

The EPA administers several programs that regulate emissions of hazardous air pollutants (HAPs) from stationary and mobile sources. The EPA identified 189 HAPs that may present a threat to human health or the environment and are regulated under control technology programs. Also, the EPA has identified 33 urban HAPs that pose the greatest threats to public health in urban areas and are regulated under the Urban Air Toxics Strategy. The EPA regulates HAP emissions primarily by setting emissions standards for vehicles and technology standards for industrial source categories.

There are various Federal programs that are applicable to major sources of emissions. For regulations controlling HAP emissions, the EPA has promulgated the National Emission Standards for Hazardous Air Pollutants (NESHAP), which are codified in Title 40 CFR Part 61 and Part 63.

### 3.3.2.2 State Authority

Similar to the Federal HAPs, toxic air contaminants are defined in California as air pollutants (primarily specific chemical compounds) which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health (ARB, 2010b). A primary health concern due to exposure to TACs is the risk of contracting cancer. The carcinogenic potential of TACs is of particular public health concern because it is currently believed by many scientists that there is no "safe" level of exposure to carcinogens; that is, any exposure to a carcinogen poses some risk of causing cancer. Health statistics show that one in four people (or 250,000 in-one-million) will contract cancer over their lifetime from all causes, including diet, genetic factors, and lifestyle choices (Doll and Peto, 1981).

Unlike carcinogens, most non-carcinogens have a threshold level of exposure below which the compound will not pose a health risk. The California Environmental Protection Agency (CalEPA) and California Office of Environmental Health Hazard Assessment (OEHHA) have developed reference exposure levels (RELs) for non-carcinogenic TACs that are health-conservative estimates of the levels of exposure at or below which health effects are not expected. The non-cancer health risk due to exposure to a TAC is assessed by comparing the estimated level of exposure to the REL. The comparison is expressed as the ratio of the estimated exposure level to the REL, called the hazard index (HI).

ARB reviews scientific research on exposure and health effects to identify the TACs that pose the greatest threat to public health. ARB maintains a 20-station toxic monitoring network within major urban areas. Data from these monitoring stations is used to determine the average annual concentrations of TACs and to assess the effectiveness of controls.

The California State Legislature passed The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588) of 1987, and amended the Act in 1992. There are four main purposes of this legislation:

1. To identify the amount of toxic substances emitted into the air by specific businesses;
2. To estimate potential adverse health effects for members of the public exposed to these toxic air pollutants;
3. To inform the public of these toxic air emissions and the associated health impacts; and
4. To protect the public health by reducing toxic air emissions from businesses.

The California Air Toxics Program, developed by ARB, established the process for identification and control of TAC emissions and includes provisions to make the public aware of significant toxic exposures and to reduce risk. The CalEPA and the OEHHA have developed guidelines for evaluating risk (OEHHA, 2003). In addition, California has adopted the Airborne Toxics Control Measures for Stationary Compression Ignition Engines, which limits the types of fuel allowed, establishes maximum allowable emission rates, and establishes recordkeeping requirements for equipment operators.

Some of the compounds that have been identified as TACs to date are briefly described below.

- ***Diesel particulate matter*** (DPM) from the combustion of diesel fuels consists of very small carbon particles, or "soot," which absorb diesel-related cancer-causing substances. DPM has the potential to contribute to cancer, premature death, and other health impacts, and currently contributes over 70 percent of the currently known risks from TACs (ARB, 1998; SCAQMD, 2011).
- ***Reactive Organic Compounds (ROCs)*** are organic compounds that easily vaporize at room temperature such as benzene, toluene, xylenes, and certain alcohols. Sources include motor vehicle exhaust, burning waste, gasoline, industrial and consumer products, pesticides, industrial processes, degreasing operations, pharmaceutical manufacturing, and dry cleaning operations. Some ROCs are highly reactive and contribute to the formation of ozone, while others have adverse, chronic, and acute health effects. In some cases, ROCs can be both highly reactive and potentially toxic.
- ***Carbonyl compounds,*** such as aldehydes and ketones, contain a carbon atom and an oxygen atom linked with a double bond (C=O). ARB currently monitors four carbonyls: formaldehyde, acetaldehyde, methyl ethyl ketone, and acrolein. Major sources of directly emitted carbonyls are fuel combustion, mobile sources, and process emissions from oil refineries. Some carbonyls are highly reactive and contribute to ozone formation, while others have adverse chronic and acute health effects. In some cases, carbonyls can be both highly reactive and potentially toxic.
- ***Vinyl Chloride*** is a highly toxic, flammable carcinogen emitted by combustion sources. Infants and children are sensitive to the inhalation of vinyl chloride.
- ***Hydrogen Sulfide ($H_2S$)*** is a by-product of desulfurization processes in sewage treatment and has adverse chronic inhalation effects. The largest source of $H_2S$ in the County is likely oil production activities.

### 3.3.2.3 Local Authority

The SBCAPCD is required to oversee implementation of AB 2588 that is described above. Through the Air Toxics "Hot Spots" Program, affected businesses, with assistance from the SBCAPCD, determine air toxic emissions. Businesses that release considerable amounts of toxic air pollutants are required to estimate public health risks associated with these emissions by performing a risk assessment. The SBCAPCD then oversees public notification and risk reduction programs required for businesses that pose a significant risk.

The SBCAPCD prepared *Procedures for Prioritizing Facilities Pursuant to the Air Toxics "Hot Spots" Information and Assessment Act of 1987*. The purpose of the prioritization procedures is to identify those facilities which must submit AB 2588 risk assessments. Facilities that must submit assessments are required to prepare the assessment pursuant to the *SBCAPCD Modeling Guidelines for Health Risk Assessments* (APCD Form -15i).

### 3.3.3 Greenhouse Gases and Climate Change

Climate change, often referred to as “global warming” is a global environmental issue that refers to any significant change in measures of climate, including temperature, precipitation, or wind. Climate change refers to variations from baseline conditions that extend for a period (decades or longer) of time and is a result of both natural factors, such as volcanic eruptions, and anthropogenic, or man-made, factors including changes in land-use and burning of fossil fuels (EPA, 2010c). Anthropogenic activities such as deforestation and fossil fuel combustion emit heat-trapping GHGs, defined as any gas that absorbs infrared radiation within the atmosphere. The heat absorption potential of a GHG is referred to as the “Global Warming Potential” (GWP). Each GHG has a GWP value based on the heat-absorption properties of the GHG relative to $CO_2$. This is commonly referred to as $CO_2$ equivalents ($CO_2e$).

According to data from the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA), the Earth’s average surface temperature has increased by about 1.2 to 1.4 degrees Fahrenheit (°F) in the last century. The eight warmest years on record (since 1850) have all occurred since 1998, with the warmest year being 2012. Based on available data, the rise in temperature is most likely due to anthropogenic sources (EPA, 2010c).

Unlike criteria air pollutants and TACs, which are of regional and local concern, GHGs emissions are a global issue, as climate change is not a localized impact. Eight recognized GHGs are described below. The first six are commonly analyzed for projects, while the last two are often excluded for reasons described below.

- ***$CO_2$*** is a colorless, odorless GHG. Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic degassing. Anthropogenic sources of $CO_2$ include burning fuels such as coal, oil, natural gas, and wood. Concentrations are currently around 379 ppm, which may rise to 1,130 ppm by the year 2100 as a direct result of anthropogenic sources (IPCC, 2007).
- ***$CH_4$*** is a gas that is the main component of natural gas. $CH_4$ forms naturally from the decay of organic matter. Natural sources include wetlands, permafrost, oceans and wildfires. Anthropogenic sources include fossil fuel production, rice cultivation, biomass burning, animal husbandry (fermentation during manure management), and landfills.
- ***Nitrous Oxide ($N_2O$),*** also known as laughing gas, is a colorless gas. $N_2O$ is produced by microbial processes in soil and water, including those reactions which occur in nitrogen-rich fertilizers. In addition to agricultural sources, some industrial processes (nylon production and nitric acid production) also emit $N_2O$. It is used in rocket engines,

as an aerosol spray propellant, and in race cars. Very small quantities of $N_2O$ may be formed during fuel combustion through the reaction of nitrogen and oxygen.

- ***Chlorofluorocarbons (CFCs)*** are gases formed synthetically by replacing all hydrogen atoms in methane or ethane with chlorine and/or fluorine atoms. CFCs were first synthesized in 1928 for use as refrigerants, aerosol propellants, and cleaning solvents. CFCs are nontoxic, nonflammable, insoluble, and chemically nonreactive in the troposphere; however, because they destroy stratospheric ozone, their production was halted by the Montreal Protocol.
- ***Hydrofluorocarbons (HFCs)*** are gases consisting of hydrogen, fluorine, and carbon, and are used for refrigeration, air conditioning, foam blowing, aerosols, and fire extinguishing. HFCs are primarily used to replace ozone depleting CFCs. HFCs do not deplete the ozone layer but some have high GWPs.
- ***Sulfur Hexafluoride ($SF_6$)*** is an inorganic, colorless, odorless, non-toxic and non-flammable gas that is used as an electrical insulator in high voltage equipment that transmits and distributes electricity. $SF_6$ has a long lifespan and high GWP potency.
- ***$O_3$*** is a GHG; however, unlike the other GHGs, $O_3$ in the troposphere is relatively short-lived and, therefore, is not global in nature. According to ARB, it is difficult to make an accurate determination of the contribution of $O_3$ precursors ($NO_x$ and ROC) to global warming. Due to the nature of $O_3$ as a short-lived gas with uneven global distribution, and because this proposed Project is not anticipated to contribute a significant level of $O_3$, it is excluded from consideration from this analysis.
- ***Water Vapor*** is the most abundant and variable GHG in the atmosphere. It is not considered a pollutant and it maintains a climate necessary for life. The main source of water vapor is evaporation from the oceans (approximately 85 percent). Other sources include evaporation from other water bodies, sublimation (change from solid to gas) from ice and snow, and transpiration from plant leaves. Because this Project is not anticipated to contribute significant levels of water vapor to the environment, it is excluded from consideration in this analysis.

The primary GHGs that would be emitted during construction and operation of the TRRP and which are currently emitted from operation of the Landfill are $CO_2$, $CH_4$ and $N_2O$. The Project is not expected to have any associated use or release of HFCs, CFCs or $SF_6$. The GWP of the three primary GHGs associated with the Project are defined by the EPA in 40 CFR 98 Subpart A, Table A-1 (as modified on November 29, 2013):

- $CO_2$ – GWP of 1
- $CH_4$ – GWP of 25
- $N_2O$ – GWP of 298

Decomposition of organic waste produces $CH_4$ and $CO_2$, depending on the conditions during the decomposition. When solid waste is disposed in a landfill, the first stage is aerobic decomposition of organic waste, where $CO_2$ is formed and very little $CH_4$ is created. Within approximately one year of landfilling, anaerobic conditions are established and $CH_4$-producing bacteria decompose the waste, generating $CH_4$ and $CO_2$.

#### 3.3.3.1 International Authority

The Intergovernmental Panel on Climate Change (IPCC) is the leading body for the assessment of climate change. The IPCC is a scientific body that reviews and assesses the most recent scientific, technical, and socio-economic information produced worldwide relevant to the understanding of climate change. The scientific evidence brought up by the first IPCC Assessment Report of 1990 unveiled the importance of climate change as a topic deserving international political attention to tackle its consequences; it therefore played a decisive role in leading to the creation of the United Nations Framework Convention on Climate Change, the key international treaty to reduce global warming and cope with the consequences of climate change.

On March 21, 1994, the United States joined a number of countries around the world in signing the United Nations Framework Convention on Climate Change. Under the Convention, governments gather and share information on GHG emissions, national policies, and best practices; launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

#### 3.3.3.2 Federal Authority

On September 22, 2009, the EPA released its final GHG Reporting Rule in 40 CFR 98. The GHG Reporting Rule is a response to the fiscal year 2008 Consolidated Appropriations Act (H.R. 2764; Public Law 110-161) that required the EPA to develop "… mandatory reporting of GHGs above appropriate thresholds in all sectors of the economy." The GHG Reporting Rule applies to most entities that emit 25,000 metric tons (MT, 1,000 kilograms) $CO_2e$ or more per year. On September 30, 2011, facility owners were required to submit an annual GHG emissions report with detailed calculations of facility GHG emissions. The GHG Reporting Rule mandates recordkeeping and administrative requirements in order for the EPA to verify annual GHG emissions reports but does not regulate GHG as a pollutant. Tajiguas Landfill currently reports its annual emissions under 40 CFR 98 Subpart HH, and data are available on the EPA's website: http://ghgdata.epa.gov/ghgp/service/html/2011?id=1002634&ds=E. The methodology for this reporting was used for the baseline analysis of this report.

The CAA defines the EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. The U.S. Congress has not passed new legislation regulating the emissions of GHGs. Lacking action from the Federal government for guidance on GHG regulation and mitigation, multiple states joined together in litigation to force the EPA to regulate

GHGs. In the 2007 case of Massachusetts v. EPA, several states requested that the EPA recognize and regulate GHGs as air pollutants. The Supreme Court ruled affirmatively that the existing CAA gave the EPA the authority to regulate GHGs. On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHGs under section 202(a) of the CAA:

- Endangerment Finding: The current and projected concentrations of the six key well-mixed GHGs – $CO_2$, $CH_4$, $N_2O$, HFCs, perfluorocarbons, and $SF_6$ – in the atmosphere threaten the public health and welfare of current and future generations.
- Cause or Contribute Finding: The EPA Administrator finds that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution which threatens public health and welfare.

Subsequently, the EPA announced a proposal to adjust implementation (called "tailoring") of the CAA to facilitate inclusion of regulation for GHGs, and, in June 2010 EPA issued the GHG Tailoring Rule to regulate GHGs under the CAA. As a result, federally enforceable permits, including Title V and PSD, are required for all facilities that are major sources of GHG emissions. Currently only acquisition of a permit has been required due to specific GHG emissions threshold exceedance and no emissions limits have been established. Tajiguas Landfill has a currently issued Title V permit and is in compliance with Federal permit requirements.

#### 3.3.3.3 State Authority

In efforts to reduce and mitigate climate change impacts, State and local governments are implementing policies and initiatives aimed at reducing GHG emissions. California, one of the largest State contributors to the national GHG emission inventory, has adopted significant reduction targets and strategies. A brief history of regulations and programs geared towards mitigating and reducing detrimental climate change impacts are represented in Table 3-4.

#### 3.3.3.4 Local Authority

SBCAPCD is in the process of developing a proposal to adopt GHG thresholds of significance for stationary source projects. Upon the recommendation of the SBCAPCD's Community Advisory Council and with direction from the Board of Directors, the SBCAPCD included a discussion of GHG emissions and climate protection in the 2010 Clean Air Plan. However, the discussion of GHG emissions and climate change in the 2010 Clean Air Plan is informational and not regulatory in nature; its inclusion is not mandated by State planning requirements.

Santa Barbara County is currently developing an Energy and Climate Action Plan (ECAP). The ECAP will identify ways the County can reduce GHG emissions and implement energy-saving measures. The ECAP is being prepared to assist the County with reducing its GHG emissions consistent with State Assembly Bill 32.

**Table 3-4 California State-Wide GHG Policy Progress**

| Calendar Year | Policy | Initiative |
|---|---|---|
| 1988 | Assembly Bill (AB) 4420 | California Energy Commission (CEC) began a study of State-wide global warming impacts and developed an inventory of GHG emission sources. |
| 2000 | Senate Bill (SB) 1771 | Established California Climate Action Registry (CCAR) to allow companies, cities, and government agencies to voluntarily record GHG emissions in anticipation of early reduction credit. |
| 2004 | AB 1493 | The ARB enacted and enforced emission standards that reduced GHG emissions from automobiles. |
| 2005 | Executive Order (EO) S-3-05 | Established GHG emission reduction targets through calendar year 2050.<br>Assigned lead agencies to develop a Climate Action Plan (CAP); the CAP developed programs and strategies to meet reduction targets. |
| 2006 | SB 107 Renewable Portfolio Standard | Required investor-owned utilities to get 20 percent of electricity from renewable sources by 2010. |
| 2006 | AB 1925 | Required CEC to study and make recommendations for capturing and storing industrial carbon dioxide. |
| 2006 | SB 1368 | Required California Public Utilities Commission to develop and adopt a GHG emission performance standard for private electric utilities. |
| 2006 | AB 32 (Global Warming Solutions Act) | Established State-wide GHG emission limits, reporting requirements, and a verification procedure to monitor and enforce compliance. This legislation represents the first enforceable State-wide program in the United States to cap all GHG emissions from major industries and include penalties for non-compliance. The Climate Change Scoping Plan, established December 11, 2008, pursuant to AB 32, outlines emission reduction strategies based on regulations, market mechanisms, and other actions. AB 32 sets California's GHG emissions reduction goal at 1990 levels by 2020. |
| 2007 | EO S-01-07 | Established State-wide goal to reduce carbon intensity of transportation fuels by at least 10 percent by 2020. |

**Table 3-4 California State-Wide GHG Policy Progress**

| Calendar Year | Policy | Initiative |
|---|---|---|
| 2007 | SB 97 | Required projects subject to the California Environmental Quality Act (CEQA) to provide GHG impact analysis; tasked local air districts to help lead and develop significance thresholds and significant impact criteria. |
| 2008 | California Air Pollution Control Officers Association (CAPCOA) CEQA & Climate Change | Guidelines for evaluating and addressing GHGs from projects subject to CEQA |
| 2008 | ARB Interim Significance Thresholds | ARB developed and proposed recommended approaches for significance thresholds for industrial, commercial and residential projects. |
| 2008 | SB 375 | Established regional targets for reducing GHG emissions from passenger vehicles. |
| 2009 | CAPCOA Model Policies for GHGs in General Plans | A resource for local government to incorporate General Plan policies to reduce GHG emissions |
| 2010 | 17 CCR Section 95100 - 95157 | Established mandatory GHG reporting, verification, and other requirements for operators of certain facilities that directly emit GHG (such as electric power generating entities) |
| 2010 | CEQA Guidelines | In 2009 the California Natural Resources Agency amended guidelines requiring the consideration of GHGs under CEQA. The amendments established that lead agencies must “make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate, or estimate the amount of GHG emissions resulting from a project” (Section 15064.4). The lead agency is also required to consider if the proposed project exceeds a threshold of significance. The guidelines became effective in 2010. |
| 2010 | CAPCOA Quantifying GHG Mitigation Measures | A resource for local government to assess emission reductions from GHG mitigation measures |

The ECAP will:

- Reduce the County's greenhouse gas emissions;
- Increase the community's resilience to the effects of climate change;
- Allow for programmatic mitigation of GHG emissions as required under CEQA;
- Identify energy efficiency goals and targets;
- Create an energy efficiency strategy to meet the County's energy reduction goals; and
- Implement programs to comply with the State of California's GHG reduction and long-term energy efficiency goals.

A Draft ECAP, consisting of summary information, has been prepared (County of Santa Barbara, 2013a). The summary information includes a 2007 GHG emissions inventory for unincorporated Santa Barbara County, a "business-as-usual" GHG emissions forecast for Santa Barbara County for 2007 through 2035, potential GHG emission reduction measures and five GHG emission reduction target options. The emission reduction measures are categorized by:

- Land Use Design;
- Transportation;
- Built Environment;
- Renewable Energy;
- Industrial Energy Efficiency;
- Waste Reduction;
- Agriculture;
- Water Efficiency;
- Sustainability Communities Strategy; and
- Community Choice Aggregation.

At the March 12, 2013 Santa Barbara County Board of Supervisors hearing, the Board of Supervisors endorsed a 15 percent GHG reduction target and implementation mechanisms included in Option 4 of the ECAP Summary Information. GHG emission reduction measures that would be implemented under Option 4 that are potentially relevant for the TRRP include waste reduction, increased recycling opportunities, construction and demolition waste recycling and landfill disposal reductions.

**An EIR was prepared to assess the potential impacts of the proposed ECAP (PMC 2015). At the May 19, 2015 hearing, the Santa Barbara County Board of Supervisors approved the Final EIR for the ECAP and passed a resolution to adopt the ECAP and amend the County's Energy Element. Also at the May 19, 2015 hearing, the Board of Supervisors approved a resolution amending Santa Barbara County's *Environmental Thresholds and Guidelines Manual* by adding a threshold of significance to guide the County's environmental analysis of greenhouse gas emissions from industrial stationary sources of a project subject to the CEQA. The Board adopted, a 1,000 MT $CO_2$e/year bright-line threshold and the County's *Environmental Thresholds and Guidelines Manual* was subsequently revised in July 2015 to reflect the new GHG significance threshold.**

### 3.3.4 Odors

Odors associated with landfills and composting are not the result of a single "smell". Compost odor is a "cocktail" of chemical species emitted from composting processes. The major odor-causing compounds in composting are sulfur-, nitrogen-, and carbon-based. The primary odor constituents in composting are ammonia, mercaptans, dimethyl sulfide, dimethyl disulfide, hydrogen sulfide (sometimes), amines, and volatile fatty acids. These compounds can coexist and interact with each other to produce diverse characteristic odors. Many compounds formed during composting are "odorous" and are considered offensive by some individuals. These offending compounds are either present in the greatest quantities, detectable at low concentrations, or have the strongest odor intensity or unpleasant hedonic tone. The quality of the odor changes as organic materials pass through different stages of decomposition.

Different composting feed stocks have different odor characteristics or profiles. Biosolids compost releases sulfur and nitrogen compounds while green waste releases volatile fatty acid, ketones, terpenes and aldehydes. Aerobic composting of green wastes produces aldehydes, alcohols, ketones, volatile fatty acids, terpenes and ammonia compounds that are associated with compost odors. Therefore, it is expected that the odor components and their concentrations emitted from the TRRP might change from week to week depending on the material being received by the facility.

#### 3.3.4.1 Federal Authority

There are no Federal regulations for odors applicable to this Project.

#### 3.3.4.2 State Authority

Section 41700 of the California Health and Safety Code allows air districts to adopt rules or regulations to protect the public from nuisance odor violations:

41700 (a) Except as otherwise provided in Section 41705, a person shall not discharge from any source whatsoever quantities of air contaminants or other material that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or that endanger the comfort, repose, health, or safety of any of those persons or the public, or that cause, or have a natural tendency to cause, injury or damage to business or property.

41700 (b) (1) A district may adopt a rule or regulation, consistent with protecting the public's comfort, repose, health, and safety, and not causing injury, detriment, nuisance, or annoyance, that ensures district staff and resources are not used to investigate complaints determined to be repeated and unsubstantiated, alleging a nuisance odor violation of subdivision (a).

### 3.3.4.3 Local Authority

The Santa Barbara County *Environmental Thresholds and Guidelines Manual* (2008) requires that environmental documents address odor impacts if a project has the potential to cause an odor or other long-term air quality nuisance problem impacting a considerable number of people.

As previously discussed, SBCAPCD is the agency responsible for regulating stationary sources of air pollution in the County. The SBCAPCD California Environmental Quality Act (CEQA) guidelines (SBCAPCD, 2011a) state the following with regard to odors:

- "If a project has the potential to cause an odor or other long-term air quality nuisance problem impacting a considerable number of people, the environmental document (Initial Study, Negative Declaration or EIR) should describe the history of complaints from pre-existing conditions, the number of people affected and other relevant information so that the impacts can be mitigated where feasible."
- "New projects that have a high probability of emitting objectionable odors or new developments that may be affected because of their location downwind should be identified early in the Initial Study. This may prevent nuisance problems after the project is built. Odor issues can sometimes be resolved by changing the location of the equipment or the process."
- "Nuisance impacts need not be quantified at the initial study stage and may be analyzed qualitatively on a case by case basis."

The following are the SBCAPCD rules that apply to the discharge of odors:

- **Rule 303 – Nuisance**. This rule restricts emissions that would cause nuisance or injury to people or property (identical to California Health and Safety Code 41700). This rules states that a person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.
- **Rule 310 – Odorous Organic Sulfides**. This rule prohibits the discharge of excessive amounts of hydrogen sulfide and organic sulfides into the atmosphere from any single source or any number of sources within one contiguous property. SBCAPCD provides quantitative thresholds as the ground level concentrations of hydrogen sulfide at or beyond the property line which are 0.06 ppm for an averaging time of 3 minutes and 0.03 ppm for an averaging time of 1 hour.

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# 4.0 Thresholds of Significance

Significance thresholds for air emissions are derived from the State CEQA Guidelines (California Office of Planning and Research, 2011), the Santa Barbara County *Environmental Thresholds and Guidelines Manual* (2008), and SBCAPCD rules and regulations. Significance thresholds for greenhouse gas emissions and odors are based on thresholds in use by other applicable agencies.

## 4.1 Criteria Pollutants

### 4.1.1 Short-term/Construction Emissions Thresholds

Short-term air quality impacts generally occur during project construction. CEQA requires a discussion of short-term impacts of a project in the environmental document. However, the County generally considers temporary construction emissions insignificant and quantitative thresholds for construction emissions have not been established.

Under SBCAPCD Rule 202 D.16, if the combined emissions from all construction equipment used to construct a stationary source which requires an Authority to Construct permit have the potential to exceed 25 tons of any pollutant, except carbon monoxide, in a 12-month period, the owner of the stationary source shall provide offsets under the provisions of Rule 804 and shall demonstrate that no ambient air quality standard will be violated.

### 4.1.2 Long-term/Operational Emissions Thresholds

Long-term air quality impacts occur during project operation and include emissions from any equipment or process used in the project (e.g., residential water heaters, engines, boilers, and operations using paints or solvents) and motor vehicle emissions associated with the project. These emissions must be summed in order to determine the significance of the project's long-term impact on air quality.

A significant adverse air quality impact may occur when a project, individually or cumulatively, triggers any one of the following:

- Interferes with progress toward the attainment of the ozone standard by releasing emissions which equal or exceed the established long-term quantitative thresholds for $NO_x$ and ROC;
- Emits (from all sources, except registered portable equipment) greater than the daily trigger for offsets in the SBCAPCD New Source Review Rule (55 pounds per day for $NO_x$ or ROC; 80 pounds per day for PM10);
- Emits greater than 25 pounds per day of $NO_x$ or ROC (motor vehicle trips only);

- Equals or exceeds the State or Federal ambient air quality standards for any criteria pollutant (as determined by modeling);
- Causes or contributes to a violation of a State or Federal air quality standard (except ozone); and
- Is inconsistent with adopted State and Federal Air Quality Plans (e.g., the 2010 Clean Air Plan).

## 4.2 Toxic Air Contaminants

A significant impact related to toxic air contaminants may occur when a project, individually or cumulatively, exceeds the SBCAPCD health risk significance thresholds (10 excess cancer cases per million and/or an acute or chronic hazard index of 1.0 or greater) at a location of an existing or planned residence or work place. Additionally, an acute hazard index of 1.0 or greater at any off-site location that is reasonably accessible to the public is also considered a significant impact.

## 4.3 Greenhouse Gases

~~Santa Barbara County has not adopted thresholds of significance for GHG emissions and therefore must make a determination on a case-by-case basis.~~

There is currently much debate about appropriate threshold levels of significance with suggestions associated with either “bright line” thresholds or “business as usual” (BAU) thresholds. With few exceptions, bright line thresholds offer more stringent and rigid constraints on proposed projects, while the details of BAU thresholds currently leave room for a large range of interpretation. The few exceptions to the bright line threshold include proposed facilities that will, in absolute terms, reduce GHG emissions. The California Air Pollution Control Officers Association (CAPCOA) has indicated that waste diversion programs from landfills offer GHG emissions reduction opportunities (CAPCOA, 2010). To this end, the proposed threshold for this project should be bright line as this methodology is stringent and will demonstrate the overall benefits of the project.

~~A 10,000 MT $CO_2$e per year threshold has been adopted by three other air districts including the South Coast Air Quality Management District (SCAQMD).~~ **As noted in Section 3.3.3.4, the Santa Barbara County Board of Supervisors adopted a threshold of significance for GHG emissions of 1,000 MT $CO_2$e/year at the May 19, 2015 hearing.** The GHG emissions associated with the Project will, when amortized, remain below this threshold when compared to existing conditions because it will provide an overall reduction of GHG emissions over the life of the Project.

## 4.4 Odors

The County of Santa Barbara *Environmental Thresholds and Guidelines Manual* (2008) does not include a quantitative odor threshold. The Manual specifies those data required for an odor assessment if a project has the potential to cause a nuisance odor impacting a large number of people. The required information includes a history of complaints from pre-existing conditions and the number of people affected. The analysis is not required to quantify nuisance impacts at the initial study stage, and the impact may be analyzed qualitatively on a case by case basis. The SBCAPCD also does not have a specific odor threshold for use in evaluating project under CEQA. However, given the statewide concerns over odor impacts from composting operations and the potential for odors from the processing of municipal solid waste, and based on concerns regarding odor emissions from SBCAPCD staff, further research was conducted as a part of this air quality analysis to identify a potential quantitative guidance standard that could be used to assist in the analysis of potential nuisance odor impacts from the Project.

The Ventura County APCD's CEQA guidelines (VCAPCD, 2003) for odors provide quantitative thresholds on the number of complaints for a project locating near an existing source of odorous emissions; the guidelines also provide a 1-mile screening distance between odorous land uses and receptors for landfill, solid waste transfer and composting facilities. A review of odor guidelines and regulations in other California jurisdictions shows that off-site standards or guidelines on odor from wastewater treatment plants are available (but no off-site standards for odor from MSW operation). An off-site odor concentration of 5 odor units per cubic meter ($OU/m^3$) has been adopted by the ARB, Bay Area Air Quality Management District (BAAQMD), and City of San Diego (RWDI, 2005). An odor unit is defined as the amount of an odorous substance, mixed in one cubic meter ($m^3$) of air, which can be perceived as a smell by 50 percent of people in the area. In North America, 35 percent of all jurisdictions had an odor standard/guideline between 4 and 6.9 $OU/m^3$ (RWDI, 2005) for wastewater treatment plants or composting facilities. A technical report prepared for the U.K. Environment Agency found that 'annoyance' typically occurs between 5 and 10 $OU/m^3$ (van Harreveld, *et al.,* 2002). Based on this research, an odor concentration of 5 $OU/m^3$ was selected as a guideline to determine if off-site odors can be detected.

Although an odor may be detected, the frequency of occurrences and the number of locations where an odor might be detected are also considerations. To help quantify if detectable odors would result in a nuisance impact, a frequency analysis was also applied. Typically if an odor can be detected more than two percent of the time, a nuisance impact may occur (Bull *et al*., 2014).

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# 5.0 Methodologies for Evaluating Air Quality and Greenhouse Gas Impacts

The methodologies presented in this technical report are based on the following guidance documents: Santa Barbara County's *Environmental Thresholds and Guidelines Manual* (2008**,** **including recent updates with respect to GHG emissions**) and *Guidelines for Implementation of the California Environmental Quality Act of 1970* (2010), SBCAPCD's *Scope and Content of Air Quality Sections in Environmental Documents* (2011a) and *Modeling Guidelines for Health Risk Assessments* (APCD Form -15i) (2014a), and EPA's GAQM (2008). The methodologies utilized to evaluate air quality and GHG impacts from the proposed Project include emissions quantification of criteria pollutants, TACs, GHGs and odors generated during short-term, temporary construction activities, and long-term operations. Methods and models used to quantify and evaluate air quality and GHG impacts are described in the following subsections.

## 5.1 Criteria Pollutant Emissions

### 5.1.1 Construction Emissions

Construction of the Project would generate criteria pollutant emissions similar to those associated with any industrial construction project. On-site emissions would arise from construction equipment and motor vehicle exhaust. On-site fugitive dust emissions would also be generated by vehicles traveling on unpaved surfaces and during site preparation earthwork. Fugitive ROC emissions would be generated during architectural coating and asphaltic paving. Off-site emissions would occur from construction worker vehicles driving to and from the work site, as well as material and equipment delivery trucks. The construction-related emissions are transient in nature. Details of the construction emission calculations are in Attachment B.

#### 5.1.1.1 Construction Equipment

The combustion of fuel to provide power for the operation of the equipment used in the construction activities would result in the generation of criteria pollutant emissions: CO, ROC, $NO_x$, sulfur oxides ($SO_x$), PM10 and PM2.5. Daily emissions from construction equipment were calculated by multiplying emission factors, in pounds per hour, calculated using ARB's OFFROAD2007 model (ARB, 2006), by daily construction equipment operating hours. The OFFROAD2007 model estimates emissions by type of equipment and engine horsepower ranges. The model also estimates daily operating hours and fuel consumption by type of equipment and engine horsepower ranges. The emission factors by type of equipment and horsepower range were calculated by dividing daily emissions in Santa Barbara County for 2015, the year that construction is anticipated to begin, by the daily operating hours in Santa Barbara County.

The vendor's construction contractor provided estimates of the types, horsepower ratings, numbers and daily operating hours by month for the construction equipment anticipated to be used during construction of the Project. These estimates are provided in Attachment A.

#### 5.1.1.2 Motor Vehicles

The combustion of fuel in motor vehicles would generate CO, ROC, $NO_x$, $SO_x$, PM10 and PM2.5 emissions. Daily exhaust emissions from on-site and off-site motor vehicle travel were calculated by multiplying emission factors, in grams per mile, calculated using ARB's EMFAC2011 model (ARB, 2013a) by daily on-site and off-site vehicle-miles-traveled (VMT). The EMFAC 2011 model estimates daily emissions by type of vehicle and type of fuel. The model also estimates daily VMT by type of vehicle and type of fuel. The emission factors by type of vehicle and fuel were calculated by dividing daily emissions in Santa Barbara County for 2015 by daily VMT in Santa Barbara County.

The vendor's construction contractor provided estimates of the types, number and daily on-site VMT by month for motor vehicles anticipated to be used on-site, which were used to calculate daily on-site motor vehicle exhaust emissions by month. Off-site motor vehicle travel was estimated from the construction contractor's estimates of the types and number of vehicles that would be used, including construction worker commuting vehicles, and estimates of the daily off-site distances that each vehicle would travel. The estimates for motor vehicle usage and travel distances are provided in Attachment A.

#### 5.1.1.3 Fugitive Particulate Matter from Off-Road Vehicle Travel

Vehicles traveling on unpaved surfaces on-site would generate fugitive PM10 and PM2.5 emissions. Daily on-site fugitive PM10 and PM2.5 emissions from vehicles traveling on unpaved surfaces were estimated by multiplying emission factors, in pounds per VMT, by daily VMT by type of vehicle. The emission factors were calculated using Equation 1a from Section 13.2.2, Unpaved Roads, of EPA's Compilation of Air Pollutant Emissions Factors (AP-42, EPA, 2006a). This equation uses surface silt content and vehicle weight. The silt content used was the average value for landfill roads from Section 13.2.2 of AP-42, and the vehicle weights were estimated from vehicle specifications. A control efficiency of 79 percent was applied to the uncontrolled emissions based on requiring the construction contractor to apply water three times per day and to limit vehicle speeds on unpaved roads and other unpaved surfaces to 15 miles per hour. Applying water three times per day is estimated to reduce uncontrolled emissions by 50 percent, and limiting vehicle speeds to 15 miles per hour is estimated to reduce emissions by 57 percent (Western Regional Air Partnership (WRAP), 2006). The resulting combined control efficiency is estimated as [1 - (1 - 50/100) x (1 - 57/100)] = 79 percent. The daily on-site VMT by type of vehicle during each construction month that was used to calculate on-site motor vehicle exhaust emissions was also used to calculate fugitive PM10 and PM2.5 emissions, based on the assumption that all on-site motor vehicle travel during construction would be on unpaved surfaces.

### 5.1.1.4 Fugitive Particulate Matter from On-Road Vehicles

Vehicles traveling on paved roads off-site would generate fugitive PM10 and PM2.5 emissions. Daily fugitive PM10 and PM2.5 emissions from vehicles traveling on paved roads were estimated by multiplying emission factors, in pounds per VMT, by daily VMT by type of vehicle. The emission factors were calculated using Equation 1 from Section 13.2.1 of AP-42 (EPA, 2011). This equation uses surface silt loading and average vehicle weight. The silt loading and average vehicle weight were default values from the California Emissions Estimator Model (CalEEMod), version 2011.1.1 (Environ, 2011). The daily off-site VMT by type of vehicle during each construction month that was used to calculate off-site motor vehicle exhaust emissions was also used to calculate off-site fugitive PM10 and PM2.5 emissions.

### 5.1.1.5 Fugitive Particulate Matter Emissions from Earthwork Activities

Earthwork activities, such as excavation, filling, bulldozing, grading and scraping during construction of the proposed Project would generate fugitive PM10 and PM2.5 emissions.

Daily emissions from grading and scraping were estimated by multiplying emission factors, in pounds per vehicles miles traveled (VMT) calculated using an equation from Table 11.9-1 in Section 11.9 of AP-42 (EPA, 1998) by daily VMT for graders and scrapers. The default grading and scraping speed in Section 11.9 was used in the emission factor equation. A control efficiency of 61 percent was applied to the uncontrolled emission factors, based on watering every three hours (WRAP, 2006). The vendor's construction contractor provided estimates of the daily number and miles traveled by graders and scrapers during each construction month.

Daily emissions from bulldozing were estimated by multiplying emission factors, in pounds per hour, calculated using an equation from Table 11.9-1 in Section 11.9, Western Surface Coal Mining, of AP-42 (EPA, 1998) by daily bulldozer operating hours. The silt content used in the equations was the average value for landfill roads from Section 13.2.2 of AP-42 (EPA, 2006a), and the moisture content used was the default value for overburden from Section 11.9 of AP-42. A control efficiency of 61 percent was applied to the uncontrolled emission factors, based requiring the construction contractor to apply water every three hours (WRAP, 2006). The vendor's construction contractor provided estimates of the daily number and operating hours for bulldozers during each construction month. These estimates are provided in Attachment A.

Daily emissions from soil dropping were estimated by multiplying emission factors, in pounds per cubic yard, calculated using Equation 1 in Section 13.2.4, Aggregate Handling and Storage Piles, of AP-42 (EPA, 2006b) by daily cubic yards of cut and fill. The mean wind speed from Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project (County of Santa Barbara, 2001) and the default moisture content for landfill cover from AP-42 Section 13.2.4 were used in the equation. The vendor's construction contractor provided estimates of daily cut and fill by construction month. These estimates are provided in Attachment A.

#### 5.1.1.6 Fugitive ROC Emissions from Architectural Coating

The application of architectural coatings, such as primers and top coats, would generate fugitive ROC emissions when the ROC in the coatings evaporates. Daily ROC emissions from architectural coating were estimated by multiplying the ROC content of the coatings, in pounds per gallon, by the daily quantity of coatings applied, in gallons. The vendor's construction contractor provided estimates of the average ROC content of coatings and the daily quantity of coatings anticipated to be applied by construction month. These estimates are provided in Attachment A.

#### 5.1.1.7 Fugitive ROC Emissions from Asphaltic Paving

Asphaltic paving would generate fugitive ROC emissions when the asphaltic paving material cures. Daily ROC emissions from asphaltic paving were estimated by multiplying the default emission factor, in pounds per acre, from the CalEEMod model (Environ, 2011) by the area paved per day. The vendor's construction contractor provided estimates of the daily area that would be paved for each construction month. These estimates are provided in Attachment A.

#### 5.1.1.8 Estimating 12-Month Total Emissions

Total emissions of each criteria pollutant over consecutive 12-month periods were estimated by first estimating total emissions for each construction month. The monthly total emissions were estimated for all sources except architectural coating and asphalt paving by multiplying the daily emissions by 22 working days per month. Monthly total ROC emissions from architectural coating and asphalt paving were estimated by multiplying daily emissions by the anticipated number of days per month that the activity would occur as estimated by the vendor's construction contractor.

Total emissions over the 12-month period starting with each construction month were estimated by summing emissions for the month and the 11 following months. This was done for each construction month, and the highest total over 12 consecutive months was identified.

### 5.1.2 Operation Emissions

Criteria pollutant emissions would be generated from the following sources during operation of the proposed Project:

- Exhaust from two Jenbacher/General Electric (GE) combined heat and power (CHP) engines combusting biogas produced in the anaerobic digesters;
- **Natural gas or propane co-firing with biogas in the combined heat and power (CHP) engines. The CHP engines will be fueled with biogas or with a mixture of biogas and natural gas as follows:**
    - **During normal operation with both engines operating, the engines will be fueled with a mixture of approximately 86.5 percent biogas and 13.5 percent natural gas.**

  - **<u>When only one engine is operating, it will only be fueled with biogas.</u>**
  - **<u>During engine start-up and SCR catalyst burn-in, the engine will only be fueled with natural gas, and only one engine will start up at a time.</u>**
- **<u>Exhaust from Rolling Bed Dryer (RBD) which will dry paper processed by the Materials Recovery Facility (MRF) with heat for the RBD operation provided by the CHP engines' exhaust has been added. Both CHP engines will exhaust completely through the RBD when it is operating. The RBD is anticipated to operate 16 hours per day, six days per week.</u>**
- Exhaust from a flare combusting biogas produced in the anaerobic digesters when the gas in a digester is purged through the flare prior to opening it to remove the digestate;
- Exhaust from a flare combusting biogas produced in the anaerobic digesters when one or both CHP engine(s) is/are offline for maintenance or other reasons;
- **<u>Exhaust from a diesel-fueled standby emergency generator;</u>**
- Fugitive ROC emissions from the diesel fuel storage tank for the MRF and AD Facility equipment **<u>and for the standby emergency generator</u>**;
- Exhaust from off-road equipment used in the MRF and AD Facility (material handler, front-end loaders, forklifts and a sweeper) and equipment used in the composting process (screen machine and windrow turner);
- Exhaust from motor vehicles operating on-site and off-site;
- Fugitive particulate matter from motor vehicles operating on-site;
- Fugitive particulate matter from motor vehicles operating off-site;
- Fugitive particulate matter from handling various materials, including MSW, digestate from the anaerobic digesters, residual materials from the MRF and digestate, and compost;
- Fugitive particulate matter from digestate and compost screening;
- Fugitive particulate matter emissions from chipping and grinding;
- Fugitive ROC from the Tipping Area Floor, MRF and AD operations which exhaust through the respective biofilters; and
- Fugitive ROC from the composting windrows.

Details of the operation emission calculations are provided in Attachment C.

#### 5.1.2.1 Emissions from CHP Engines

The CHP engines will be Jenbacher/GE Model JMS416Vb82, with an engine horsepower rating of 1,573 horsepower.

Maximum hourly CO, ROC, $NO_x$, PM10 and PM2.5 exhaust emissions from the CHP engines were estimated by multiplying emission factors, in grams per brake-horsepower-hour (g/bhp-hr), by the engine horsepower ratings. The engines will be equipped with selective catalytic reduction (SCR) systems to control $NO_x$ emissions and oxidation catalysts to control CO and ROC emissions. The CO, ROC and $NO_x$ emission factors were provided by the control system manufacturer and the filterable particulate matter emission factor was estimated by Bekon Energy Technologies (see Attachment A). The condensable particulate matter emission factor was from Table 3.2-2 in Section 3.2, Natural Gas Fired Reciprocating Internal Combustion Engines, of AP-42 (EPA, 2000). It was assumed that both the filterable and condensable PM10 and PM2.5 emission factors would be the same as the particulate matter emission factor.

**The CHP engines will be fueled with biogas or with a mixture of biogas and natural gas/propane as follows:**

- **During normal operation with both engines operating, the engines will be fueled with a mixture of approximately 86.5 percent biogas and 13.5 percent natural gas/propane.**
- **When only one engine is operating, it will only be fueled with biogas.**
- **During engine start-up and SCR catalyst burn-in, the engine will only be fueled with natural gas/propane, and only one engine will start up at a time.**

**Propane and natural gas have similar emission factors. Combustion of propane in the engines as a startup/assisting fuel in place of natural gas will have minimal effect on emissions. Startup ROC is assumed to increase for propane combustion, as the effectiveness of the oxidation catalyst will be minimized before the engine achieves a higher sustained exhaust temperature. Sulfur content of the propane is based on typical propane contents using HD-5 sulfur content limitations. Emissions from CO, ROC (non-startup), $NO_x$, PM10, and PM2.5 are expected to be similar to natural gas.**

When an engine is brought online after being shut-down for maintenance or other reasons, approximately 30 minutes without any removal of CO, ROC or $NO_x$ would occur before the emission control system reaches operating temperature. Emissions during start-up periods were estimated by multiplying uncontrolled emission factors by the engine horsepower ratings. The system vendor estimates that a maximum of 36 start-ups per year would occur for each CHP engine.

The SCR system vendor estimates that the SCR system catalyst would need to be replaced approximately once every two years. The catalyst is coated with a protective material to avoid damage in shipment. Approximately 120 hours of operation at full engine load is required to burn off the coating. During this period, the control system is anticipated to operate at approximately 50 percent of normal control efficiency, according to the control system vendor.

Hourly $SO_2$ emissions were estimated from the anticipated sulfur content of the biogas, the hourly biogas consumption, provided by the engine manufacturer, and the assumption that all sulfur in the biogas would be converted to $SO_2$. The biogas would be treated with carbon filters that would reduce the sulfur concentration prior to use by the engines. The vendor's technology provider estimated that the carbon filters would reduce the biogas sulfur content from approximately 200 parts per million by volume (ppmv) to approximately 20 ppmv.

Maximum daily emissions were estimated based on one engine operating at 100 percent load for 24 hours per day and the other engine operating at 100 percent load for 30 minutes during a start-up and at 100 percent load for 23.5 hours with normal emission control system operation. Annual emissions for each engine were estimated by multiplying estimated hourly emissions by estimated operating hours per year for start-ups (36 startups/year x 0.5 hours/start-up = 18 hours/year), catalyst burn-in (120 hours/year) and normal operations (8,760 hours/year – 18 hours for start-ups – 120 hours/year for catalyst burn-in – 438 hours/year offline for maintenance = 8,184 hours/year).

#### 5.1.2.2 Emissions from Rolling Bed Dryer

**The emissions calculated for the CHP engines would exhaust through the RBD stack during normal operations up to 16 hours per day, six days per week in order to dry paper recovered from waste in the MRF building. The RBD is equipped with a dust collector to capture PM10/PM2.5.**

#### 5.1.2.3 Emissions from Flare

The flare manufacturer and model have not yet been selected. However, the vendor has indicated that emissions from the flare would be approximately the same as from a John Zink Model ZTOF flare.

Maximum hourly CO, ROC, $NO_x$, PM10 and PM2.5 emissions from the flare were estimated by multiplying emission factors, in pounds per million British thermal units (MMBtu), by the flare heat input, in MMBtu per hour. The CO, $NO_x$ and particulate matter emission factors were provided by John Zink and the ROC emission factor was the limit specified in SPCAPCD Rule 359.

The flare would be operated when the gas in one of the 16 anaerobic digester vessels is purged through the flare prior to opening the vessel to remove the digestate. The exhaust from the two CHP engines would be directed through the vessel during the purging process. However, the flow from the CHP engines' exhaust would not result in additional emissions from the flare combustion because the biogas entering the engines would already have been combusted. The vendor estimates that the purging process is anticipated to require one hour and to occur 278 times per year. Therefore, the hourly heat input was assumed to be one-sixteenth of the heat input for the two CHP engines when operating at 100 percent load.

The flare would also be operated when one ~~or both~~ CHP engine~~(s)~~ is~~/are~~ offline for maintenance or other reasons. The hourly heat input was assumed to be equal to the heat input for ~~either~~ one ~~or two~~ CHP engine~~s~~ when operating at 100 percent load. The vendor estimates that each CHP engine would be offline for five percent of the time during a year, which is equal to 438 hours per year. **Based on the experience of the anaerobic digestion system vendor (Bekon) with historical operations of twenty similar systems in Europe, both CHP engines have never been offline at the same time.**

Hourly $SO_2$ emissions were estimated from the anticipated sulfur content of the biogas, the hourly biogas consumption and the assumption that all sulfur in the biogas would be converted to $SO_2$. The biogas would not be treated prior to combustion in the flare. The vendor's technology provider estimated that the biogas sulfur content would be approximately 200 ppmv. The biogas consumption when an anaerobic digester vessel is purged was assumed to be one-sixteenth of the biogas consumption by the two CHP engines operating at 100 percent load. The biogas consumption when one or both CHP engine(s) is/are offline was assumed to be equal to the biogas consumption when one or both of the CHP engines operating at 100 percent load.

Maximum daily emissions were estimated based on the flare operating for one hour per day between the hours of 8 a.m. and 4 p.m. for anaerobic digester purging plus 24 hour per day with both CHP engines offline. It should be noted that the assumption that both CHP engines would be offline at the same time is a conservative assumption, because only one engine would be taken offline at a time for maintenance. Annual emissions were estimated by the sum of estimated hourly emissions during anaerobic digester purging multiplied by 278 operating hours per year and hourly emissions with two engines offline multiplied by 438 hours per year.

#### 5.1.2.4 Emissions from Fuel Storage Tank

The Project will include one 10,000 gallon aboveground diesel fuel storage tank to provide fuel for the equipment operated in the MRF and the AD Facility. The vendor's engineering staff estimated the throughput for the MRF and AD Facility equipment fuel storage tank to be 240,000 gallons per year. Annual ROC emissions from the storage tank were calculated using the EPA TANKS program, version 4.0.9d (EPA, 2006c). Daily ROC emissions from the storage tank were calculated by dividing annual emissions by 365 days per year.

#### 5.1.2.5 Emissions from 150-kW Emergency Generator

**The Project will include one 150-kW diesel emergency generator to provide emergency power for the MRF building in the event of a power outage. The standby emergency generator will be a diesel-fueled Caterpillar Model D150-8 150-kW with an engine horsepower rating of 230 horsepower (hp).**

**Maximum hourly CO, ROC, $NO_x$, PM10 and PM2.5 emissions from the generator were estimated by multiplying emission factors, in g/bhp-hr, by the engine horsepower rating**

**and the amount of time during an hour that the engine is anticipated to be operated during testing and maintenance. The generator would be purchased after 2015 and would meet Tier 4 emission standards. Therefore, the emission factors were assumed to be equal to the Tier 4 standards and the PM10 and PM2.5 emission factors were assumed to equal the particulate matter emission standards (Title 13, California Code of Regulations, Section 2423). Hourly $SO_2$ emissions were estimated from the limit for sulfur in diesel fuel of 15 parts-per-million by weight (ppmw), the hourly fuel consumption by the engine at 100 percent load as specified by the manufacturer and the amount of time during an hour that the engine is anticipated to be operated during testing and maintenance. The vendor's engineering staff estimated that the generator would be operated for 30 minutes once per week for testing and maintenance. Therefore, daily emissions would be the same as hourly emissions. Annual emissions were estimated by multiplying daily emissions by 52 days of operation for testing and maintenance per year.**

#### 5.1.2.6 Emissions from Sub-skid Diesel Fuel Storage Tank

**The Project will include one sub-skid diesel fuel storage tank for use with the emergency generator. The throughput of this tank is estimated to be 1,005 gallons per year. Annual ROC emissions from each storage tank were calculated using the EPA TANKS program, version 4.0.9d (EPA, 2006c). Daily ROC emissions from each storage tank were calculated by dividing annual emissions by 365 days per year.**

#### 5.1.2.7 Emissions from Off-Road Equipment

Off-road equipment on the Project site during operation will be located within three areas of the site: the MRF building, the AD Facility building and the Composting Area.

The following is a list of equipment within each of these areas:

MRF Building

- **Two Caterpillar 980 M Loaders - 386 hp;**
- **One Caterpillar 938 K Loader - 169 hp;**
- **Three Caterpillar 2P-6000 Forklifts - 61 hp;**
- ~~Two Volvo L110G Loaders – 260 hp;~~
- ~~One Volvo L90G Loader – 173 hp;~~
- ~~One Volvo L20F Loader – 56 hp;~~
- ~~Three Toyota 6,000 lb Forklifts – 57 hp;~~
- One Tennant 800 Sweeper – **65** ~~63~~ hp; and
- One Caterpillar M322D Material Handler – 173 hp.

Anaerobic Digestion Facility Building

- **Two Caterpillar 938 M Loaders - 169 hp.**
- ~~One Volvo L110G Loader – 260 hp.~~

**MRF and AD Facility Perimeter Road**

- **One Tennant M30 Scrubber-Sweeper - 41 hp.**

Composting Area

- **One Caterpillar 938 K Loader - 169 hp; and**
- **One Vermeer CT1010 TX Windrow Turner - 215 hp.**

**Note that compost screening will be performed with electrically powered equipment instead of diesel-fueled equipment.**

- ~~One Volvo L90G Loader – 173 hp;~~
- ~~One Compost Screen Machine 612T – 84 hp; and~~
- ~~One Vermeer CT1010 TX Windrow Turner – 215 hp.~~

Hourly CO, ROC, $NO_x$, PM10 and PM2.5 exhaust emissions from each piece of equipment were estimated by multiplying emission factors, in g/bhp-hr, by the engine load factor and horsepower rating. The equipment would be purchased after 2015, when new off-road equipment engines will be required to meet EPA Tier 4 emission standards. Therefore, the emission factors were assumed to be equal to the Tier 4 standards and the PM10 and PM2.5 emission factors were assumed to equal the particulate matter emission standards (Title 13, California Code of Regulations, Section 2423). Load factors for the equipment were from ARB's OFFROAD2011 model (ARB, 2011a). Air in the MRF and AD Facility buildings will be exhausted through baghouse particulate matter filtration systems located ahead of the biofilters with particulate matter control efficiencies of 99.9 percent, based on manufacturer's specifications. Therefore, a control efficiency of 99.9 percent was applied to PM10 and PM2.5 emissions from equipment operating in the MRF and AD Facility buildings. Hourly $SO_2$ emissions were estimated from the sulfur content of diesel fuel and estimates of hourly fuel use provided by the vendor's engineering staff.

Daily emissions were estimated by multiplying hourly emissions by the number of hours per day that each piece of equipment would operate, as estimated by the vendor's engineering staff. Annual emissions were estimated by multiplying daily emissions by the anticipated annual operating days estimated by the vendor's engineering staff. These estimates are provided in Attachment A.

#### 5.1.2.8 Motor Vehicle Exhaust Emissions

The following motor vehicles would be operated on-site:

- Natural-gas fueled Freightliner tractors and trailers used to transport finished compost off-site;
- Diesel-fueled tractor/trailers used to import CSSR for the optional CSSR element; and
- Two diesel-fueled Ford F350 XL or equivalent trucks with a utility trailer.

Additionally, tractor/trailers would be used to transport MRF and AD residue to the Landfill for disposal and to transport AD digestate to the composting area. However, these trips would replace trips that are currently made to transport MSW to the Landfill. Therefore, emissions associated with these trips would not increase emissions from current Landfill operations and were not included in the Project emission calculations.

The following motor vehicles would be operated off-site:

- Natural-gas fueled Freightliner tractors and trailers used to transport finished compost off-site;
- Natural-gas fueled Freightliner tractors and trailers used to transport recyclables off-site;
- Diesel-fueled tractors and trailers used to transport CSSR from the South Coast Recycling and Transfer Station in Santa Barbara to the Tajiguas Landfill instead of to Gold Coast in Ventura, California (optional CSSR element only);
- Diesel-fueled Ford F250 XL or equivalent trucks used for general utility purposes; and
- Employee commuting vehicles.

Daily motor vehicle exhaust emissions were estimated by multiplying emission factors for each type of motor vehicle, in grams per mile (g/mile), by the daily distance traveled by each type of vehicle. The emission factors were estimated as follows:

- ROC, $NO_x$ and particulate matter emission factors for the natural-gas fueled Freightliner tractors were taken from Table D-1a of the Carl Moyer Program 2011 Guidelines (ARB, 2011b). The engines in the Freightliner tractors will be certified to meet the emission standards for 2010 and later model years. Therefore, the emission factors for alternative fueled vehicles certified to the 2010 emission standards in Table D-1a were used. PM10 and PM2.5 emission factors were assumed to be equal to the particulate matter emission factor;
- Table D-1a of the Carl Moyer Program 2011 Guidelines does not provide emission factors for CO. Therefore, the CO emission rate for 2017 model year T7 tractors traveling at 15 miles per hour, which is the anticipated on-site travel speed for the tractors, from the EMFAC2011 model (ARB, 2013a) was used for the Freightliner

tractors on-site travel. Because the Freightliner tractors will travel at various speeds off-site, the CO emission factor for Freightliner tractors off-site was estimated by dividing the total daily CO emissions from 2017 model year T7 tractors in 2017 in Santa Barbara County by the total daily VMT from these vehicles from the EMFAC2011 model.

- CO, ROC, $NO_x$, PM10 and PM2.5 emission rates for T7 tractors traveling at 15 miles per hour, which is the anticipated on-site travel speed for the tractor/trailers importing CSSR, in Santa Barbara County in 2017 from the EMFAC2011 model (ARB, 2013a) were used for the tractor/trailer on-site travel for importing CSSR.
- CO, ROC, $NO_x$, PM10 and PM2.5 emission rates for 2017 model year light heavy-duty trucks 2 traveling at 45 miles per hour, which is the anticipated on-site travel speed for the Ford F250 XL truck, from the EMFAC2011 model (ARB, 2013a) were used for the Ford F350 XL on-site travel.
- The $SO_2$ emission factor for the Freightliner tractors was estimated from the diesel-fuel equivalent fuel mileage for the tractors provided by the vendor's engineering staff, the heat contents of diesel fuel and natural gas and the sulfur content limit for pipeline natural gas.
- The $SO_2$ emission factor for the Ford F350 XL truck and the tractor/trailers was estimated from the fuel mileage for the trucks provided by the vendor and the sulfur content of diesel fuel.
- The emission factors for the diesel-fueled tractors, the Ford F250 XL trucks and the worker commuting vehicles were estimated by dividing total daily emissions by total daily VMT in 2017 in Santa Barbara County calculated with the EMFAC2011 model (ARB, 2013a). Emissions and VMT for T7 tractors, light heavy-duty trucks 1 and for light duty trucks 1 were used for the diesel-fueled tractors, the Ford F250 XL trucks and for the worker commuting vehicles, respectively.

The daily on-site and off-site VMT for the Freightliner tractors and the on-site VMT for the tractor/trailers importing CSSR were estimated by multiplying the daily number of round trips for transporting each type of material by estimates of the round-trip distance for transporting each type of material provided by the vendor. The daily number of trips for each type of material was estimated by dividing the annual quantity of each type of material to be transported by the number of days when the trips would occur. The annual quantities and number of days when trips would occur are in Attachment A.

The daily off-site VMT for the tractors and trailers transporting CSSR from the South Coast Recycling and Transfer Station to the Tajiguas Landfill instead of Gold Coast was estimated by multiplying the daily number of round trips for transporting CSSR to the Landfill by the difference between the round-trip travel distance from the South Coast Recycling and Transfer Station to Tajiguas Landfill (44 miles) and to Gold Coast (78 miles). The daily number of round trips for transporting CSSR was estimated by dividing the annual quantity of CSSR to be transported by the number of days when the trips would occur. The annual quantity and number of days when trips would occur are in Attachment A.

The daily VMT for the Ford F350 XL truck was estimated based on estimates of the daily number of trips and the round-trip distances for each trip provided by the vendor.

The daily VMT for worker commuting vehicles was derived from estimates of the daily number of one-way worker trips that are anticipated and the trip origins from the project traffic study (Associated Transportation Engineers, 2013) and estimates of the one-way travel distances provided by the vendor.

Annual motor vehicle exhaust emissions were estimated by multiplying daily exhaust emissions by the number of days per year that the vehicles are anticipated to operate.

#### 5.1.2.9 Fugitive Particulate Matter Emissions from On-site Motor Vehicles

Daily on-site fugitive PM10 and PM2.5 emissions from vehicles traveling on unpaved surfaces were estimated by multiplying emission factors, in pounds per VMT, by daily VMT by type of vehicle. The emission factors were calculated using Equation 1a from AP-42 Section 13.2.2, Unpaved Roads (EPA, 2006a). This equation uses surface silt content and vehicle weight. The silt content used was the average value for landfill roads from Section 13.2.2 of AP-42, and the vehicle weights were estimated from vehicle specifications. A control efficiency of 79 percent was applied to the uncontrolled emissions based on requiring the construction contractor to apply water three times per day and to limit vehicle speeds to 15 miles per hour. Applying water three times per day is estimated to reduce uncontrolled emissions by 50 percent, and limiting vehicle speeds to 15 miles per hour is estimated to reduce emissions by 57 percent (WRAP, 2006). The resulting combined control efficiency is estimated as [1 - (1-50/100) x (1 - 57/100)] = 79 percent. The daily on-site VMT by type of vehicle that was used to calculate on-site motor vehicle exhaust emissions was also used to calculate fugitive PM10 and PM2.5 emissions, based on the assumption that on-site motor vehicle travel would be on unpaved surfaces.

Annual motor vehicle fugitive PM10 and PM2.5 emissions were estimated by multiplying daily emissions by the number of days per year that the vehicles are anticipated to operate.

#### 5.1.2.10 Fugitive Particulate Matter Emissions from Off-site Motor Vehicles

Daily fugitive PM10 and PM2.5 emissions from vehicles traveling off site on paved roads were estimated by multiplying emission factors, in pounds per VMT, by daily VMT by type of vehicle. The emission factors were calculated using Equation 1 from Section 13.2.1, Paved Roads, of AP-42 (EPA, 2011a). This equation uses surface silt loading and average vehicle weight. The silt loading and average vehicle weight are default values from CalEEMod, version 2011.1.1 (Environ, 2011). The daily off-site VMT by type of vehicle that was used to calculate off-site motor vehicle exhaust emissions was also used to calculate off-site fugitive PM10 and PM2.5 emissions.

Annual motor vehicle fugitive PM10 and PM2.5 emissions were estimated by multiplying daily emissions by the number of days per year that the vehicles are anticipated to operate.

#### 5.1.2.11 Fugitive Particulate Matter Emissions from Material Handling

The following material transfers would occur during operation of the Project:

- Unloading MSW in the MRF building;
- Transferring organics into the AD Facility building;
- ~~Dropping digestate into and out of the digestate screen;~~
- Loading digestate into trucks for transport to the compost operations area;
- Unloading digestate onto windrows;
- Dropping compost during windrow turning;
- Dropping compost into and out of the compost screen;
- Unloading compost onto the compost storage pile; and
- Loading compost into export trucks.

Additionally, MRF residue and digestate residue would be unloaded into the Landfill. However, unloading these materials would replace unloading of materials that currently occurs at the Landfill. Therefore, emissions associated with unloading these materials would not increase emissions from current Landfill operations and were not included in the Project emission calculations.

Daily fugitive PM10 and PM2.5 emissions from material handling were estimated by multiplying emission factors, in pounds per ton of material transferred, calculated using Equation 1 in Section 13.2.4, Aggregate Handling and Storage Piles, of AP-42 (EPA, 2006b) by daily quantities of the materials that would be transferred. The mean wind speed from Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project (County of Santa Barbara, 2001) was used in the equation. The moisture contents used in the equation for digestate and compost **is the maximum moisture content of materials used to develop the fugitive particulate matter emission factor equation for material transfers, 4.8 percent, This is a conservative assumption as the moisture content** ~~were~~ estimated by the vendor ~~(~~**is** 50 percent for digestate and 40 percent for compost~~)~~, and the moisture contents for MSW and for MRF and digestate residues were the value for MSW from Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project (County of Santa Barbara, 2001). Air in the MRF and AD facility buildings will be exhausted through baghouse particulate matter filtration systems ahead of the biofilters with particulate matter control efficiencies of 99.9 percent, based on manufacturer's specifications. Therefore, a control efficiency of 99.9 percent was applied to PM10 and PM2.5 emissions from transfers inside the MRF and AD Facility buildings.

The daily quantities of materials that would be transferred were estimated by dividing the annual quantities by the number of operating days. Annual emissions were estimated by multiplying daily emissions by the number of operating days. The annual quantities and number of operating days are provided in Attachment A.

#### 5.1.2.12 Fugitive Particulate Matter Emissions from Digestate and Compost Screening

Daily fugitive PM10 and PM2.5 emissions from screening ~~digestate and~~ compost were estimated by multiplying emission factors, in pounds per ton of material screened, by the daily quantities of materials screened. Emission factors are not available for screening ~~digestate or~~ compost. Therefore, emission factors for controlled screening from Table 11.19.2-2 of AP-42 Section 11.19, Crushed Stone Processing and Pulverized Mineral Processing (EPA, 2004) were used. ~~A control efficiency of 99.9 percent was applied to PM10 and PM2.5 emissions from screening digestate, which would occur inside the AD Facility building.~~

The daily quantities of materials that would be screened were estimated by dividing the annual quantities by the number of operating days. Annual emissions were estimated by multiplying daily emissions by the number of operating days. The annual quantities and number of operating days are provided in Attachment A.

#### 5.1.2.13 Fugitive Particulate Matter Emissions from Chipping and Grinding

Hourly fugitive PM10 and PM2.5 emissions from chipping and grinding wood were estimated by multiplying emission factors, in pounds per ton processed, by the hourly quantity processed, in tons. The BAAQMD recommends the use of a PM10 emission factor based on "Log Debarking" from a previous edition of AP-42, Table 10.3-1 for tub grinders (BAAQMD, 2008). Although a different type of chipper/grinder would be used for the chipping and grinding activities for the Project, the emission factor recommended by the BAAQMD was used because no other emission factors could be identified. The PM2.5 emission factor was assumed to be equal to the PM10 emission factor.

The vendor provided estimates of the hourly capacity of the chipper/grinder and the daily operating hours. Daily emissions were estimated by multiplying hourly emissions by the daily operating hours, and annual emissions were estimated by multiplying daily emissions by the number of operating days per year.

#### 5.1.2.14 Fugitive ROC Emissions from Composting Windrows

Hourly fugitive ROC emissions from the composting windrows were estimated based on the methods presented in the document entitled *Compost VOC Emission Factors* (San Joaquin Valley Air Pollution Control District (SJVAPCD), 2010). The total digestate production at the proposed Project is 73,590 tons/year, or 201.6 tons/day. According to ~~estimates provided by the vendor~~ **recent sampling of organic MSW in Santa Barbara County, 48.1** ~~68.2~~ percent of the digestate will come from food waste and **51.9** ~~23.3~~ percent comes from green waste. The volatile organic compound (VOC) emission factor for food waste (37.1 lb VOC/ton digestate) is based on Appendix A, Table 6.1 of the referenced document. The VOC emission factor for green waste (5.71 lb VOC/ton digestate) is based on Table 1 of the referenced document.

Daily fugitive ROC emissions from the green waste digesting were estimated by multiplying ROC emission factor for green waste (lb VOC/ton) by the green waste digestate processed (tons/day). Similarly, daily fugitive ROC emissions from the food waste digesting were estimated by multiplying ROC emission factor for food waste (lb VOC/ton) by the food waste digestate processed (tons/day). Total daily ROC emissions from composting windrows were determined as the sum of the VOC emissions from green waste digesting and food waste digesting. A control of 97 percent was applied based on the controls published in the BAAQMD Engineering Evaluation for Zero Waste Energy's proposed anaerobic digestion facility. Best Available Control Technologies (BACT) (such as 20% inert dry wood chip blending, interactive pile management, irrigation, and finished compost blanket pseudo-biofilter) are employed to achieve a further VOC reduction of 90 percent. Annual emissions were estimated by multiplying hourly emissions by 8,760 hours per year.

#### 5.1.2.15 Fugitive ROC Emissions from Organic Waste in Anaerobic Digestion Facility

Organic waste materials from the MRF may be stored in the AD Facility for up to 24 hours prior to loading into an anaerobic digestion vessel. These materials may begin to decay before loading into a vessel, emitting fugitive ROC into the AD Facility building. The ROC emitted within the AD Facility building would be controlled by venting the air through the biofilter prior to being exhausted to the atmosphere.

Fugitive ROC emissions from the decomposition of the organic waste prior to being exhausted through the biofilter were estimated by multiplying the daily amount of food waste and green waste anticipated to be stored in the AD Facility building by the emission factors used to estimate windrow ROC emissions in Section 5.1.2.**14**. Because the emission factors in Section 5.1.2.**14** are for ROC emissions from a full composting cycle of approximately 60 days, they were divided by the cycle length, in days, to estimate emission factors for the one-day period that the waste materials may be stored in the AD Facility building prior to loading into anaerobic digestion vessels. The biofilter manufacturer estimates that the biofilter would remove 95 percent of the ROC. Hourly emissions were estimated by dividing daily emissions by 24 hours per day, and annual emissions estimated by multiplying daily emissions by 365 days per year.

## 5.2 Ambient Air Dispersion Modeling

Ambient air dispersion modeling was used to both determine the impacts of criteria pollutants, and also to provide for the dispersion input files for the Health Risk Assessment (HRA). The methodology utilized for the ambient air dispersion modeling is from the SBCAPCD's *Modeling Guidelines for Health Risk Assessments* (APCD Form -15i) (SBCAPCD, 2014a) and EPA's GAQM (EPA, 2008). The most recent version of SBCAPCD Modeling Guidance adopts ISCST3 as the preferred general purpose (flat and complex terrain) dispersion model.

An important difference between the modeling of the criteria pollutants and the modeling of health risks is the sources that are included. The existing Landfill sources were not included in the air quality impact assessment (AQIA) of the criteria pollutants. Instead of including these sources in the AQIA, the maximum air pollutant background levels that were observed at local monitoring stations were added to the results of the Project modelling. This approach is generally conservative as it accounts for existing emissions at the maximum observed levels. However, an HRA integrates the TAC emissions to determine the overall health impacts. There are no background data for TACs available in this area. Therefore, based on the SBCAPCD modeling guidelines for HRAs (SBCAPCD, 2014a), emissions of TACs from the existing Landfill sources, projected to post-Project levels, were included in the dispersion modeling that is used as an "onramp" for the HRA model. In other words, only emissions from newly proposed Project equipment were included in the AQIA, while all Tajiguas Landfill sources, both existing and proposed, were included in the facility-wide HRA.

Section 5.2.5 gives the proposed Project sources and emissions, and also lists the existing Landfill sources that were included in the HRA.

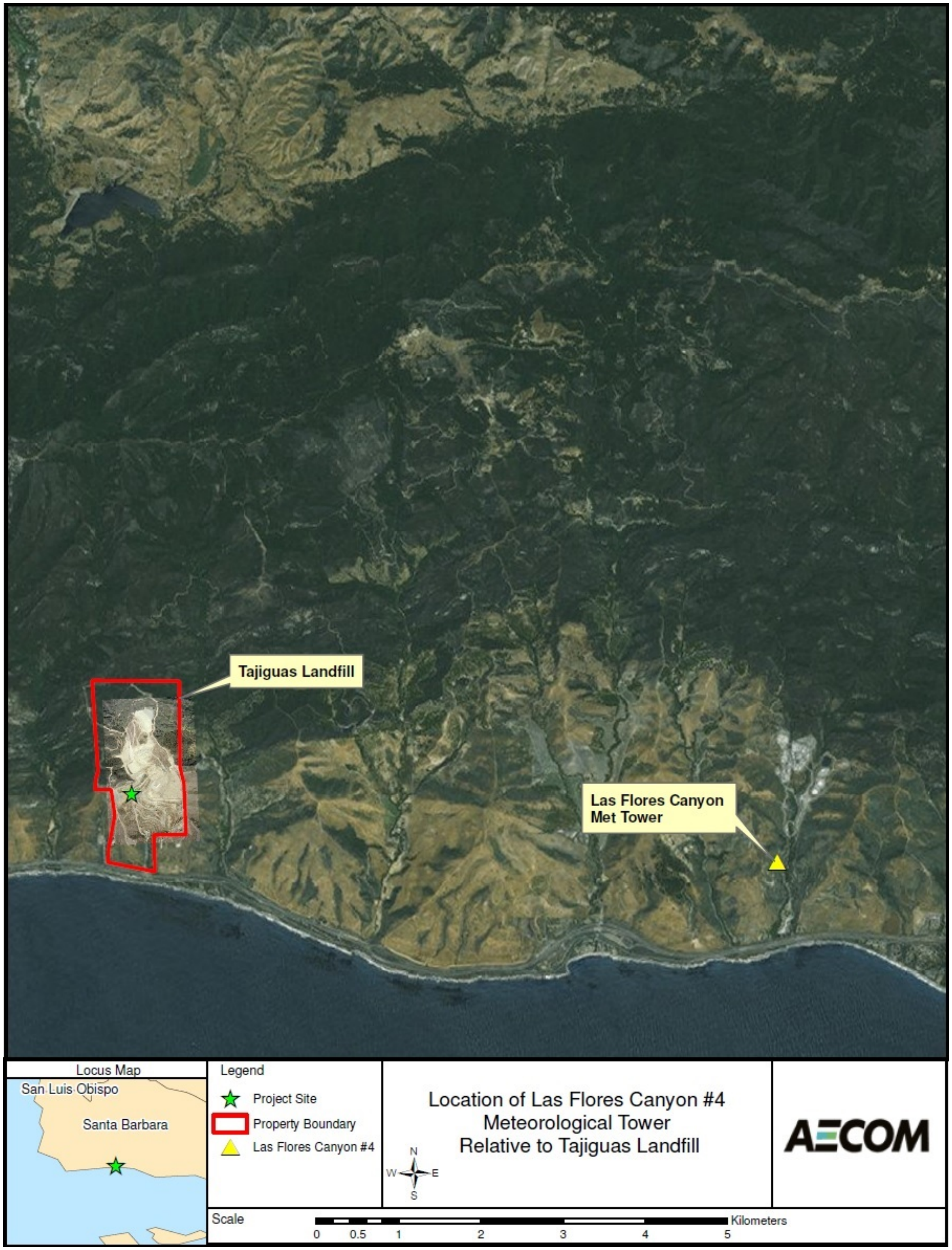
### 5.2.1 Overview of Ambient Air Dispersion Modeling

The most recent version of the EPA's ISCST3 model (Version 02035) was used in the analysis. ISCST3 was applied with the following non-default options, as described in SBCAPCD Guidance:

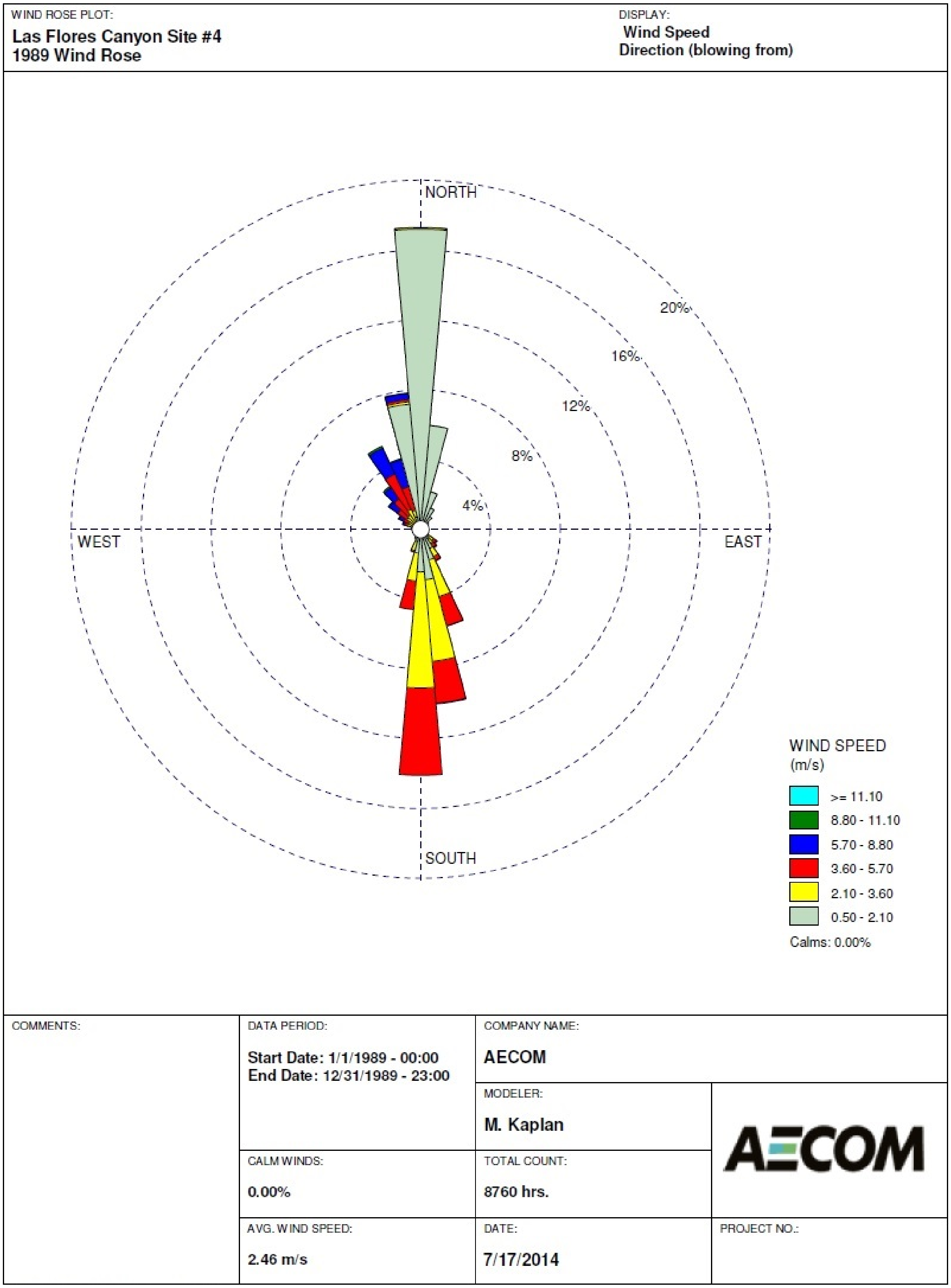
- GRDRIS: Specifies that the non-default option of gradual plume rise will be used.
- NOBID: Specifies that the non-default option of no buoyancy-induced dispersion will be used.
- NOCALM: Specifies that the non-default option to bypass the calms processing routine will be used (Short Term only).

The modeling was run on one year (1989) of meteorological data provided by SBCAPCD consisting of surface observations from Las Flores Canyon Site #4, in Goleta, California, and concurrent upper air data from Vandenberg Air Force Base in Vandenberg, California. The 1989 dataset corresponds to the single year that has been processed by the SBCAPCD for modeling. The location of Las Flores Canyon Site #4 relative to the Tajiguas Landfill is shown in Figure 5-1. The wind rose for Las Flores Canyon Site #4 is shown in Figure 5-2.

**Figure 5-1 Relative Locations of Tajiguas Landfill and the Las Flores Canyon Meteorological Site**



## Figure 5-2  Las Flores Canyon Site #4 1989 Wind Rose



Based on CEQA requirements, air dispersion modeling was conducted for the proposed Project sources to demonstrate compliance against the NAAQS and CAAQS. Modeling was conducted for the criteria pollutants $NO_2$, PM2.5, PM10, $SO_2$ and CO. Lead emissions were assumed to be negligible based on the type of sources associated with the proposed Project and lead was not modeled in this analysis. The modeling conducted involved assessing the air quality impacts of (1) the proposed sources associated with the TRRP, and (2) existing maximum monitored background concentrations to represent non-modeled sources in the area. All model input and output files are provided in Attachment D, the electronic modeling archive, to facilitate review of the modeling analyses. The following sub-sections detail the general aspects of the modeling analyses.

### 5.2.2 Model Selection

The suitability of an air quality dispersion model for a particular application is dependent upon several factors. The following selection criteria were evaluated:

- Stack height relative to nearby structures,
- Dispersion environment,
- Local terrain, and
- Representative meteorological data.

SBCAPCD Modeling Guidance requires that the Industrial Source Complex - Short Term (ISCST3) model be used for all air dispersion modeling assessments. SBCAPCD requires ISCST3 because at this time the District has meteorological datasets available for this model (primarily for use with California's health risk assessment model HARP) and prefers applicants use SBCAPCD-processed data to eliminate any discussion of subjective decisions an applicant may have had to make in processing its own dataset. SBCAPCD is in the process of updating its meteorological data, but until such time as those data become available, ISCST3 will remain the District's preferred model. Therefore, the latest version of ISCST3 (Version 02035) was used to assess air quality and health risk impacts for the Project.

### 5.2.3 Good Engineering Practice Stack Height

Good engineering practice (GEP) stack height is defined as the stack height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant as a result of atmospheric downwash, wakes or eddy effects created by the source, nearby structures, or terrain features.

A GEP stack height analysis was performed for all proposed stacks for each modeling scenario in accordance with EPA's guidelines (EPA, 1985). Per the EPA guidelines, the physical GEP height ($H_{\mathbf{GEP}}$) is determined from the dimensions of all buildings which are within the region of influence using the following equation:

$$H_{GEP} = H_B + 1.5L$$

where:

$H_B$ = height of the structure within 5L of the stack which maximizes $H_{GEP}$, and

L = lesser dimension (height or projected width) of the structure.

For a squat structure, i.e., height less than projected width, the formula reduces to:

$H_{GEP} = 2.5\ H_B$

In the absence of influencing structures, a “default” GEP stack height is credited up to 65 meters (213 feet).

A summary of the GEP stack height analyses for all TRRP point emission sources is given in Table 5-1. All proposed stacks are less than the GEP formula height and therefore potentially subject to building downwash. Wind direction-specific building dimensions for input to ISCST3 were developed with the EPA’s Building Profile Input Processor (BPIP-PRIME) for input to ISCST3. The BPIP input and output files are provided in the modeling archive (Attachment D). The buildings included in the BPIP analysis are shown in Figure 5-3 for the proposed sources, ~~and~~ Figue 5-4**a** for existing Landfill sources**, and Figure 5-4b for existing landfill sources that will be relocated to be close to the maintenance building**.

### 5.2.4 Receptor Grid

A comprehensive Cartesian receptor grid was developed for use in the ISCST3 modeling. The most recent version of EPA’s AERMAP terrain processor (version 11103) was used. The grid was centered at the approximate center of the TRRP emission sources and extended out 10 kilometers from that location. The receptors were spaced at the following intervals in accordance with the recommendations in Section 2.8 of the SBCAPCD modeling guidelines:

- 50-m increment along the property line;
- 100-m increment out to 2 kilometers;
- 250-m increment between 2 and 5 kilometers from the property line; and
- 500-m increment between 5 and 10 kilometers from the property line.

All receptor coordinates were in NAD83, UTM Zone 10. A total of 4,252 receptors were used in the analysis. The receptor grid used in the analysis is shown in Figure 5-5. For HARP modeling, the same receptor grid was used with a flagpole height of 1.5 meters. An additional grid of receptors with 100-meter spacing was developed to establish the extent of the impacts for the facility-wide Health Risk Assessment as shown in Figure 5-6.

### 5.2.5 Sources and Emission Data

All emission sources associated with the TRRP were included in the criteria pollutant modeling and all sources from TRRP and the existing Landfill operations were included in the HRA at their future emission rates if the Project is built. These Project sources include combustion related emission sources located at the MRF/AD buildings as well as vehicular, material handling, and fugitive emission sources located near the MRF/AD buildings, the existing and future landfill activities, existing flare and engine, composting area, and the connecting roads. The following provides a description of the TRRP sources. Attachment D contains the characteristics of the point, volume and area sources. Short term and annual emissions for each source are provided in Attachment C.

**Table 5-1 Summary of GEP Analysis for the Tajiguas Landfill Resource Recovery Project**

| Emission Source | Model Source Name | Stack Height (m) | Controlling Buildings / Structures | Building Height (m) | Projected Width (m) | GEP Formula Height (m) |
|---|---|---|---|---|---|---|
| CHP Engine~~s~~ **1** | CHPSTACK | **15.24**<br>~~14.63~~ | AD Facility Building | **13.49**<br>~~11.28~~ | **31.69**<br>~~70.08~~ | **33.72**<br>~~28.20~~ |
| **CHP Engine 2** | **CHP2** | **15.24** | **AD Facility Building** | **13.49** | **27.33** | **33.72** |
| **Rolling Bed Dryer** | **RBD** | **16.46** | **Tipping Floor Area** | **15.24** | **58.73** | **38.10** |
| Flare | FLARE | **16.46**<br>~~12.80~~ | **Tipping Floor Area** ~~AD Facility Building~~ | **15.24**<br>~~11.28~~ | **64.06**<br>~~65.17~~ | **38.10**<br>~~28.20~~ |
| ~~Tipping Area Biofilter Stack~~ | ~~BFTIPDPM~~ | ~~4.27~~ | ~~Tipping Floor Area~~ | ~~18.59~~ | ~~22.58~~ | ~~46.47~~ |
| ~~Tipping Area Biofilter Stack~~ | ~~BFTIPTAC~~ | ~~4.27~~ | ~~Tipping Floor Area~~ | ~~18.59~~ | ~~22.58~~ | ~~46.47~~ |
| ~~Screen~~ | ~~SCREEN~~ | ~~3.05~~ | ~~N/A~~ | ~~N/A~~ | ~~N/A~~ | ~~N/A~~ |
| MRF/AD Diesel Tank[2] | DSLTANK2 | 3.10 | Tipping Floor Area | **15.24**<br>~~18.59~~ | **41.61**<br>~~30.20~~ | **38.10**<br>~~46.47~~ |
| **Emergency Generator** | **EMGEN** | **2.50** | **Tipping Floor Area** | **15.24** | **41.61** | **38.10** |
| **Emerg. Gen. Diesel Tank** | **EMGENTNK** | **1.11** | **Tipping Floor Area** | **15.24** | **41.61** | **38.10** |
| Existing Engine[1] | EXISTENG | 9.55 | Cogeneration Plant | 6.71 | 8.61 | 16.77 |
| Existing Flare[1] | EXISTFLR | 10.52 | Cogeneration Plant | 6.71 | 7.89 | 16.77 |
| Clear Diesel Tank[1, 2] | CLRDSL | 1.60 | **Maintenance Building** ~~Tipping Floor Area~~ | **6.10**<br>~~18.59~~ | **18.29**<br>~~30.20~~ | **15.25**<br>~~46.47~~ |

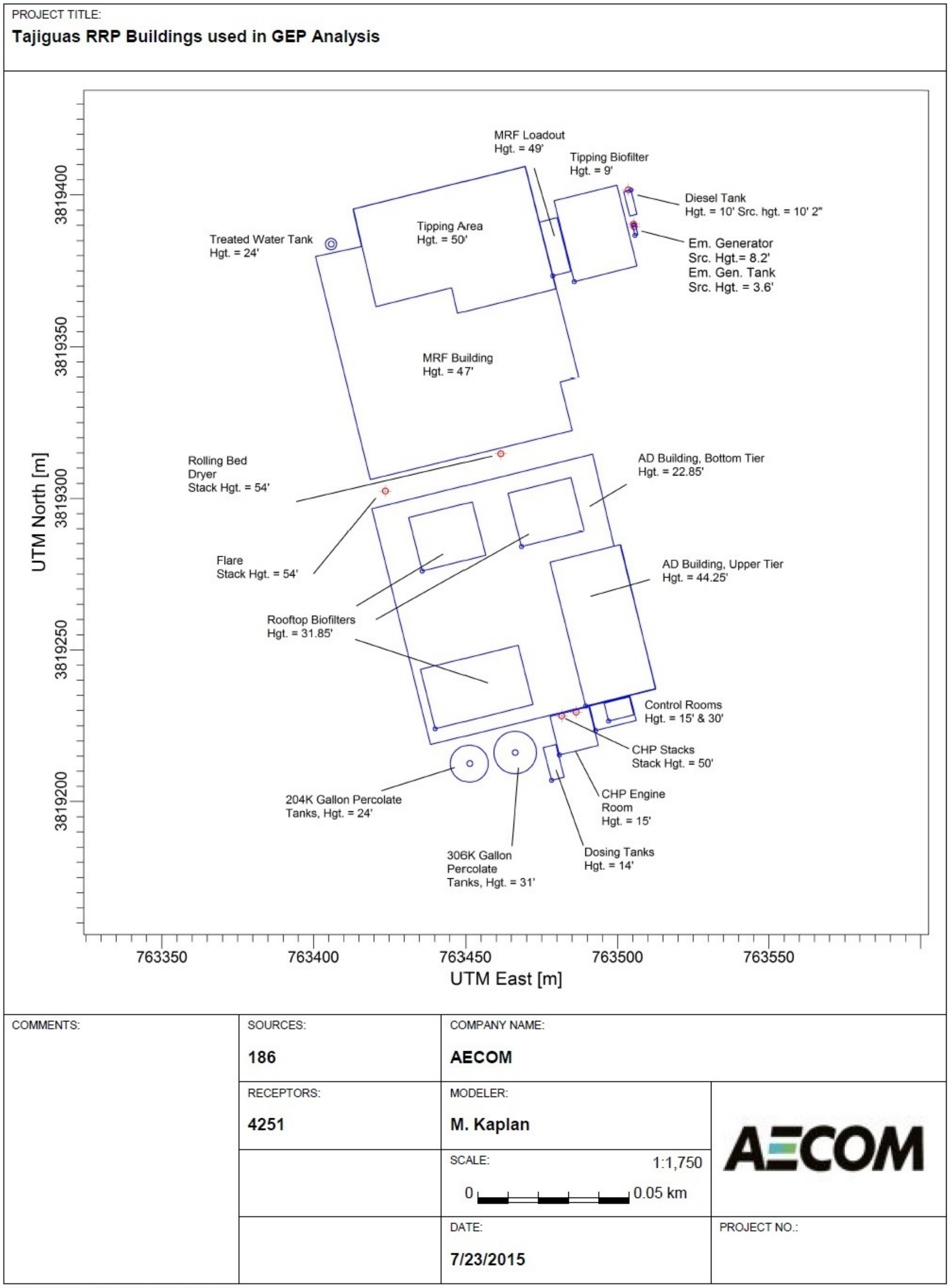
**Table 5-1 Summary of GEP Analysis for the Tajiguas Landfill Resource Recovery Project**

| Emission Source | Model Source Name | Stack Height (m) | Controlling Buildings / Structures | Building Height (m) | Projected Width (m) | GEP Formula Height (m) |
|---|---|---|---|---|---|---|
| Red Diesel Tank[1, 2] | REDDSL | 3.81 | **Maintenance Building** ~~Tipping Floor Area~~ | **6.10** ~~18.59~~ | **18.29** ~~30.20~~ | **15.25** ~~46.47~~ |
| Unleaded Gas Tank Loading[1, 2] | GASLOAD | 3.66 | **Maintenance Building** ~~Tipping Floor Area~~ | **6.10** ~~18.59~~ | **18.29** ~~30.20~~ | **15.25** ~~46.47~~ |
| Unleaded Gas Tank Breathing[1, 2] | GASBREAT | 3.66 | **Maintenance Building** ~~Tipping Floor Area~~ | **6.10** ~~18.59~~ | **18.29** ~~30.20~~ | **15.25** ~~46.47~~ |

[1] The existing engines are included in the Health Risk Assessment but not the criteria pollutant modeling.

[2] The diesel and gasoline storage tanks emit air toxics only and are, therefore, included in the Health Risk Assessment but not the criteria pollutant modeling.

## Figure 5-3 Proposed TRRP Buildings Included in the Project GEP Analysis




AERMOD View - Lakes Environmental Software

**Figure 5-4a Existing Landfill Buildings Included in the Project GEP Analysis**

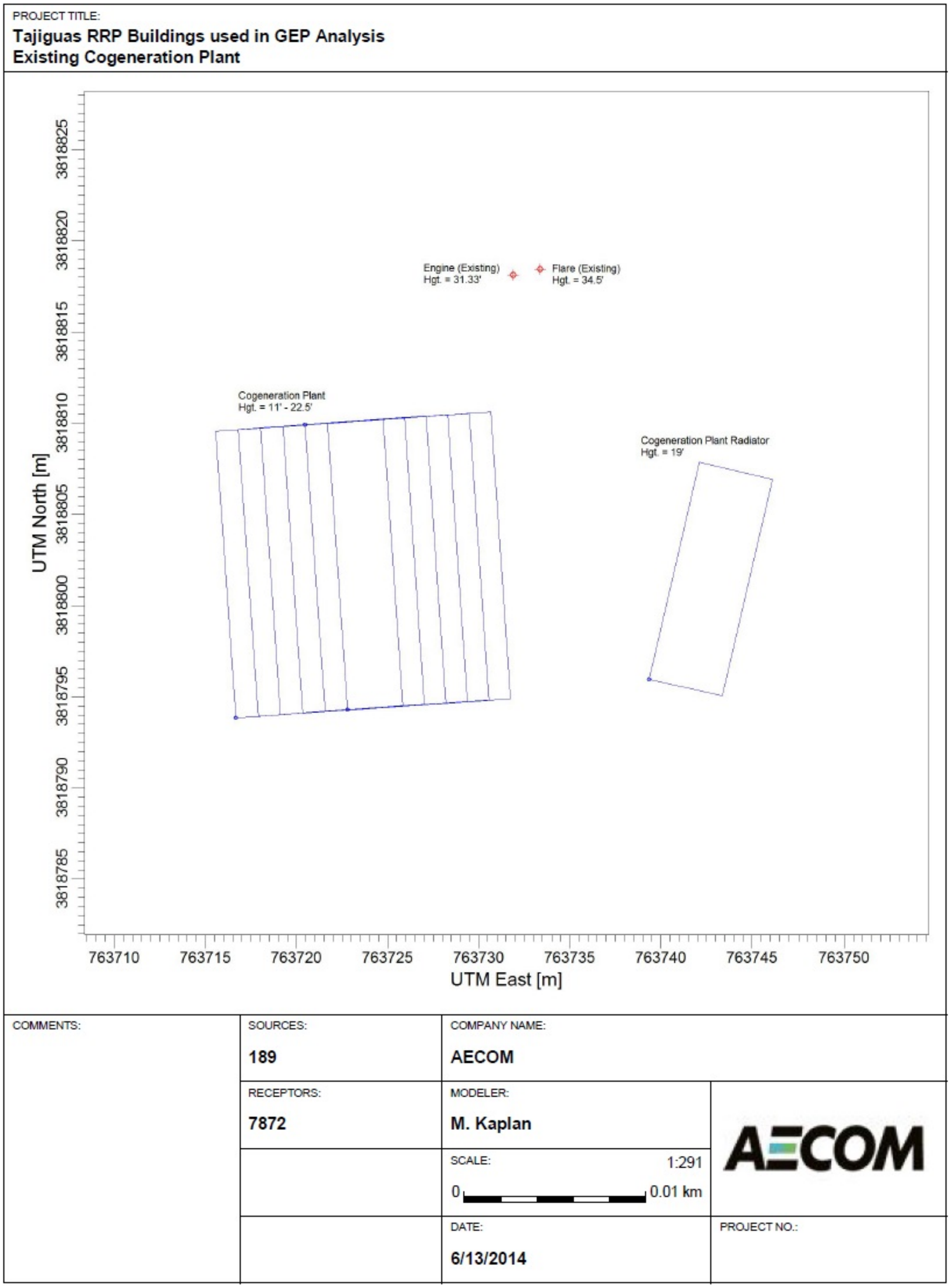


**Figure 5-4b Existing Landfill Sources Relocated to Near Maintenance Building**

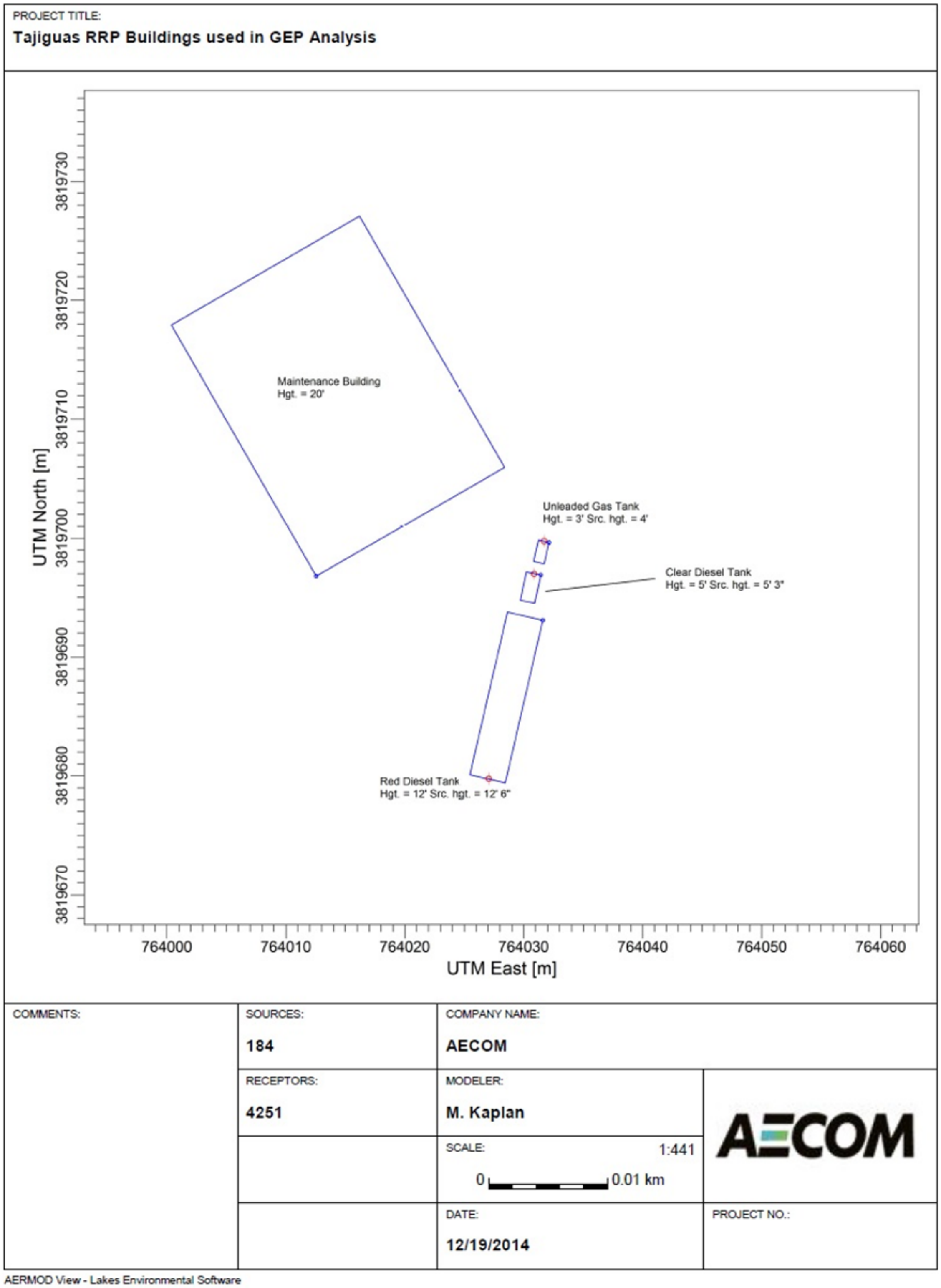


**Figure 5-5 Receptor Grid used in TRRP ISCST3 Analysis**

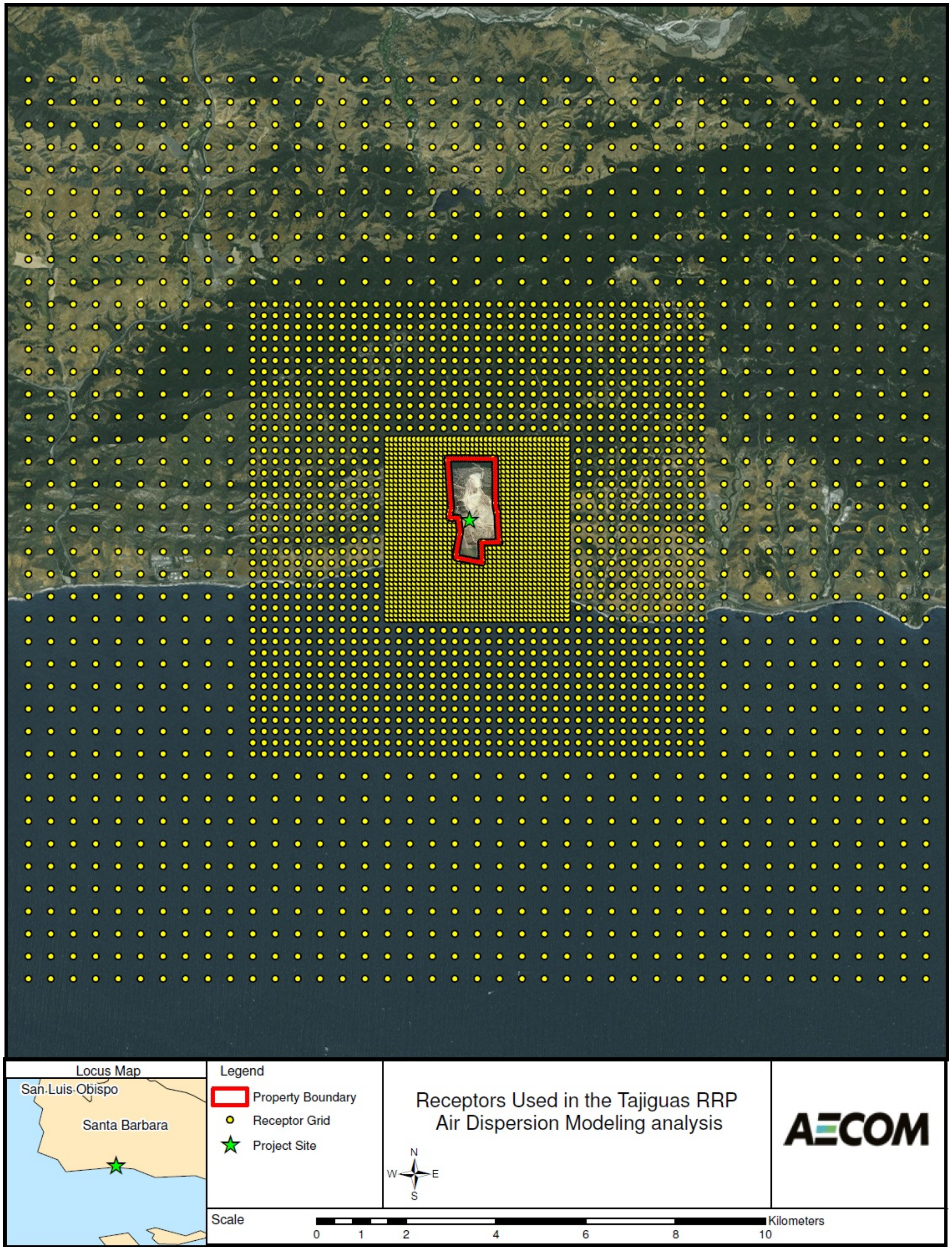
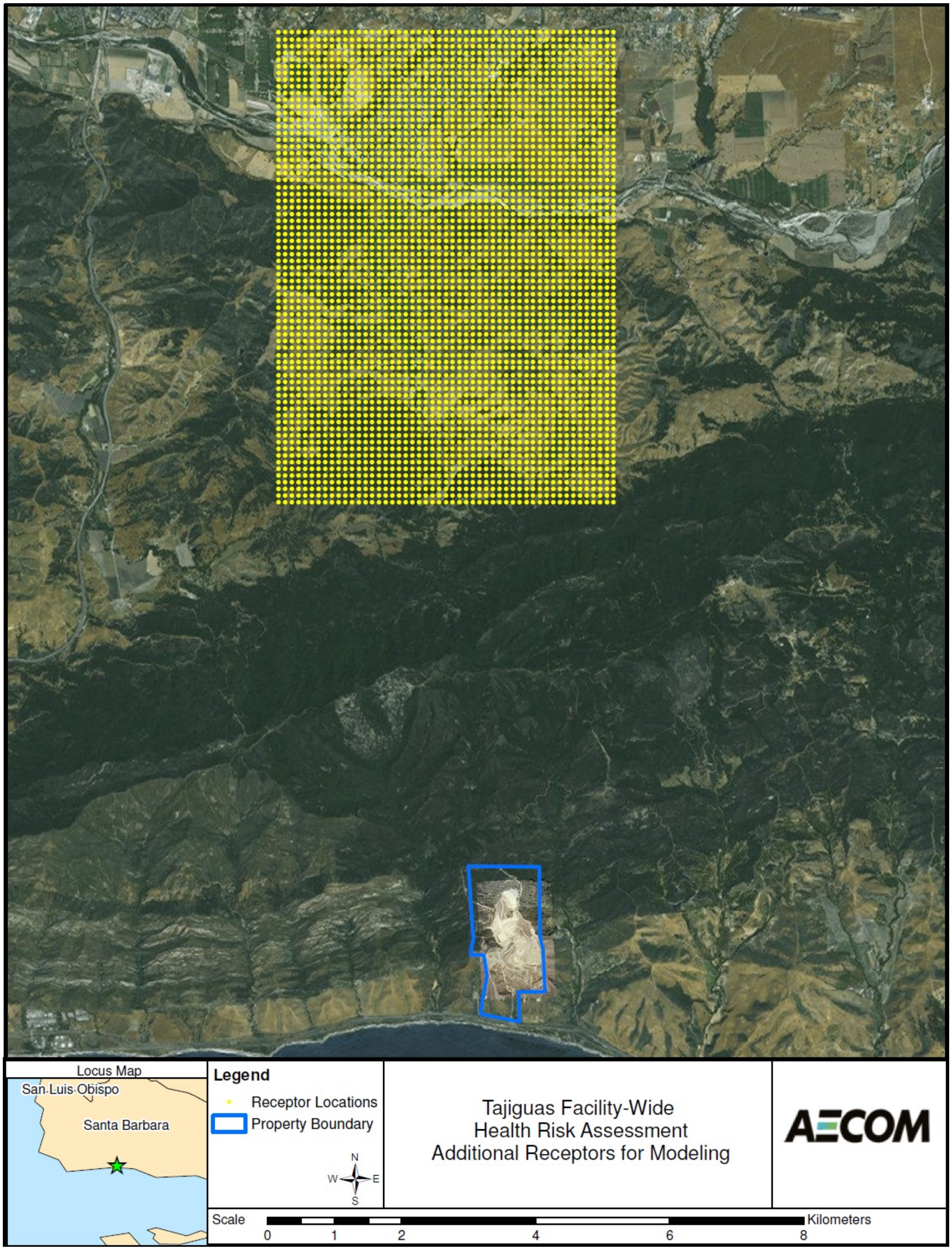


**Figure 5-6 Additional Receptor Grid used in Facility-Wide HRA Analysis**



#### 5.2.5.1 Point Sources

- Combined Heat and Power Engines (Source: CHPSTACK): This source represents the ~~2~~ **first** CHP engine ~~that share a combined~~ stack.
- **Combined Heat and Power Engine (Source: CHP2): This source represents the second CHP engine stack.**
- **Rolling Bed Dryer (Source: RBD): This source represents the rolling bed dryer stack. It is assumed that the dryer will operate 16 hours per day, six days per week.**
- Flare (Source: FLARE): This source represents the biogas flare. The flare will operate no more than 1 hour per day during the daytime (8 a.m. to 4 p.m.). For those short-term modeling standards that are longer than 1 hour (3-hour $SO_2$, 8-hour CO, and 24-hour $SO_2$, PM10, and PM2.5), the emission rate determined for the short-term modeling was divided by the number of hours in the averaging period to simulate that the flare will only operate for 1 hour on any given day. In order to account for the flare operating only during daytime hours, the source was active in the modeling during the period from 8 a.m. to 8 p.m. each day.
- Diesel Storage Tank (Source: DSLTNK2): This diesel storage tank is used for the MRF and AD sources.
- **Emergency Generator (Source: EMGEN): This source represents the emergency generator stack. This emergency generator is needed for critical life safety systems. It is assumed that the generator will operate 30 minutes per week for testing for a total of 26** ~~50~~ **hours/year. In order to minimize impacts, the testing would be done in the daytime, and testing emissions are limited in the AQIA and HRA to occurring between 10 am and 4 pm.**
- **Emergency Generator Diesel Tank (Source: EMGENTNK): This emergency generator diesel tank is used for the emergency generator.**
- ~~Screen machine (Source: SCREEN): This source represents the screen in the composting area. The screen will operate during the daytime (8 a.m. to 4 p.m.).~~
- Existing Cogeneration Plant Engine (Source: EXISTENG): This source represents the existing internal combustion (IC) engine that burns LFG.
- Existing Cogeneration Plant Flare (Source: EXISTFLR): This source represents the existing flare that burns LFG and landfill condensate.
- Gasoline Storage Tank Loading (Source: GASLOAD): This gasoline storage tank is used for Landfill operations.
- Gasoline Storage Tank Breathing (Source: GASBREAT): This gasoline storage tank is used for Landfill operations.

- <u>Clear Diesel Storage Tank (Source: CLRDSL)</u>: This clear diesel storage tank is used for Landfill operations.
- <u>Red Diesel Storage Tank (Source: REDDSL)</u>: This red diesel fuel storage tank is used for Landfill operations.

#### 5.2.5.2 Volume and Road Sources

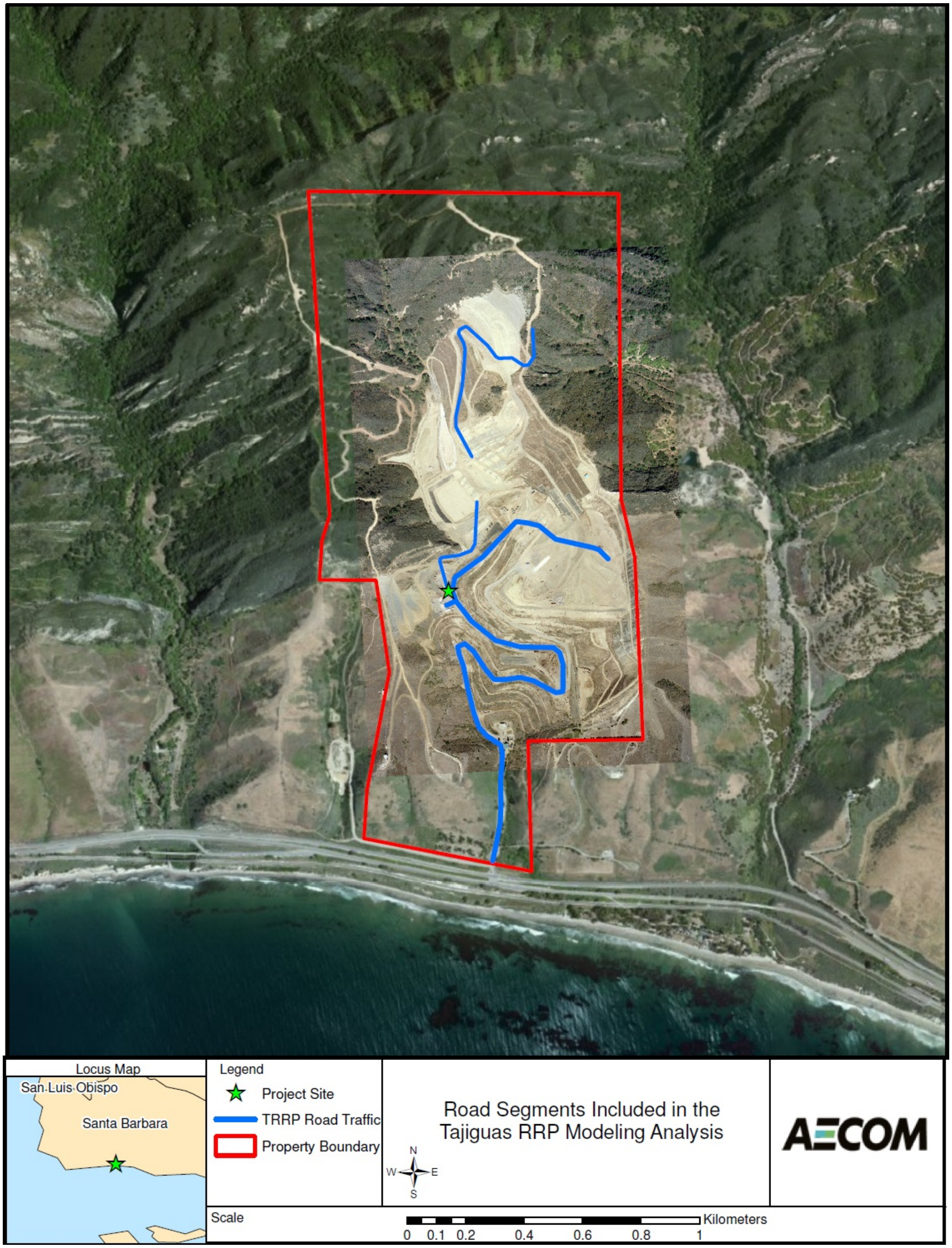
Road sources were developed to represent vehicular traffic related to the TRRP on Landfill property for the criteria pollutant modeling and for all vehicular traffic relating to post-Project operations for the entire Landfill for the HRA. The roads were represented by lines of volume sources, each having the following characteristics, calculated using the haul road configuration tool based on the Haul Road Workgroup Final Report Submission to EPA Office of Air Quality Planning and Standards (EPA OAQPS, 2012) in the Lakes Environmental AERMOD View software:

- The sources were assumed to be adjacent, elevated sources.
- Vehicle height was assumed to be 12 feet (3.66 m).
- Plume height, equal to vehicle height (3.66 m) x 1.7 (top of plume height per haul road report) = 6.22 m.
- Release height = Plume height / 2 = 3.11 m.
- Initial Sigma-z = Plume height / 2.15 = 2.89 m.
- Lane type = 2 lanes, road width = 30 feet (9.14 m).
- Plume width = Road width + 6 m = 15.14 m
- Initial Sigma-Y = Plume width / 2.15 = 7.04 m

Four road segments, as shown in Figure 5-7, were created to represent vehicular traffic at the landfill. There are two sources of road emissions: vehicular exhaust and fugitive dust.

- <u>MRFENTRY (Sources ROAD0048-ROAD0166)</u>: These sources represent emissions of vehicular traffic from the entrance to the landfill off Route 101 to the MRF Building. Traffic related to the Project will travel from 8 a.m. to 2 p.m., while additional landfill traffic will travel on this road from 7 a.m. to 5 p.m.
- <u>MRFCOMP (Sources ROAD0001-ROAD0047, ROAD0165-166)</u>: These sources represent emissions of the vehicular traffic from the MRF Building to the compost delivery area. Traffic on this road will occur during the hours of 8 a.m. to 2 p.m.
- <u>HAUL (Sources HL005579-HL005604)</u>: These sources represent emissions of vehicular traffic from the MRF Building to the Trash Fill area. Traffic on this road will occur during the hours of 7 a.m. to 5 p.m.

**Figure 5-6  Road Sources included in the TRRP Air Dispersion Modeling**



- SCRAPER (Sources SC005663-SC005720): These sources represent emissions of scraper transporting materials from the Trash Fill area to the Daily Cover Cut Area and North Stockpile. The scraper will operate during the hours of 7 a.m. to 5 p.m.

Four other sources are modeled as volume sources since they generate only fugitive emissions:

- Chipper/Grinder (Source: CHIPPER): This source represents the chipping and grinding of materials in the composting area. It has an electric motor and thus generates PM10 and PM2.5 only as fugitive emissions from the chipping and grinding activity. The chipper will operate during the hours of 10 a.m. to 4 p.m.
- Green Waste Grinder (Source: GWGRIND): This source represents the grinding of materials in the green waste area of the existing landfill. This grinder operates during the hours of 7 a.m. to 5 p.m.
- Gasoline Tank Refueling (Source: GASREFU): This source represents the refueling of the on-site gasoline tank modeled with parameters outlined in Form 25T.
- Gasoline Tank Spillage (Source: GASSPILL): This source represents the spillage of gasoline at the gasoline tank modeled with parameters outlined in Form 25T.

#### 5.2.5.3 Area Sources

- **MRF** Tipping Area Biofilter ~~Stack~~ (Source BFTIPDPM): This source represents emissions from the tipping area in the MRF building vented through the biofilter ~~and up through a stack 14 feet above grade~~ **that is 70 feet wide, 90 feet long and 9 feet deep at ground level**. This source is assumed to be active for 16 hours/day, from 7 a.m. to 11 p.m. for all pieces of equipment except the sweeper, which is assumed to operate 24 hours/day**. The initial sigma-z to represent the plume turbulence was calculated based on the volume source calculation for a source on or adjacent to a building, using the adjacent roof height next to the biofilter: Building height is 49 feet (14.94 m) / 2.15 = 22.8 feet (6.95 m).**
- **MRF** Tipping Area Biofilter ~~Stack~~ (Source BFTIPTAC): This source represents emissions from the tipping area in the MRF building vented through the biofilter ~~and up through a stack 14 feet above grade~~ **that is 70 feet wide, 90 feet long and 9 feet deep at ground level**. This source is assumed to be active for 24 hours/day, for the fugitive ROC emissions from processing material**. The initial sigma-z to represent the plume turbulence was calculated based on the volume source calculation for a source on or adjacent to a building, using the adjacent roof height next to the biofilter: Building height is 49 feet (14.94 m) / 2.15 = 22.8 feet (6.95 m).**
- AD Facility Biofilters (Sources BFMRFDPM and BFADDPM): These sources represent emissions from the two AD Facility biofilters. The emissions are distributed based on the area of the sources between the two biofilters. These sources are located on top of the AD Facility building. The initial sigma-z to represent the plume turbulence was

calculated based on the volume source calculation for a source on or adjacent to a building, using the additional roof height above the biofilter as the side of the building: Building height is **22.8 feet (6.95 m) / 2.15 = 10.6 feet (3.23 m)** ~~8 feet (2.44 m) / 2.15 = 10.6 feet (1.13 m)~~. These sources are assumed to be active for 6 hours per day, from 8 a.m. to 2 p.m., which is the time period when mobile sources would be operating and generating emissions inside the AD Facility.

- AD Facility Biofilters (Sources BFMRFTAC and BFADTAC): These sources represent emissions from the two AD Facility biofilters. The emissions are distributed based on the calculated flow of the air from the two biofilters. These sources are located on top of the AD Facility building. The initial sigma-z to represent the plume turbulence was calculated based on the volume source calculation for a source on or adjacent to a building, using the additional roof height above the biofilter as the side of the building: Building height is **22.8 feet (6.95 m) / 2.15 = 10.6 feet (3.23 m)** ~~8 feet (2.44 m) / 2.15 = 10.6 feet (1.13 m)~~. These sources are assumed to be active for 24 hours per day, while material is being processed and generating emissions inside the AD Facility.
- **AD Facility Biofilter (Source BF_SCRUB): This source represents emissions from the two AD building rooftop biofilters and humidifier/scrubbers. These sources are adjacent to each other, totaling 66 feet wide, 108 feet long and 9 feet deep. The initial sigma-z to represent the plume turbulence was calculated based on the volume source calculation for a source on or adjacent to a building, using the additional roof height above the biofilter as the side of the building: Building height is 22.8 feet (6.95 m) / 2.15 = 10.6 feet (3.23 m). These sources are assumed to be active for 8 hours per day, from 8 a.m. to 4 p.m.**
- **Outdoor sweeper (Sources SWEEP1 and SWEEP2): This source represents emissions from the Tennant M30 Scrubber-Sweeper that will be used around the MRF and AD buildings to sweep road dust and debris. The initial sigma-z to represent the plume turbulence was calculated based on the volume source calculation for a source on or adjacent to a building, using the adjacent building height: Building height is 50 feet (15.24 m) / 2.15 = 23.3 feet (7.09 m). These sources are assumed to be active for 6 hours per day, from 11 a.m. to 5 p.m.**
- Windrow / Composting Area: (Source: WNDRWDPM): This source represents equipment and fugitive emissions occurring in the composting area including the turning of windrows, material transfer to the curing pile, etc. The initial sigma-z was based on an equipment height of 13 feet (3.93 m) / 2.15 = 6 feet (1.83 m). The emissions from the windrow turning operations and fugitive dust are assumed to occur 8 hours per day from 8 a.m. – 4 p.m.
- Windrow / Composting Area: (Source: WNDRWTAC): This source represents fugitive emissions occurring in the composting area. The initial sigma-z was based on an equipment height of 13 feet (3.93 m) / 2.15 = 6 feet (1.83 m). The fugitive emissions occur 24 hours per day.

- Composting Delivery Area (Source: COMPMAT): This source represents vehicular and fugitive emissions in the compost delivery area. Sources include the fugitive emissions from compost screening, compost to curing pile transfer, compost into truck transfer, and wood grinding operations. The initial sigma-z was based on an equipment height of 13 feet (3.93 m) / 2.15 = 6 feet (1.83 m). The daily hours of operation are 8 a.m. – 4 p.m.
- Trash Fill Area (Source: TRSHFILL): This source represents the vehicle exhaust and fugitive emissions generated by the trash compactors and bulldozers in this area. The daily hours of operation for this equipment are 7 a.m. to 5 p.m.
- Green Waste Area (Source: GRNWASTE): This source represents the vehicle exhaust and fugitive emissions generated by the wheeled loaders in this area. The daily hours of operation for this equipment are 7 a.m. to 5 p.m.
- Landfill Main Operational Area (Source: LFMAINOP): This source represents the vehicle exhaust and fugitive emissions generated by the motor graders, backhoe loader, hydraulic excavator, wheeled tractor mower, wheeled loaders, small off-road trucks, water trucks and fuel truck. The daily hours of operation for this equipment are 7 a.m. to 5 p.m.
- Daily Cover Cut Area and North Stockpile (Source: AREA6N7): This source represents the vehicle exhaust and fugitive emissions from the bulldozers maintaining these areas. The daily hours of operation for this equipment are 7 a.m. to 5 p.m.
- Landfill Gas Fugitives (Source: LFGFUG): This source represents the landfill gas fugitive emissions not routed to the engines or flares.

### 5.2.6 $NO_2$ Modeling

On March 1, 2011, EPA released a memorandum with final guidance for the modeling of the new 1-hour $NO_2$ NAAQS that was finalized in April 2010. The memorandum presents a tiered approach for modeling $NO_2$ from $NO_x$ emissions that provides for increased levels of refinement:

- Tier 1: full conversion of $NO_x$-to-$NO_2$;
- Tier 2: use of 0.8 as an ambient ratio of $NO_2$-to-$NO_x$ for the 1-hour $NO_2$ standard and 0.75 for the annual $NO_2$ standard (no further justification needed); and
- Tier 3: apply the ozone limiting method (OLM) or Plume Volume Molar Ratio Method (PVMRM).

The ISCST3 model cannot perform the Tier 3 refinement or produce results in the proper form of the standard. As a result, for all 1-hour and annual $NO_2$ NAAQS and CAAQS modeling for normal operations, the Tier 2 refinement approach was applied. Additionally, because the model cannot output the results in the form of the 1-hour $NO_2$ standard, and because only one year of meteorological data was provided by the agency, the $98^{th}$ percentile of the hourly modeled concentrations, rather than the 3-year average of the $98^{th}$ percentile daily maxima, is reported.

### 5.2.7 Short-Term Operation Emissions Scenarios

Emissions of $NO_x$, CO, and $SO_x$ will be higher than normal during certain short-term operations. Three additional scenarios were modeled for determining maximum short-term impacts of these criteria pollutants:

1. The flare combusting the landfill gas while **one** ~~both~~ CHP engine~~s~~ **is** ~~are~~ offline;
2. Start-up of one CHP engine while the second is in normal operating mode; and,
3. SCR burn-in on one CHP engine while the second is in normal operating mode.

Short-term $NO_x$, CO, and $SO_x$ emissions were evaluated for these three scenarios because (1) the flare is a higher emitting source of these pollutants than the CHP engines; (2) $NO_x$ and CO control technologies (i.e., SCR and oxidation catalyst) are not as efficient at reducing emissions during startup as the SCR and oxidation catalyst must first reach an optimum temperature for the catalytic reactions to occur; and (3) the SCR catalyst system will need to be replaced about once every two years, and it takes about 120 hours to break in (burn off) the protective coating on the new SCR replacement catalyst, which, similar to start-up, has lower control efficiency during these events. Further, there are very stringent short-term $NO_2$ NAAQS and CAAQS that warrant these additional analyses.

Although these scenarios will occur infrequently (i.e., each CHP engine is anticipated to be offline five percent of the time, each engine is anticipated to be started-up 36 times per year and catalyst replacement is anticipated to occur once every 18 months to two years), they can be planned and are not considered to be upsets, and hence were evaluated in order to ensure maximum impacts were determined. Only $NO_x$, CO, and $SO_x$ were evaluated for these three scenarios as PM10 and PM2.5 emissions would be approximately the same during start-up and catalyst burn-off since the control system is not intended to reduce PM10 and PM2.5 emissions.

In order to most effectively mitigate the emissions during the SCR burn-in period, the Project operator would not use landfill gas (LFG) to fuel the engine during this activity. Instead, only propane from the existing propane tank or natural gas, if available from a future pipeline, would be used as fuel to ensure the minimum criteria pollutant emissions during the SCR burn-in period. Bekon Energy Technology provided the flare purging emissions mitigation guidance based on their experience with 20 operating anaerobic digestion facilities in Europe. An SCR manufacturer (Stueller Technology) provided the CHP engine start-up and SCR burn-in emission effectiveness parameters and SCR burn-in emission mitigation guidance. Additional information on these scenarios is provided in Attachment A.

### 5.2.8 Ambient Air Impact Criteria

The NAAQS and CAAQS are health standards which have been implemented to protect the public, and hence constitute the criteria by which impacts are judged. These standards are summarized for each pollutant and averaging period that was analyzed for this Report in Table 5-2.

**Table 5-2 Ambient Air Impact Criteria (µg/m$^3$) for Project Modeling**

| Pollutant | Averaging Period | NAAQS | | CAAQS |
|---|---|---|---|---|
| | | Primary | Secondary | Primary |
| $NO_2$ | 1-hour | 188 | -- | 339 |
| | Annual | 100 | 100 | 57 |
| CO | 1-hour | 40,000 | -- | 23,000 |
| | 8-hour | 10,000 | -- | 10,000 |
| PM10 | 24-hour | 150 | 150 | 50 |
| | Annual | -- | -- | 20 |
| PM2.5 | 24-hour | 35 | 35 | |
| | Annual | 12.0 | 15 | 12 |
| $SO_2$ | 1-hour | 196 | -- | 655 |
| | 3-hour | -- | 1,300 | -- |
| | 24-hour | 365 | -- | 105 |
| | Annual | 80 | -- | -- |

### 5.2.9 Representative Ambient Background Concentrations

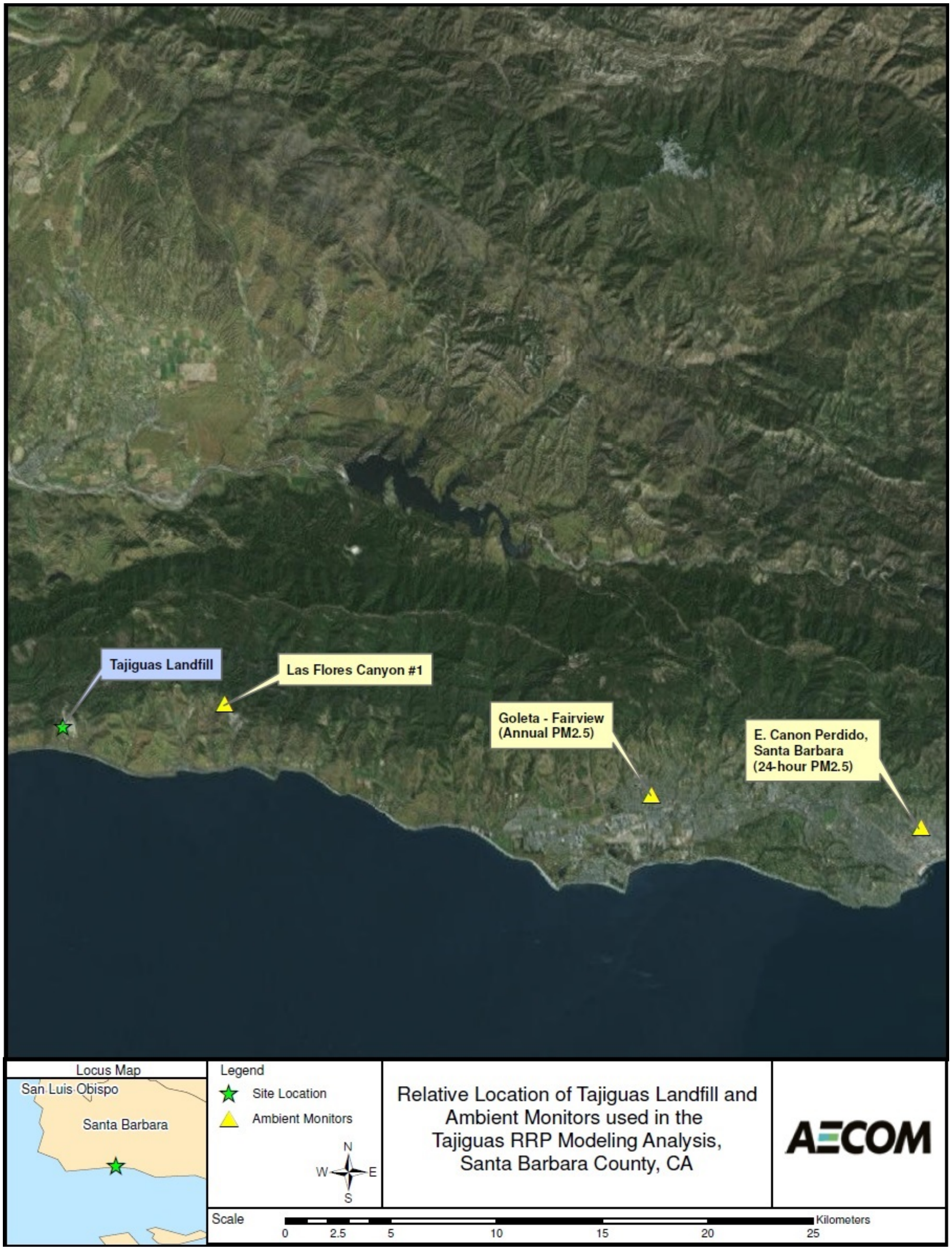
For this Project, the appropriate ambient background for each pollutant was added to the modeled impacts from the Project to account for impacts from non-Project sources since there were no other sources in the immediate vicinity of the Project. The background concentrations for the years 2010 through 2012 used in this analysis are summarized in Table 5-3. CO, 1-hour $NO_2$ and $SO_2$ (CAAQS), 3-hour and 24-hour $SO_2$, annual $NO_2$ and $SO_2$, 24-hour and annual PM10 and annual PM2.5 values are the maximum concentration over the three year period. The 1-hour $NO_2$ and 24-hour PM2.5 (NAAQS) values are the 98$^{th}$ percentile for each year averaged over the three year period. The 1-hour $SO_2$ (NAAQS) values are the 99$^{th}$ percentile for each year averaged over the 3-year period. The relative locations of the Tajiguas Landfill and the monitors used in the modeling are shown in Figure 5-8.

**Table 5-3 Ambient Background Concentrations[1]**

| Pollutant | Averaging Period | Concentration (ppb) | | | Concentration (µg/m³) | | | Back-ground (µg/m³) |
|---|---|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 | |
| CO | 1 hour | 0.6 | 0.6 | 0.6 | 689.7 | 689.7 | 689.7 | 689.7 |
| | 8 hour | 0.5 | 0.3 | 0.5 | 574.7 | 344.8 | 574.7 | 574.7 |
| $NO_2$ | 1 hour (NAAQS) | 0.011 | 0.013 | 0.014 | 20.7 | 24.5 | 26.3 | 23.8 |
| | 1 hour (CAAQS) | 0.035 | 0.023 | 0.024 | 65.8 | 43.3 | 45.1 | 65.8 |
| | Annual | 0.002 | 0.002 | 0.002 | 3.6 | 3.9 | 3.6 | 3.9 |
| $SO_2$ | 1 hour (NAAQS) | 0.005 | 0.007 | 0.063 | 13.1 | 18.3 | 165.1 | 65.5 |
| | 1 hour (CAAQS) | 0.006 | 0.014 | 0.073 | 15.7 | 36.7 | 191.3 | 191.3 |
| | 3 hour | 0.005 | 0.008 | 0.061 | 12.2 | 21.8 | 158.9 | 158.9 |
| | 24 hour | 0.003 | 0.004 | 0.024 | 7.9 | 10.5 | 62.9 | 62.9 |
| | Annual | 0.001 | 0.001 | 0.002 | 3.0 | 1.7 | 4.0 | 4.0 |
| PM10 | 24 hour | --- | --- | --- | 29.0 | 32.0 | 34.0 | 34.0 |
| | Annual | --- | --- | --- | 13.0 | 13.3 | 13.3 | 13.3 |
| PM2.5 | 24 hour (NAAQS) | --- | --- | --- | 12.0 | 19.0 | 17.0 | 16.0 |
| | Annual | --- | --- | --- | 7.7 | 11.0 | 9.0 | 9.0 |

[1] All data taken from the EPA AIRS database: http://www.epa.gov/airdata/ad_rep_mon.html. All values are from the Las Flores Canyon Site #1 monitor, except 24-hour and annual PM2.5 which are taken from 700 E. Canon Perdido, Santa Barbara, and Goleta – Fairview, respectively. Santa Barbara was used for 24-hour PM2.5 because it was the only monitor nearby with data in the form of the PM2.5 24-hour NAAQS ($98^{th}$ percentile). The Las Flores Canyon Site #1 station does not monitor PM2.5.

**Figure 5-7 Relative Locations of Tajiguas Landfill and Ambient Air Quality Monitors**



## 5.3 Health Risk Assessment

As discussed in Section 5.2.1, the existing Landfill sources as well as the proposed Project sources were analyzed in the HRA.

### 5.3.1 Toxic Air Contaminant Emission Calculation Methodology

TACs would be emitted from the following on-site sources during operation of the Tajiguas Landfill including existing and proposed sources:

- Proposed CHP engines;
- **Proposed rolling bed dryer;**
- Proposed composting windrows;
- Proposed MRF/AD Facility biofilters;
- Proposed screen;
- **Proposed emergency diesel generator;**
- **Proposed diesel fuel tanks;**
- Existing and proposed flares;
- Existing and proposed diesel-fueled engines in equipment and motor vehicles;
- Existing and proposed diesel fuel storage tanks;
- Existing and proposed chipping and grinding equipment;
- Existing Landfill gas fugitives;
- Existing gasoline fuel storage tank; and
- Existing Landfill gas-fired IC engine.

Details of the TAC emission calculations for the proposed Project are presented in Attachment C.1 while TAC emission calculations for the existing Landfill sources are presented in Attachment C.2.

#### 5.3.1.1 Methodology for TAC Emissions from CHP Engines

TACs contained in the biogas that are not completely combusted to carbon dioxide in the engines would be emitted in the engines' exhausts. Additionally, ammonia, produced from urea, would be used as a reactant in the SCR systems controlling $NO_x$ emissions from the engines. Excess ammonia would be used in the system to achieve adequate $NO_x$ reduction, which would result in unreacted ammonia being emitted in the SCR systems' exhausts.

Hourly TAC emissions in the engines' exhausts from incomplete biogas combustion were estimated based on the emission factors presented in the SBCAPCD approved emission factors for LFG-fired IC engines equipped with an oxidation catalyst. Hourly TAC emissions from the CHP engines were calculated by multiplying the emission factor (lb/MMcf) with the hourly LFG usage (MMcf/hour). Annual TAC emissions from the CHP engines were estimated by multiplying the emission factor (lb/MMcf) with the annual LFG usage (MMcf/year). The annual LFG usage was estimated by multiplying the hourly fuel usage by the operating hours per year. **The CHP exhaust will be diverted to the RBD up to 16 hours per day, 6 days per week and will exit the RBD stack.**

Hourly ammonia emissions in the SCR systems' exhausts were estimated from the ammonia concentration in the exhaust specified by the SCR system manufacturer and the SCR system exhaust flow rate.

Annual ammonia emissions from the CHP engines were estimated by multiplying the hourly emissions (lb/hour) by the estimated annual hours of operation (hours/year), which in turn were calculated as the ratio of annual biogas combusted in the engines to the hourly biogas combustion rate in the engines.

#### 5.3.1.2 Methodology for TAC Emissions from Flare

TACs contained in the biogas that are not completely combusted to carbon dioxide in the flare would be emitted in the flare exhaust. TAC emissions from the flare were estimated based on emission factors from a source test of a flare combusting LFG at the Santa Maria Landfill from September 9 to 11, 2010 and from emission factors presented in the California Air Toxic Emission Factor (CATEF) database, updated December 7, 2000 for flares fired on LFG. This choice of emission factors is based on the assumption that biogas is similar in composition to landfill gas. The CATEF database presents mean, median and maximum emission factors for all California air toxics emitted by LFG-fired IC engines. The maximum CATEF emission factors were used for TACs that were not measured during the source test at the Santa Maria Landfill. Hourly TAC emissions were estimated by multiplying the emission factors (lb/MMscf) by the maximum hourly rating of the flare (MMscf).

Annual TAC emissions from the flare were estimated by multiplying the emission factors by the annual flare biogas use. The annual flare biogas use was calculated by adding the annual biogas use during AD vessel purging (1/16 of flow to both CHP engines x number of annual vessel purges) to the annual biogas use when CHP engines are offline (flow to each CHP engine at 100 percent load x hours each engine is offline x 2 engines).

#### 5.3.1.3 Methodology for TAC Emissions from Proposed New Diesel-Fueled Engines

Combustion of diesel fuel in compression ignition engines would generate emissions of DPM, which represent TAC emissions with potential cancer and chronic non-cancer health effects from diesel-fueled engines for health risk assessments. DPM is smaller than 10 micrometers in diameter. Therefore, PM10 emissions from the diesel-fueled engines were used to represent

DPM emissions. The methodologies for estimating PM10 emissions from diesel fueled engines are described in Sections 5.1.2.4 (off-road equipment) and 5.1.2.5 (on-site motor vehicles).

Emission factors for speciated exhaust TACs with potential acute effects were determined based on the factors presented in the document entitled *AB 2588 Emission Factors for Diesel Fuel Internal Combustion*, VCAPCD, 2003. Hourly emissions were determined by multiplying the emission factors (lb/gal) by the hourly fuel consumption rate of the engines (gal/hour). The hourly emissions from these sources are limited to the periods of 7:00 a.m. to 5:00 p.m. during a day.

#### 5.3.1.4 Methodology for TAC Emissions from Diesel and Gasoline Fuel Storage Tanks

Fugitive emissions from the diesel fuel storage tanks will contain TACs that are present in the diesel fuel. Annual TAC emissions from each storage tank were calculated using the EPA TANKS program, version 4.0.9d (EPA, 2006c). Hourly TAC emissions from each fuel storage tank were calculated by dividing annual emissions by 8,760 hours per year. Fugitive emissions from loading, breathing losses, refueling and spillage from the gasoline tank were calculated using the emission factors in *Gasoline Station Heath Risk Assessment Application Form 25T*, SBCAPCD, 2011b.

#### 5.3.1.5 Methodology for TAC Emissions from Composting Windrows

The composting windrows would produce fugitive ammonia emissions. Hourly and annual fugitive ammonia emissions were estimated using the same procedures used to estimate fugitive ROC emissions from the windrows described in Section 5.1.2.**14** with emission factors for ammonia emissions from composting instead of emission factors for ROC.

Emissions of organic TACs from composting windrows were based on speciation of the ROC emissions. The ROC emissions were calculated based on the methodology discussed in Section 5.1.2.**14**. The speciation of ROCs from composting windrows was based on the mass fractions presented in Kumar, *et al.* (2011).

#### 5.3.1.6 Methodology for TAC Emissions from Existing LFG-Fired IC Engine

The existing IC Engine is a Caterpillar 3616 model engine capable of burning LFG with a rated capacity of 3.1 MW. Hourly TACs from the combustion of LFG were calculated by multiplying emission factors in pounds per million standard cubic feet (lb/MMscf) by the maximum rated hourly capacity flow rate in standard cubic feet per hour (scf/hour). The emissions were determined based on the maximum combustion emissions factors for IC engines fired on LFG from the CATEF database.

Annual TAC emissions from the IC engine were estimated by multiplying emission factors in pounds per million standard cubic feet by the annual fuel usage reported for the year 2013.

#### 5.3.1.7 Methodology for Fugitive TAC Fugitive Emissions from Organic Waste in Anaerobic Digestion Facility Building

Hourly and annual fugitive TAC emissions from organic waste in the AD Facility building were estimated by multiplying hourly and annual fugitive ROC emissions calculated as described in Section 5.1.2.**15** by speciation factors for emissions from composting windrows presented in Kumar, *et al.* (2011).

#### 5.3.1.8 Methodology for TAC Emissions from Existing Diesel-Fueled Engines

Combustion of diesel fuel in compression ignition engines would generate emissions of DPM, which represent TAC emissions with potential cancer and chronic non-cancer health effects from diesel-fueled engines for health risk assessments. DPM is smaller than 10 micrometers in diameter. Therefore, PM10 emissions from the diesel-fueled engines were used to represent DPM emissions.

RRWMD provided records of on-site diesel-fueled off-road equipment and motor vehicle use during 2013. The records included equipment type and model, model year, horsepower (for off-road equipment), annual fuel use and annual hours of use (for off-road equipment) or VMT (for motor vehicles). Since the TRRP would reduce the quantity of materials disposed at the Landfill from 2013 levels, RRWMD estimated the post-Project hours of use and VMT based on a 35 percent reduction from 2013 values.

PM10 emission factors, in grams/brake-horsepower-hour, for the off-road equipment were estimated as the emission standards corresponding to the equipment model year and engine horsepower rating. Annual horsepower produced by each piece of equipment was estimated by multiplying the engine horsepower rating by a load factor from the CARB OFFROAD2011 off-road equipment emissions model and the projected annual hours of operation after implementation of the TRRP. The annual horsepower ratings were multiplied by the PM10 emission factors to estimate annual PM10 emissions.

PM10 emission factors in grams/mile for the motor vehicles were estimated based on the emission factors from the CARB EMFAC2011 on-road motor vehicle emissions model for T7 tractors for the vehicle model year traveling at 15 miles per hour in Santa Barbara County. These emission factors were multiplied by the projected annual VMT after implementation of the TRRP to estimate annual PM10 emissions.

Emission factors for speciated exhaust TACs with potential acute effects were determined based on the factors developed by VCAPCD (2003) for AB2588 for diesel fueled IC engines. Hourly emissions were determined by multiplying the emission factors in pounds per gallons by the hourly fuel consumption rate of the engines. The hourly consumption rates of the engines were estimated by dividing annual fuel use in 2013 by the annual operating hours in 2013.

#### 5.3.1.9 Methodology for TAC Emissions from Existing Flare

TACs from the existing flare were estimated were estimated using the same emission factors used for the proposed new flare as described in Section 5.3.1.2. Hourly TAC emissions were estimated by multiplying the emission factors in lb/MMscf by the maximum hourly flow rate provided in scf/hour from actual one-minute flow data provided by SBCAPCD. Annual TAC emissions from the flare were estimated by multiplying emission factors in lb/MMscf by the annual fuel usage reported for the year 2013.

#### 5.3.1.10 Methodology for TAC Emissions from Existing Landfill Gas Fugitives

Existing landfill TACs were determined using site-specific sampling and analysis results. These data were collected from a period of 2009 to 2013; samples were analyzed for individual TACs. A single speciation of the sample result was developed using the maximum values measured in the period; pollutants below detection levels were included at their detection limits. Toxic pollutants included in EPA AP-42 (Default concentrations for LFG constituents for landfills with waste in place on or after 1992) but not included in the sampling results were included in the speciation profile at the levels shown in EPA AP-42.

Fugitive TAC emission rates were calculated from the speciation profile and the landfill fugitive LFG emission rate. The fugitive LFG emission rate was calculated by first estimating the methane production rate using Equation HH-1 from 40 CFR 98, Subpart HH. The estimated methane production rate was then divided by the fraction of methane in LFG (50 percent from the EPA LandGEM model) to calculate the estimated LFG production rate. The LFG production rate was then reduced by the estimated landfill gas collection system capture efficiency, estimated using Equation HH-3 from 40 CFR 98, Subpart HH, to calculate the fugitive LFG emission rate.

### 5.3.2 Methodology for Evaluating Cancer Risk and Non-Cancer Health Hazards

The Health Risk Assessment (HRA) evaluated the TRRP and the entire facility for cancer risk and both acute and chronic non-cancer health hazards. Figures 5-9 and 5-10 show the sources assessed in the Project-only and facility-wide HRAs, respectively. The health risk methodology is based on the OEHHA Guidance Manual (2003). The latest OEHHA cancer potency factors and chronic and acute RELs for each TAC were used. The approved health values are incorporated into HARP Version 1.4f. Carcinogenic risks and potential non-carcinogenic chronic health effects were calculated using the annual concentrations at the flagpole height of 1.5 meters while the acute non-cancer health hazards were determined using the predicted maximum 1-hour concentrations at 1.5 meters above ground-level. The HARP software performs the necessary risk calculations following the OEHHA Risk Assessment Guidelines and the ARB Interim Risk Management Policy for risk management decisions.

## Figure 5-8 Proposed TRRP Sources Modeled in the HRA

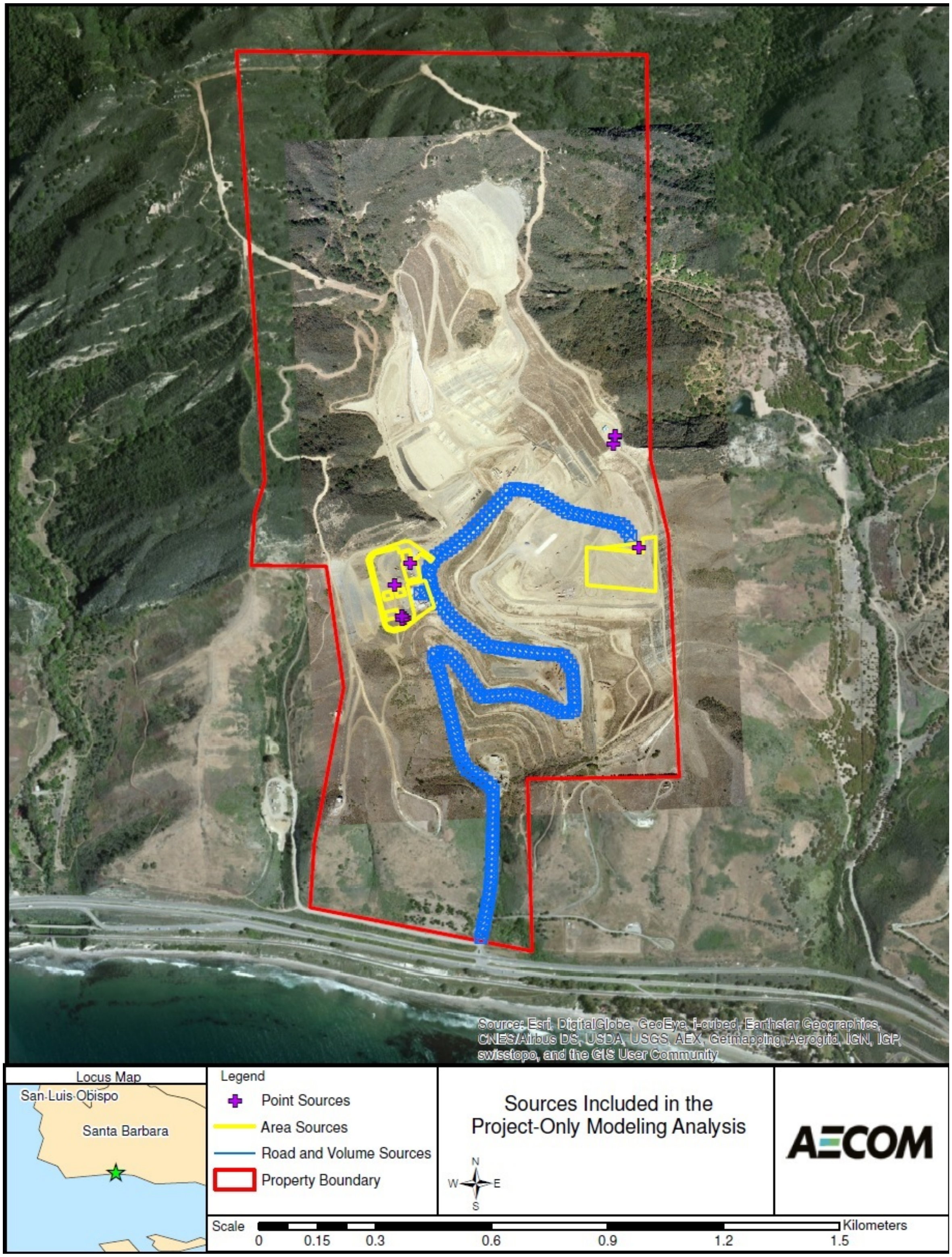
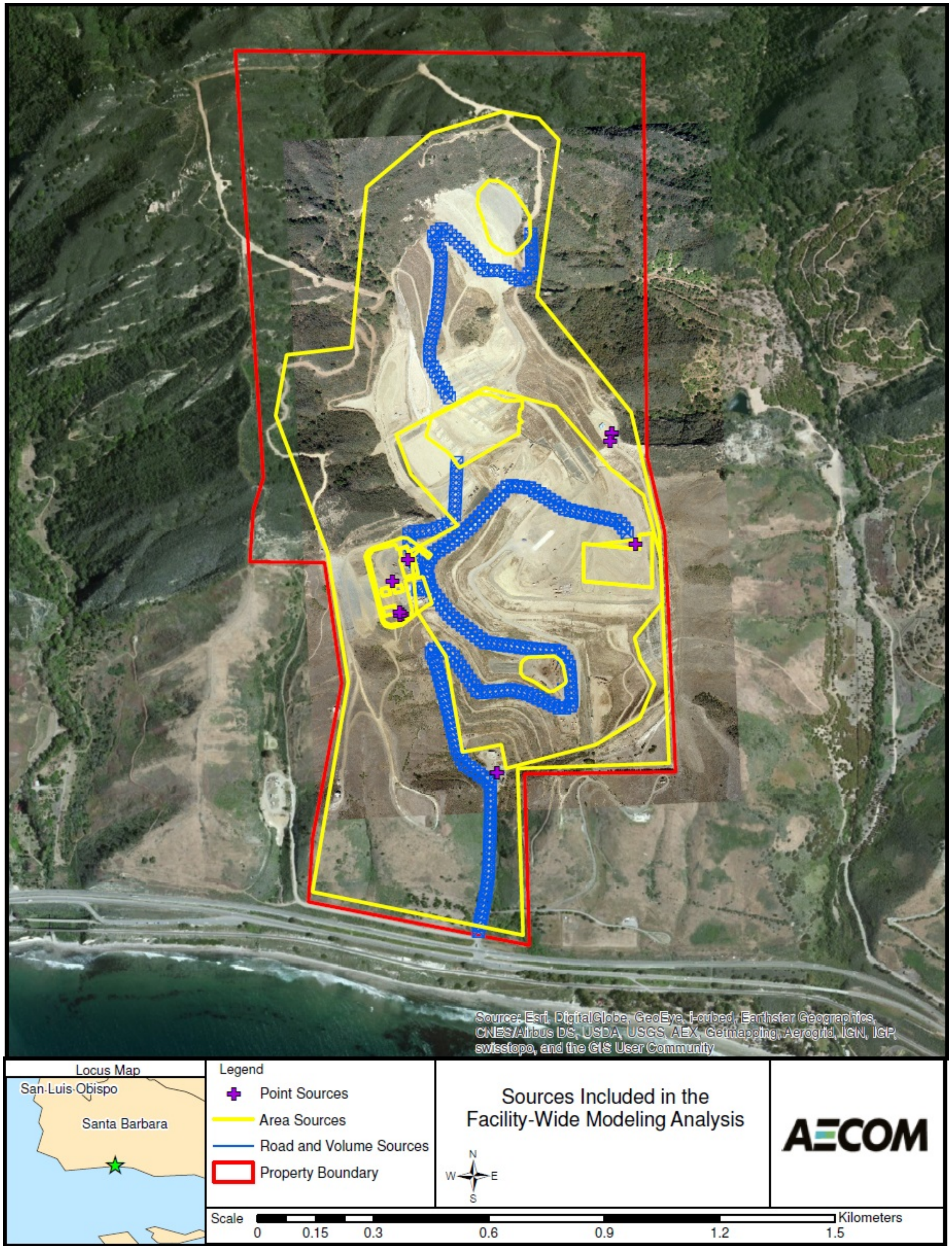


**Figure 5-9 Existing and Proposed Facility-Wide Sources Modeled in the HRA**



#### 5.3.2.1 HARP Model Input Options and Pathways

The following HARP modeling options were used for the risk analysis to estimate cancer and non-cancer impacts at the maximum impact location on the same receptor grid (Figure 5-5) as the criteria pollutant modeling. In addition, an extended receptor grid (Figure 5-6) was developed in order to determine the full extent of the area in which cancer risks could be above 1.0 in one million or non-cancer hazard indices could be above 0.1. AECOM plotted the calculated risk for each option below and selected the highest residential, worker or acute risk based on the entire receptor grid.

- 70-year Resident Cancer Risk – Derived (Adjusted) Method;
- 9-year (Child Resident) Cancer Risk – Derived (OEHHA) Method;
- 40-year Worker Cancer Risk – Point Estimate;
- Chronic HI – Derived (OEHHA) Method; and
- Acute HI – Simple Acute HI.

The Derived (OEHHA) risk analysis method uses the high-end point-estimates of exposure for the two dominant (driving) exposure pathways, while the remaining exposure pathways use average point estimates. The Derived (Adjusted) method is identical to the Derived (OEHHA) method but uses the breathing rate at the 80$^{th}$ percentile of exposure rather than the high-end point-estimate when the inhalation pathway is one of the dominant exposure pathways. The cancer risk estimates using the Derived equations/methods are based on a 70-year exposure (resident). The point-estimate analysis uses a single value rather than a distribution of values in the dose equation for each exposure pathway. The off-site worker exposure duration assumed a standard work schedule since the facility will operate full time, per OEHHA guidance (2003). For the cancer and chronic HI impacts for workers, the HARP modeling option “modeled ground level concentration (GLC) and default exposure assumptions” was used. This includes the highly conservative 40-year exposure duration for the worker receptors along with an OEHHA-defined 95$^{th}$ percentile breathing rate of 393 liters of air per kilogram per day (l/kg-day). Child cancer risk was evaluated for a 9-year exposure scenario. The simple acute HI method is a conservative approach where the maximum concentrations from each emission source are superimposed to impact receptors at the same time, irrespective of wind direction and/or atmospheric stability, and is a health protective approach to assess acute impacts.

The modeled exposure pathways consisted of all pathways recommended for a health risk assessment. Exposure pathways that were enabled include homegrown produce (using rural default ingestion fractions), dermal absorption, soil ingestion, pigs, eggs, poultry, and mother’s milk in addition to the inhalation pathway. As discussed later in Section 6.2, although TRRP health risk impacts are well below significance levels, the cancer risks modeled for the facility-wide HRA that includes the existing Tajiguas Landfill sources extended well to the north before dropping to below a 1.0 in-one-million risk isopleth. Since the area with impacts greater than 1.0 in-one-million cancer risk includes Alisal Lake and the Alisal Guest Ranch Resort that keeps cows on its property, the fishing and beef/dairy pathways were added to the facility-wide HRA. Long-term risks (i.e., cancer and chronic non-carcinogenic HI) and short-term risk (Acute HI) were calculated at the identified off-site receptors.

### 5.3.2.2 Exposure Assumptions

The chief exposure assumptions are continuous exposure to the TAC concentrations produced by continuous emissions at the maximum emission rates over a 70-year period at each receptor location to estimate lifetime residential cancer risks and over a 40-year period to estimate worker cancer risks. Although the Landfill would only have approximately 20 years (2016 to approximately 2036) of capacity left if extended by the proposed Project, SBCAPCD requires that these long exposure periods (40 and 70 years) be assessed. The actual risks are not expected to be any higher than the predicted risks and are likely to be substantially lower. The cancer risk for an inhaled TAC is estimated by multiplying the exposure concentration by the breathing rate (l/kg-day) times the inhalation cancer potency factor (milligrams per kilogram per day [mg/kg-day])$^{-1}$.

### 5.3.2.3 DPM Unit Risk Factor

The DPM inhalation potency factor is a best-estimate value established by the ARB Scientific Review Panel (SRP) based on review of more than 30 DPM exposure studies. The established potency risk factor is a 95$^{th}$ percentile upper confidence limit value, meaning that there is only a five percent chance that the value is underestimated (too low). The most significant of these studies reviewed by the SRP are occupational studies of exposure to DPM by railroad workers. The occupational results were then extrapolated to the general population, which may include more sensitive individuals than the railroad workers evaluated in the study (ARB, 2004).

### 5.3.2.4 Analytical Uncertainties

Sources of uncertainty in the assessment of risks to public health include emissions estimates, dispersion modeling, exposure characteristics, and extrapolation of toxicity data in animals to humans used to develop unit risk factors (cancer) and RELs (non-cancer). To address this uncertainty, highly conservative assumptions were used in this HRA, as discussed below. In aggregate, these assumptions overestimate the predicted risks such that actual risks are unlikely to be higher, but could be considerably lower or non-existent.

<u>Air Dispersion Modeling</u>

In general, EPA-dispersion models such as ISCST3 (used in this HRA) are designed to over-predict concentrations rather than under-predict. For example, the model algorithms assume chemical emissions are not transformed in the atmosphere into other chemical compounds (e.g., photochemical reactions). For certain pollutants, conversion may occur quickly enough to reduce concentrations substantially.

Exposure Characteristics

Important uncertainties related to exposure include the identification of exposed populations and their exposure characteristics. The choice of a "residential" maximum exposed individual is very conservative in the sense that no real person is likely to spend 24 hours a day, 365 days a year over a 70-year period at exactly the point of highest toxicity-weighted annual average air concentration. Further, the remaining life of the Landfill with the proposed TRRP would be approximately 20 years.

Toxicity Assessment

Another area of uncertainty is in the use of toxicity data in risk estimation. Estimates of toxicity for the HRA obtained from OEHHA are conservative compilations of toxicity information. Toxicity estimates are derived either from observations in humans or from projections derived from experiments with laboratory animals. When toxicity estimates are derived from animal data, they usually involve extra safety factors to account for possibly greater sensitivity in humans, and the less-than-human-lifetime observations in animals. Overall, the chemical toxicity factors (e.g., unit risk factors and RELs) used in the proposed Project HRA are biased toward over-estimating risk. The amount of the bias is unknown, but could be substantial.

#### 5.3.2.5 Risk Reporting

The original Tajiguas Landfill Expansion EIR (County of Santa Barbara, 2002) determined there would be a Class I significant health risk impact. This result was based on exceedance of the cancer risk threshold at the point of maximum impact (PMI) which occurred at the Landfill property boundary. For CEQA impact analyses, the SBCAPCD currently only requires the reporting of the HRA results at a PMI that is reasonably accessible to the public for the acute non-cancer health risk (SBCAPCD, 2014b, 2014c). Acute impacts are based on short term exposures, and hence could be experienced by people after a relatively short exposure (e.g., 1 hour). Long term impacts, e.g., cancer risk and chronic non-cancer effects that depend on exposures over many years (9 to 70 years), are only required to be reported for the maximum exposed individual at a residence (MEIR) or work place (MEIW).

Health impacts were assessed at all receptors shown in Figures 5-5 and 5-6 as previously noted. Those receptor grids were used to determine the health risk at the PMI for Acute HI, as well as the HRA results at the MEIR and MEIW.

## 5.4 Greenhouse Gas

### 5.4.1 Landfill Greenhouse Gas Emissions after Waste Diversion

A landfill produces GHG emissions through aerobic and anaerobic breakdown of waste. Multiple factors including regional climate as well as quantity and type of waste determine the quantity and time release of these GHG emissions. EPA 40 CFR 98 Subpart HH provides a methodology to calculate the annual release of $CH_4$ and $CO_2$ from a landfill. However, biogenic

$CO_2$ emissions are excluded as they are part of the natural carbon cycle. $CO_2$ emissions naturally occur in the environment but are considered pollutants when they result from anthropogenic processes. Because all $CO_2$ emissions, regardless of being biogenic or anthropogenic, result in the same warming effect it is important to track them where possible.

However, when naturally occurring $CO_2$ is emitted as a result of an industrial process, it should not be counted as a pollutant generated by the facility. For the TRRP, existing $CO_2$ within the landfill that is produced (collected) with the biogas is considered to be naturally occurring $CO_2$.

The Tajiguas landfill is required to calculate and report GHG emissions to the EPA on an annual basis. In order to assess the true impact of the TRRP, it is necessary to forecast what the Landfill GHG emissions would be based on a future scenario in which the Project will be undertaken. A scenario projecting the annual GHG emissions into the future will demonstrate the cumulative effects of waste diversion over an extended time period.

TRRP will divert a large quantity of waste containing high levels of organic carbon away from the landfill. EPA 40 CFR 98 Subpart HH methodologies were used to predict future annual GHG emissions due to the operation of TRRP. The EPA methodology for reporting GHG emissions was originally derived from the IPCC protocols and is considered a first-order decay model. A first-order decay model is the most widely used scientific methodology for predicting the GHG emissions from the decomposition of waste. Calculations are contained in Attachment E.

Equation HH-1 in 40 CFR 98 Subpart HH was used to model annual $CH_4$ emissions. Table HH-3 was used to calculate the landfill gas collection efficiency rate, which was then multiplied by the results of Equation HH-1 to predict the total $CH_4$ collected by the landfill gas collection system in the future. Equation HH-6 was used to account for $CH_4$ collection, destruction efficiency, and oxidation. All equations and tables are taken from EPA 40 CFR 98 Subpart HH and all variables used were taken directly from Tajiguas Landfill's 2012 report to the EPA. Projected future years required the following additional assumptions:

- 75,461 MT of waste disposed of annually until 2036;
- A 95 percent reduction in the degradable organic carbon (DOC) factor; and
- Final emissions year of 2066.

The annual waste disposal quantity of 75,461 MT until 2036 was selected based on the following factors:

- 188,654 MT, which is the average annual disposal over the last ten years, was assumed to be the annual waste disposed without TRRP.
- Based on the project description estimate, about 60% of the 188,654 MT of waste would be diverted by the MRF, leaving 75,461 MT still to be landfilled.
- Tajiguas Landfill is predicted to accept waste until 2036 if TRRP is implemented.

The 95 percent reduction in the DOC factor was selected because the engineering assessment of the Project description estimates that the MRF will separate 95 percent of organic material.

The final emissions year was selected as 2066 because the Tajiguas Landfill will be set to close in 2036 if TRRP is implemented and the EPA estimates that a landfill can produce $CH_4$ emissions from waste decomposition for up to 30 years after closure.

### 5.4.2 Construction Greenhouse Gas Emissions Calculations

GHG emissions will be generated during construction of the Project by the combustion of fuel in off-road construction equipment engines and in on-site and off-site motor vehicle engines.

#### 5.4.2.1 Construction Equipment

Daily GHG emissions from construction equipment were calculated by multiplying emission factors, in pounds per hour, calculated using ARB's OFFROAD2007 model (ARB, 2006), by daily construction equipment operating hours. The OFFROAD2007 model estimates $CO_2$ and $CH_4$ emissions by type of equipment and engine horsepower ranges. The model also estimates daily operating hours and fuel consumption by type of equipment and engine horsepower ranges. The $CO_2$ and $CH_4$ emission factors by type of equipment and horsepower range were calculated by dividing the OFFROAD2007 daily emissions estimates for Santa Barbara County for 2015, the year that construction is anticipated to begin, by the daily OFFROAD2007 estimated operating hours in Santa Barbara County. Because the OFFROAD2007 model does not estimate $N_2O$ emissions, $N_2O$ emission factors were estimated using the default emission factor for $N_2O$ emissions from diesel-fueled construction equipment in Table 13.7 of the 2013 Climate Registry Default Emission Factors (Climate Registry, 2013). This default emission factor is in grams per gallon of diesel fuel. Hourly fuel use by type of equipment and horsepower range calculated from the OFFROAD2007 model output was used to convert the emission factor to pounds per hour.

The vendor's construction contractor provided estimates of the types, horsepower ratings, numbers and daily operating hours by month for the construction equipment anticipated to be used during construction of the Project. These estimates are provided in Attachment A.

Monthly $CO_2$, $CH_4$ and $N_2O$ emissions from off-road construction equipment during construction of the Project were estimated by multiplying daily emissions during each month by 22 working days per month, and emissions during all of the construction months were summed to calculate total emissions.

#### 5.4.2.2 Motor Vehicles

Daily GHG emissions from on-site and off-site motor vehicle travel were calculated by multiplying emission factors, in grams per mile, calculated using ARB's EMFAC2011 model (ARB, 2013a) by daily on-site and off-site vehicle-miles-traveled (VMT). The EMFAC 2011 model estimates daily $CO_2$ emissions by type of vehicle and type of fuel. The model also estimates daily VMT by type of vehicle and type of fuel. The $CO_2$ emission factors by type of vehicle and fuel were calculated by dividing daily emissions in Santa Barbara County for 2015 by daily VMT in Santa Barbara County.

The EMFAC2011-LDV model (ARB, 2013b) estimates daily $CH_4$ emissions and VMT by type of vehicle for gasoline-fueled vehicles. $CH_4$ emission factors for gasoline-fueled vehicles were estimated by dividing daily $CH_4$ emissions in Santa Barbara County for 2015 by daily VMT in Santa Barbara County. $CH_4$ emission factors for diesel-fueled vehicles were estimated by multiplying total organic gases (TOG) emission factors by 0.048, as recommended by ARB (2013c). TOG emission factors by type of vehicle were estimated by dividing total TOG emissions in Santa Barbara County in 2015 from the EMFAC2011 model by daily VMT in Santa Barbara County.

As recommended by ARB (2013c), $N_2O$ emission factors for gasoline-fueled vehicles were estimated by multiplying the $NO_x$ emission factors, calculated as described in Section 5.1.1.2, by 0.0416. $N_2O$ emission factors for diesel-fueled vehicles were estimated by dividing the emission factor of 0.3316 grams per gallon (recommended by ARB (2013c)) by the estimated fuel mileage, in miles per gallon, by type of vehicle. The mileage was estimated by dividing total daily fuel consumption by type of vehicle in Santa Barbara County for 2015 estimated by the EMFAC2011 model by the total daily VMT by type of vehicle in Santa Barbara County.

The vendor's construction contractor provided estimates of the types, number and daily on-site VMT by month for motor vehicles anticipated to be used on-site, which were used to calculate daily on-site motor vehicle exhaust emissions by month. Off-site motor vehicle travel was estimated from the construction contractor's estimates of the types and number of vehicles that would be used, including construction worker commuting vehicles, by estimates of the daily off-site distances that each vehicle would travel. These estimates are provided in Attachment A.

Monthly $CO_2$, $CH_4$ and $N_2O$ emissions from motor vehicles during construction of the Project were estimated by multiplying daily emissions during each month by 22 working days per month, and emissions during all of the construction months were summed to calculate total emissions.

### 5.4.3 Operation Greenhouse Gas Emissions Calculations

GHG emissions will be generated during operation of the Project by the following sources:

- Exhaust from the two Jenbacher/GE CHP engines:
  - o Combusting biogas produced in the anaerobic digesters. However, the biogenic $CO_2$ produced is ultimately excluded and only the trace $CH_4$ and $N_2O$ emissions are included in the final analysis;
  - o **Combusting natural gas or propane co-firing in the CHP during some operations as listed in Section 5.4.3.1 below.**

- Exhaust from the flare combusting biogas produced in the anaerobic digesters when the gas in a digester is purged through the flare prior to opening it to remove the digestate and when a CHP engine is offline. However, the biogenic $CO_2$ produced is ultimately excluded and only the trace $CH_4$ and $N_2O$ emissions are included in the final analysis;
- **Exhaust from the diesel-fueled emergency generator;**
- Exhaust from off-road equipment used in the MRF and AD Facility (front-end loaders, forklifts, material handler and a sweeper) and equipment used in the composting process (screen machine and windrow turner)
- Exhaust from motor vehicles operating on-site and off-site;
- Indirect GHG emissions offset from export of electricity; and.
- Fugitive $CH_4$ from the composting windrows.

#### 5.4.3.1 Emissions from CHP Engines

**The CHP engines will be Jenbacher/GE Model JMS416Vb82, with an engine horsepower rating of 1,573 hp.**

Hourly $CO_2$, $CH_4$ and $N_2O$ emissions from biogas combustion in the two CHP engines were estimated by multiplying emission factors, in grams per MMBtu, by the hourly fuel heat input by the engines, in MMBtu per hour. The default $CO_2$, $CH_4$ and $N_2O$ emission factors for natural gas**/propane** combustion from Tables C-1 and C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas combustion were used since the heating values of both biogas and natural gas are primarily from methane. The hourly fuel heat input was from engine manufacturer's specifications.

**The CHP engines will be fueled with biogas or with a mixture of biogas and natural gas/propane as follows:**

- **During normal operation with both engines operating, the engines will be fueled with a mixture of approximately 86.5 percent biogas and 13.5 percent natural gas/propane.**
- **When only one engine is operating, it will only be fueled with biogas.**
- **During engine start-up and SCR catalyst burn-in, the engine will only be fueled with natural gas or propane, and only one engine will start up at a time.**

**Propane and natural gas have similar emission factors. Combustion of propane in the engines as a startup/assisting fuel in place of natural gas will have minimal effect on emissions. Startup ROC is assumed to increase for propane combustion, as the effectiveness of the oxidation catalyst will be minimized before the engine achieves a higher sustained exhaust temperature. Sulfur content of the propane is based on typical**

**propane contents using HD-5 sulfur content limitations. Emissions from CO, ROC (non-startup), $NO_x$, PM10, and PM2.5 are expected to be similar to natural gas.**

Additionally, $CO_2$ in the biogas would be emitted in the CHP exhaust. These "pass-through" $CO_2$ emissions were estimated from the vendor's estimate of the $CO_2$ volume fraction in the biogas (60 percent) and the estimated biogas consumption rate, provided by the engine manufacturer.

Annual emissions were estimated by multiplying estimated hourly emissions by estimated operating hours per year. The annual operating hours were estimated by dividing the estimated annual biogas production by the hourly biogas consumption by the engines.

$CO_2$ emissions from biogas are considered biogenic. The~~se~~ **86.5 percent of** biogenic emissions are accounted for, but are excluded from the final analysis as they are considered a part of the natural carbon cycle. As discussed in Section 5.4.1, when naturally occurring $CO_2$ emissions are released as a result of an industrial process they should not be counted as a pollutant generated by the facility.

#### 5.4.3.2 Emissions from Flare

Hourly $CO_2$, $CH_4$ and $N_2O$ emissions from biogas combustion in the flare were estimated by multiplying emission factors, in grams per MMBtu, by the hourly fuel heat input to the flare, in MMBtu per hour. The default $CO_2$, $CH_4$ and $N_2O$ emission factors for natural gas combustion from Tables C-1 and C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas combustion were used since the heating values of both biogas and natural gas are primarily from methane. During AD vessel purging, the hourly fuel heat input (i.e., the amount of biogas combusted in the flare) was assumed to be one-sixteenth[4] of the total heat input for the two CHP engines operating at 100 percent load. When a CHP engine is offline, the hourly fuel heat input was assumed to be equal to the heat input for one CHP engine operating at 100 percent load.

Additionally, $CO_2$ in the biogas would be emitted in the flare exhaust. These "pass-through" $CO_2$ emissions were estimated from the $CO_2$ volume fraction in the biogas and the estimated biogas consumption rate, assumed to be one-sixteenth of the total biogas consumption for the two CHP engines operating at 100 percent load.

Annual emissions were estimated by multiplying estimated hourly emissions by estimated operating hours per year. The annual operating hours were provided by the vendor.

[4] This amount is based on the gas in one of the 16 anaerobic digester vessels being purged through the flare prior to opening the vessel to remove the digestate.

$CO_2$ emissions from biogas are considered biogenic. Similar to $CO_2$ emissions from the CHP engines, **86.5 percent of** these biogenic emissions are accounted for, but are excluded from the final analysis as they are considered a part of the natural carbon cycle.

### 5.4.3.3

**Hourly $CO_2$, $CH_4$ and $N_2O$ emissions from the standby emergency generator were estimated by multiplying emission factors, in grams/gallon, by the generator hourly fuel consumption, in gallons per hour, and the amount of time during an hour that the engine is anticipated to be operated during testing and maintenance. Default $CO_2$, $CH_4$ and $N_2O$ emission factors for diesel fuel combustion from Tables C-1 and C-2 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel combustion were used. Hourly fuel consumption was from the manufacturer's specifications. The vendor estimated that the generator would be operated for 30 minutes once per week for testing and maintenance. Annual emissions were estimated by multiplying emissions during one 30-minute testing and maintenance period by 52 testing and maintenance periods per year.**

### 5.4.3.4 Emissions from Off-Road Equipment

Daily $CO_2$, $CH_4$ and $N_2O$ exhaust emissions from each piece of off-road equipment that would be operated for the Project were estimated by multiplying emission factors, in grams per gallon, by the equipment hourly fuel consumption rate, in gallons per hour. **These equipment are listed in Section 5.1.2.7 above.** The default $CO_2$ emission factor from Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No.2 distillate fuel oil and default $CH_4$ and $N_2O$ emission factors for diesel fuel combustion from Tables 12.1 and 13.7 of the 2013 Climate Registry Default Emission Factors (Climate Registry, 2013) were used. The vendor provided estimates of hourly fuel consumption.

Annual emissions were estimated by multiplying hourly emissions by the vendor's estimates of the hours per day and days per year that the equipment would be operated.

### 5.4.3.5 Emissions from Motor Vehicles

The types of motor vehicles that would be operated for the Project are listed in Section 5.1.2.**8**. Daily $CO_2$, $CH_4$ and $N_2O$ emissions from the motor vehicles were estimated by multiplying emission factors, in grams per mile, by daily VMT.

The $CO_2$ emission factor for the natural-gas fueled Freightliner tractors was estimated from the natural gas $CO_2$ emission factor for compressed natural gas (CNG)-fueled vehicles, in grams per standard cubic foot, from Tables 13.1 of the 2013 Climate Registry Default Emission Factors (Climate Registry, 2013), the diesel-fuel equivalent mileage estimated by the vendor and the heat contents of diesel fuel and natural gas. The $CH_4$ and $N_2O$ emission factors for CNG-fueled heavy-duty vehicles, in grams per miles, from Table 13.6 of the 2013 Climate Registry Default Emission Factors (Climate Registry, 2013), were used for the Freightliner tractors.

The $CO_2$ emission rate for 2017 model year light-heavy duty trucks 2 in Santa Barbara County in 2017 from the EMFAC2011 model (ARB, 2013a) was used for the Ford F350 XL truck. As recommended by ARB (2013c), the $CH_4$ emission factor was estimated by multiplying the TOG emission rate for those vehicles by 0.048, and the $N_2O$ emission factor was estimated by dividing the emission factor of 0.3316 grams per gallon by the estimated fuel mileage, in miles per gallon, provided by the vendor.

The $CO_2$ emission factors for the other vehicles (diesel-fueled tractors, Ford F250 XL trucks and worker commuting vehicles) were estimated by dividing daily emissions in Santa Barbara County for 2017 estimated by the EMFAC2011 model (ARB, 2013a) by daily VMT in Santa Barbara County for 2017.

$CH_4$ emission factors for worker commuting vehicles, which were assumed to be gasoline-fueled, were estimated by dividing daily $CH_4$ emissions in Santa Barbara County for 2017 by daily VMT in Santa Barbara County calculated with the EMFAC2011-LDV model (ARB, 2013b). $CH_4$ emission factors for the diesel-fueled tractors and Ford F250 XL trucks were estimated by multiplying TOG emission factors by 0.048, as recommended by ARB (2013c). TOG emission factors by type of vehicle were estimated by dividing total TOG emissions in Santa Barbara County in 2017 from the EMFAC2011 model by daily VMT in Santa Barbara County.

As recommended by ARB (2013c), $N_2O$ emission factors for the gasoline-fueled worker commuting vehicles were estimated by multiplying the $NO_x$ emission factors, calculated as described in Section 5.1.2.**8**, by 0.0416. $N_2O$ emission factors for the diesel-fueled tractors and Ford F250 XL trucks were estimated by dividing the emission factor of 0.3316 grams per gallon recommended by ARB (2013c) by the estimated fuel mileage, in miles per gallon. The mileage was estimated by dividing total daily fuel consumption by type of vehicle in Santa Barbara County for 2017 estimated by the EMFAC2011 model by the total daily VMT by type of vehicle in Santa Barbara County.

The estimation of daily VMT for each type of vehicle is described in Section 5.1.2.**8**. Annual $CO_2$, $CH_4$ and $N_2O$ emissions were estimated by multiplying daily emissions by the anticipated number of days per year that each type of vehicle would operate.

#### 5.4.3.6 Indirect GHG Emissions Offset from Export of Electricity

There are multiple sources of electricity associated with the proposed Project. The Project's AD and solar photovoltaic arrays, both of which are sources of renewable energy, would provide enough electricity to operate the site, and any excess electricity generated on site would be exported to the Southern California Edison (SCE) grid. The gross energy generation totals were provided by the County's vendor. The difference between the electricity generated on site and the electricity consumed is equal to the energy exported. Each energy grid has an average emissions-to-energy intensity. According to the Climate Action Reserve, SCE has an average emissions intensity of 630.9 lb $CO_2$e/MWh (megawatt hour). Multiplying this factor by the gross electricity exported provides the GHG offset for energy generation on site. These estimates are provided in Attachment A.

#### 5.4.3.7 Fugitive CH4 Emissions from Composting Windrows

$CH_4$ emissions from the composting windrows were estimated by multiplying an emission factor, in pounds per hour per 1,000 square feet of surface area, by the estimated surface area of the compost windrows.

Emission factors for composting anaerobic digestate mixed with wood chips are not available. An emission factor from source tests conducted by the SCAQMD at San Joaquin Composting, Inc. in Lost Hills, California in February and March 1996 is 1.23 lb/1,000 square feet per hour (SCAQMD, 1996). The facility composted 50 percent digested sewage sludge and 50 percent green waste by weight. The $CH_4$ emission factor for composting digestate was estimated by the vendor to be three percent of the source test report emissions due to an estimated 97 percent capture of the feedstock's biomethane potential (See Section 5.1.2.**14**) and related emissions during the two 28-day in-vessel anaerobic digestion/composting phases.

The compost windrows' surface area was calculated from the vendor's estimate of the windrows' volume, the windrows' width and height (see Attachment A), and the use of a triangular windrow cross section. Daily emissions were estimated by multiplying hourly emissions by 24 hours per day, and annual emissions were estimated by multiplying daily emissions by 365 days per year.

## 5.5 Odors

The potential for an objectionable odor response depends on several other factors besides the magnitude of the odor. These other factors are the frequency, duration, location and offensiveness of the odor. For this study, the modeling of odor unit emissions provides a means to accomplish a quantitative odor impact assessment.

### 5.5.1 Operating Scenario

For the proposed TRRP, odors would be generated at the MRF and AD facilities, composting and finishing operations areas. Based on the current understanding of the MRF and AD facilities, the odor control strategy will be to enclose the process(es) where possible, maintain negative air pressure inside the buildings, and process general odorous air with three different biofilters for treatment. When designed and operated properly, the **four** ~~three~~ biofilters will be the ~~three~~ main sources of odors from the ventilation and exhaust systems. Gaseous products from the anaerobic digestion process are sent to the CHP engines for combustion, and odors are assumed to be oxidized and odorous emissions from this source would be insignificant. The aerobic composting and finishing operations areas will not be covered; however, odors from composting and finishing areas are expected to be minimized as the materials would have already gone through the main anaerobic digestion process. Best management practices and standard operating procedures will limit the amount of fugitive odor emissions from the facilities and composting areas.

The MRF biofilter will extract general air from the organics recovery, recyclable sorting and recyclable storage areas inside the MRF building. The most odorous area is expected to be the organics recovery area which is ventilated at 5 air changes per hour. The recycling sorting and storage areas are ventilated at 4 and 3 air changes per hour, respectively. Residual material will cause odors in the separated recycled streams, but they will not be as odorous as the organics recovery stream.

The AD biofilter will extract general air from the mixed organics, central mixing, Source Separated Organics mixing and Source Separated Organics delivery areas. These sources are expected to be the most odorous due to the amount of stockpiling, physical mixing/agitation, and age of material. The air changes per hour will range from 3 to 4 for each of the areas, and some re-circulated air may be introduced from the MRF facility. Based on a pressurized bladder seal door system, the AD vessels are assumed to be completely isolated from the AD facility working space. However, a small portion of the purge air from the anaerobic digesters may be released into the general building ventilation or it will be directly exhausted to the biofilter. This release will increase the odor loading for short durations. The odor loading of the AD biofilter**s** will be greater than the tipping floor biofilter since the material is older and has higher organic content.

Based on a review of sampling results from a similar composting facility in a German study by Bekon (BUB, 2010), typical biofilter odor inlet loadings can average 3,300 OU/$m^3$. Although the review of sampling results indicates a high odor removal efficiency range of 95 to 98 percent, the Bekon study shows the odor removal efficiency to be approximately 90 percent or 339 OU/$m^3$ outlet concentration.

The tipping floor biofilter will extract general ventilation air from the tipping floor. This area is ventilated at 5 air changes per hour; however, some of the supply air may be re-circulated from the MRF area. The tipping floor will stockpile MSW, which will start to decompose and release odors. If material is stockpiled for longer periods and left undisturbed, odor emissions can increase. Based on the Bekon test data (BUB, 2010), the tipping floor biofilter is estimated to have an average outlet loading of 436 OU/$m^3$.

MSW- and SSOW-derived digestate will be separately laid down into windrows at the composting area. Literature review shows that odors in concentrations of 600 to 1,000 OU/$m^3$ were released from MSW windrows, and odors emitted from organic waste and food waste windrows were found to be around 410 OU/$m^3$.Based on the Bekon study (BUB, 2010), a value of 1,005 OU/$m^3$ was measured at a similar landfill in Germany. For the TRRP odor impact modeling, 1,005 OU/$m^3$ is assumed for odor emitted from the undisturbed (pre-turning) MSW- and SSOW-derived digestate windrows with mitigation measures equaling a control efficiency of 85 percent based on the 20 minutes of irrigation after turning, mixing in 20 percent wood chips, and compost blanket (a pseudo-biofilter).

Windrow turning (and other means of agitation) causes release of intense odors which are typically experienced following turning. Windrow turning increases odor emission by opening the interior of windrows and releasing trapped odorants. Odors are greatest with the first turning and subside quickly with subsequent turnings. Based on the Bekon test data (BUB, 2010), odor release from the windrow immediately after turning is approximately 3,633 $OU/m^3$ on average.

Odor release from the cured compost storage area is expected to be relatively low. The Bekon study (BUB, 2010) measured odor concentrations for yard waste, MSW and organic waste curing piles of 27 $OU/m^3$ on average. It has been assumed that odor released from the cured compost storage area would be approximately 27 $OU/m^3$ with mitigation measures similar to those employed for the compost windrows area.

Based on the operation of the facility, the following scenario shown in Table 5-4 was determined to be the most reasonable operating scenario to produce maximum or conservative odor results. Note that although the MRF would operate from 7 a.m. to 11 p.m., it is conservatively assumed that odors could be generated inside the MRF and exhausted through the biofilter 24 hours per day.

**Table 5-4 Operating Scenario for the Odor Emission Sources**

| Source Grouping | Source State | Daily Operation | Odor Emission $OU/sec/m^2$ |
|---|---|---|---|
| **Tipping Area** ~~MRF~~ Biofilter | Constant | 24 hours/day | **10.30** ~~6030.32~~ |
| ~~Tipping Area~~ **MRF Biofilter (AD1 and AD2)** | Constant | 24 hours/day | **20.45** ~~23.843 [1]~~ |
| AD Facility Biofilter**s (BFSCRUB)** | Constant | 24 hours/day | **8.46** ~~9.44~~ |
| Windrow Group 1 (undisturbed) | Constant | 24 hours/day | **0.0814** ~~0.0799~~ |
| Windrow Group 2 (recently turned) | Intermittent | 8 a.m. to 4 p.m.<br>4 p.m. to 8 a.m. | 1.0275<br>0.5427 |
| Cured Pile & Screening | Constant | 24 hours/day | 0.0035 |

~~[1] Emissions for the tipping area biofilter are OU/sec since the emissions are vented to a stack and represented as a point source in the modeling.~~

Although delivery of material may only occur during the day, the MRF and AD facilities can be processing stockpiled material and the biofilters will be a constant odor source 24 hours per day. For the composting area windrows, it was assumed that approximately one quarter of the piles are turned during one working day. For convenience, the windrow piles are divided into two separate groups. It was assumed that the eastern-most group (closest to the properly line) had recently been turned and that the entire group will have emissions for a freshly turned windrow between the hours of 8 a.m. and 4 p.m., 7 days per week (although the composting area operates on a 6 day per week schedule). The average odor flux for a recently turned windrow, instead of the peak, is used to represent that some piles might be more or less offensive at the TRRP. Outside of these operating hours, the eastern-most group will emit odors with an undisturbed emission rate. The other windrow group is assumed to be undisturbed and to emit odors at a constant rate. The operating scenario does not include an analysis of upset conditions such as failures with the biofilter, biogas system, building ventilation system, etc.

### 5.5.2 Model Inputs

As previously discussed, SBCAPCD Modeling Guidance requires that the ISCST3 model be used for air dispersion modeling assessments. Therefore, the latest version of ISCST3 was used for the modeling of odor emissions.

Similar model inputs from the criteria pollutants impact analysis were used for the odor impact modeling. The buildings, source parameters and meteorological data set remain the same. Only one "pollutant", odor, was modeled. All sources were modeled as area sources with an odor flux rate in OU/sec/$m^2$. Table 5-5 presents the emission rates modeled. Note that because of emission unit limitations, it was necessary to divide the emission rates by 1,000, and then multiply the modeled impacts by 1,000 in order to facilitate the modeling.

**Table 5-5 Modeled Odor Source Parameters and Emission Rates**

| Source Description | Source Name | Release Height (m) | Area ($m^2$) | Initial Sigma-z (m) | Emissions (OU/sec/$m^2$) |
|---|---|---|---|---|---|
| Tipping Area Biofilter | BF_TIP | **2.74** ~~3.05~~ | **585.3** ~~371.8~~ | **6.95** ~~4.96~~ | **1.0303E-02** ~~6.03E+00 [1]~~ |
| MRF Biofilter | BF_**AD1**~~MRF~~ | **9.71** ~~8.84~~ | **780.4** ~~669.2~~ | **3.24** ~~1.28~~ | **2.0446E-02** ~~2.38E-02~~ |
| AD Facility Biofilter | BF_AD**2** | **9.71** ~~8.84~~ | **662.2** ~~557.7~~ | **3.24** ~~1.28~~ | **2.0446E-02** ~~1.00E-02~~ |
| **AD Facility Biofilter** | **BF_SCRUB** | **9.71** | **14,068.8** | **3.24** | **8.46E-03** |
| Windrow Area – Undisturbed | WINDROWS | 3.66 | 14075.4 | 1.83 | 8.14E-05 |
| Windrow Area – Recently Turned | TURNING | 3.66 | 4512.6 | 1.83 | 1.03E-03 |
| Curing Pile | CURING | **3.66** ~~6.10~~ | 1412.3 | 1.83 | 3.55E-06 |

~~[1] Emissions for the tipping area biofilter are OU/sec since the emissions are vented to a stack and represented as a point source in the modeling.~~

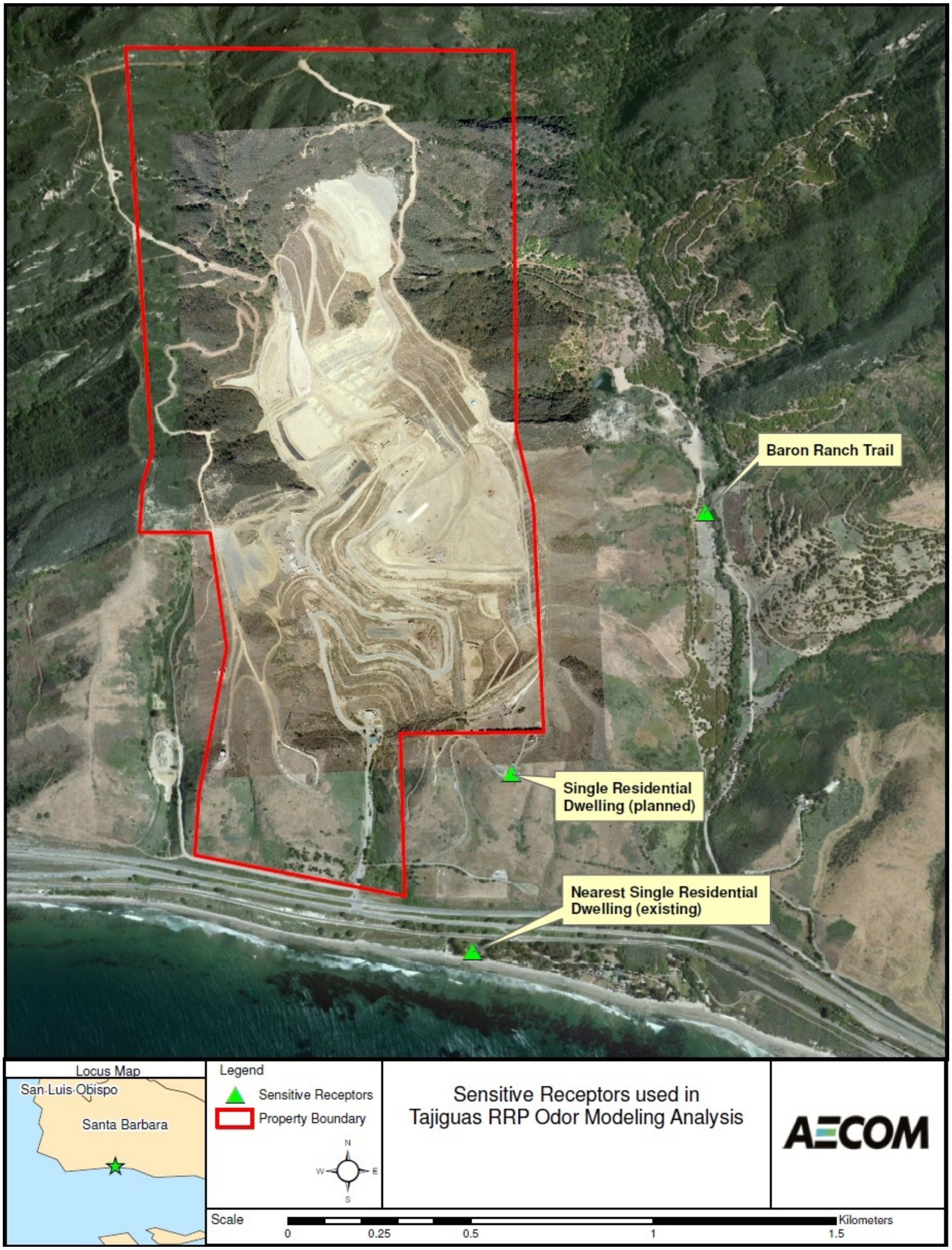
All guidelines for odor-based contaminants are expressed in a 10-minute averaging period; however, the dispersion model estimates concentration for a 1-hour averaging time period. Hourly results obtained with the model needed to be converted to 10 minutes average concentration according to the following equation: C (1 hour) = C (10 minutes) *$(10/60)^{0.28}$.

A standard receptor grid was placed around the TRRP facility, along with receptors spaced evenly along the property line, similar to the criteria pollutant impact analysis. In addition, three single point receptors were chosen for frequency analysis (Table 5-6). These receptors were selected to represent locations where members of the general public might be present. One receptor was located on the nearby Baron Ranch hiking trail to the east, while the other two were located at the closest residential dwelling in the southeast rural community, and at the location of a planned residence located in close proximity to the landfill. The locations of these receptors are shown in Figure 5-11.

**Table 5-6 Single Point Receptors Used for Frequency Analysis**

| Single Point Receptor | UTM East | UTM North |
|---|---|---|
| Baron Ranch Trail | 764609 | 3819332 |
| Closest Existing Single Residential Dwelling (Arroyo Quemada Lane) | 764002 | 3818221 |
| Closest Planned Single Residential Dwelling (APN 081-150-034) | 764109 | 3818707 |

## Figure 5-10 Receptors used in TRRP Odor Modeling Analysis



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# 6.0 Impact Assessment Results

## 6.1 Criteria Pollutants

The following section is an analysis of criteria pollutant air quality impacts associated with construction and operation of the proposed Project.

### 6.1.1 Emissions Estimates

#### 6.1.1.1 Construction Emissions Estimates and Impacts

Table 6-1 shows the maximum estimated criteria pollutant emissions generated during consecutive 12-month periods during the Project's 19 months of construction using the methodologies described in Section 5.1. These estimates only account for reductions from dust control measures such as application of water and/or dust suppressants, and no other reductions were assumed. Accordingly, the emissions reported in Table 6-1 for ROC, $NO_x$, CO, and $SO_x$ are unmitigated. As discussed above in Section 4.1.1, Santa Barbara County does not have quantitative CEQA significance thresholds for temporary construction impacts, and instead the analysis compares the emissions to the SBCAPCD Rule 202 offset thresholds.

**Table 6-1 Maximum 12-Month Construction Emissions**

| | Maximum Annual Emissions (tons/12 months) | | | | | |
|---|---|---|---|---|---|---|
| | **ROC** | **$NO_x$** | **CO** | **$SO_x$** | **PM10** | **PM2.5** |
| Maximum 12-Month Total | 1.71 | 11.35 | 8.38 | <0.005 | 11.77 | 1.69 |
| SBCAPCD Threshold[1] | 25 | 25 | -- | 25 | 25 | 25 |
| Significant Impact (Yes/No) | No | No | No | No | No | No |

[1] SBCAPCD Rule 202 D.16

Under SBCAPCD Rule 202 D.16, for projects that include a stationary source that requires an Authority to Construct permit, a 25 tons per year threshold is used for criteria pollutant emissions, except carbon monoxide. If pollutants exceed the 25 tons per year threshold, the owner of the stationary source is required to provide offsets and must demonstrate that no ambient air quality standard will be violated. As shown in Table 6-1, the maximum construction emissions during a 12-month time period would not exceed the established thresholds.

#### 6.1.1.2 Normal Operation Emissions Estimates

Operation emissions were calculated both for the Project without the optional CSSR component and for the Project with the optional CSSR component. Table 6-2 and Table 6-3 show maximum daily criteria pollutant emissions generated during operation of the base Project (without the optional CSSR). Table 6-2 includes emissions from all sources – on-site equipment, on-site vehicles, and off-site vehicles and compares the emissions to the daily triggers for offsets in the SBCAPCD New Source Review Rule (55 pounds per day for $NO_x$ or ROC; 80 pounds per day for PM10). Table 6-3 shows emissions from on-site and off-site vehicles only and compares emissions to Santa Barbara County's threshold of 25 pounds per day of $NO_x$ or ROC for motor vehicle trips only.

**Table 6-2 Maximum Daily Operation Emissions – All Sources (Without Optional CSSR)**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | ROC | $NO_x$ | CO | $SO_x$ | PM10 | PM2.5 |
| On Site Equipment and Vehicles | **39.89** ~~43.98~~ | **45.18** ~~44.79~~ | **143.32** ~~151.79~~ | **13.53** ~~27.01~~ | **39.87** ~~37.86~~ | **23.01** ~~22.86~~ |
| Off Site Vehicles | 4.42 | 6.87 | 23.76 | 0.07 | 4.33 | 1.30 |
| Total Emissions | **44.32** ~~48.40~~ | **52.04** ~~51.66~~ | **167.08** ~~175.55~~ | **13.61** ~~27.08~~ | **44.20** ~~42.19~~ | **24.31** ~~24.16~~ |
| Santa Barbara County CEQA Threshold[1] | 55 | 55 | -- | -- | 80 | -- |
| Significant Impact (Yes/No) | No | No | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008). These thresholds are based on SBCAPCD's New Source Review Rule.

**Table 6-3 Maximum Daily Operation Emissions – Vehicle Emissions Only (Without Optional CSSR)**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | ROC | $NO_x$ | CO | $SO_x$ | PM10 | PM2.5 |
| On Site Vehicles | 0.03 | 0.06 | 0.12 | <0.005 | 13.11 | 1.31 |
| Off Site Vehicles | 4.42 | 6.87 | 23.76 | 0.07 | 4.33 | 1.30 |
| Total Emissions | 4.45 | 6.93 | 23.88 | 0.07 | 17.44 | 2.61 |
| Santa Barbara County CEQA Threshold[1] | 25 | 25 | -- | -- | -- | -- |
| Significant Impact (Yes/No) | No | No | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008).

As shown in Table 6-2, the maximum daily emissions of ROC, $NO_x$ and PM10 from all sources are below the thresholds. Additionally, implementation of the TRRP is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated emissions. Thus, the overall change in emissions from operation of the proposed Project would be expected to be less than the emissions listed in Table 6-2. Impacts based on the emissions from the proposed Project's operation without optional CSSR would be less than significant.

As shown in Table 6-3, the maximum daily emissions from vehicles only (without CSSR) would not exceed the thresholds established by Santa Barbara County. Therefore, the vehicle emissions from operation of the Project would not result in a significant impact.

Table 6-4 and Table 6-5 show maximum daily criteria pollutant emissions generated during the Project's operation, with the inclusion of the optional CSSR element. Table 6-4 includes emissions from all sources – on-site equipment, on-site vehicles, and off-site vehicles and compares the emissions to the daily triggers for offsets in the SBCAPCD New Source Review Rule (55 pounds per day for $NO_x$ or ROC; 80 pounds per day for PM10). Table 6-5 shows emissions from on-site and off-site vehicles only and compares emissions to Santa Barbara County's threshold of 25 pounds per day of $NO_x$ or ROC for motor vehicle trips only. As shown in Table 6-4, the maximum daily emissions of ROC, $NO_x$ and PM10 from all sources including CSSR are below the thresholds. As shown in Table 6-5, the maximum daily emissions from vehicles only, with the optional CSSR element, would not exceed the thresholds established by Santa Barbara County.

**Table 6-4 Maximum Daily Operation Emissions – All Sources (With CSSR)**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | ROC | $NO_x$ | CO | $SO_x$ | PM10 | PM2.5 |
| On-site Equipment and Vehicles | **39.91** ~~44.01~~ | **37.21** ~~44.86~~ | **125.87** ~~151.86~~ | **12.26** ~~27.01~~ | **46.12** ~~44.20~~ | **23.56** ~~23.49~~ |
| Off-site Vehicles | 5.73 | 4.98 | 30.71 | 0.09 | 5.45 | 1.62 |
| Total Emissions | **45.64** ~~49.74~~ | **42.91** ~~49.84~~ | **156.58** ~~182.57~~ | **12.35** ~~27.10~~ | **51.57** ~~49.65~~ | **25.17** ~~25.11~~ |
| Santa Barbara County CEQA Threshold[1] | 55 | 55 | -- | -- | 80 | -- |
| Significant Impact (Yes/No) | No | No | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008). These thresholds are based on SBCAPCD's New Source Review Rule.

**Table 6-5 Maximum Daily Operation Emissions – Vehicle Emissions Only (With CSSR)**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | ROC | $NO_x$ | CO | $SO_x$ | PM10 | PM2.5 |
| On-site Vehicles | 0.06 | 0.14 | 0.19 | <0.005 | 19.44 | 1.94 |
| Off-site Vehicles | 5.73 | 4.98 | 30.71 | 0.09 | 5.45 | 1.62 |
| Total Emissions | 5.79 | 5.12 | 30.90 | 0.09 | 24.89 | 3.56 |
| Santa Barbara County CEQA Threshold[1] | 25 | 25 | -- | -- | -- | -- |
| Significant Impact (Yes/No) | No | No | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008).

Impacts from the proposed Project's operation with the optional CSSR element would be less than significant. Emissions of each criteria pollutant from operation of the Project with the optional CSSR element are incrementally higher than the emissions from operation of the Project without the optional element.

### 6.1.1.3 Short-Term Operation Emissions Scenarios

As noted in Section **5.2.7** ~~5.1.2.12~~, emissions of $NO_x$, CO, and $SO_x$ criteria pollutants were estimated for three additional, but infrequent, short-term scenarios. These emissions are presented in Table 6-6. **Scenarios 2 and 3 reflect use of propane as the fuel, since that fuel would be worst case for $SO_2$ emissions.**

**Table 6-6 Emissions for Short-Term Scenarios**

| Scenario | Scenario Description | Emissions (pounds/hour) | | |
|---|---|---|---|---|
| | | $NO_x$ | CO | $SO_2$ |
| 1 | Flare Operation with **One** CHP Engine~~s~~ Offline | **0.79** ~~1.19~~ | **1.98** ~~3.95~~ | **0.05** ~~1.12~~ |
| 2 | **One** CHP Engine Start-up **on Propane** | **1.25** ~~1.67~~ | **5.72** ~~6.76~~ | **0.15** ~~N/A~~ |
| 3 | SCR Burn-in **on Propane** | **1.25** ~~1.67~~ | **1.04** ~~6.76~~ | **0.11** ~~N/A~~ |

### 6.1.2 Air Dispersion Modeling

ISCST3 was applied with 1 year of meteorological data to determine maximum impacts during operation of the Project in order to evaluate compliance with the NAAQS and CAAQS. All modeling files are provided in Attachment D, the electronic modeling archive. All modeling scenarios included the emissions from the optional CSSR element. Since emissions with the optional element would be higher than emissions without CSSR, the impacts without CSSR would also be lower than the results reported in this section.

#### 6.1.2.1 NAAQS Modeling Results (With CSSR)

The results of the NAAQS analysis for Normal Operations (including the optional CSSR element) are shown in **Tables 6-7 and 6-8. Results with the CHP engines emitting through the CHP engine stacks are in Table 6-7, and results with the CHP engines emitting through the RBD stack are in Table 6-8. Table 6-9 summarizes the results of the NAAQS analysis for the Flare purging with one CHP Engine offline. Table 6-10 summarizes the results of the NAAQS analysis for the CHP Engine Start-up and SCR Burn-in scenarios. These scenarios affect $NO_2$ and $SO_2$ concentrations for both scenarios and CO for CHP engine startup only. As seen in Tables 6-7 through 6-10, all impacts are below the NAAQS. Therefore compliance with all NAAQS is demonstrated.**

The modeled concentrations shown are the "design value" concentration based on the form of the standard:

- For all annual modeling periods, the NAAQS concentration is the highest modeled annual average impact.
- For 1-hour $NO_2$ and $SO_2$, the NAAQS concentration is the highest $98^{th}$ and $99^{th}$ percentile modeled impact respectively. This is a conservative value relative to the forms of those standards, which are the 3-year average of the $98^{th}$ (or $99^{th}$) percentile daily maximum impact. As SBCAPCD only provided one-year of meteorological data and because the ISCST3 model is incapable of producing results in the true form of the standard, the maximum $98^{th}$ and $99^{th}$ percentages are reported.
- For 24-hour PM2.5, the form of the standard is the 3-year average of the $98^{th}$ percentile impact. However, because EPA guidance[5] recommends adding the 3-year average of the highest modeled concentration at each receptor to the $98^{th}$ percentile background, that value is what is reported here.
- For all other standards, the form of the standard is "not to be exceeded more than once per year;" therefore, the high-2nd-high impact is reported.

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[4]http://www.epa.gov/ttn/scram/guidance/clarification/Official%20Signed%20Modeling%20Proc%20for%20 Demo%20Compli%20w%20PM2.5.pdf

As shown in the table, the modeled impacts from Project sources, when combined with the appropriate ambient background, are below the NAAQS in all cases. Therefore compliance with all NAAQS is demonstrated.

Table 6-8 summarizes the results of the NAAQS analysis for the Flare with the CHP Engines Offline scenario. Table 6-9 summarizes the results of the NAAQS analysis for the CHP Engine Start-up and SCR Burn-in scenarios. These scenarios affect $NO_2$ **and $SO_2$** concentrations for both scenarios and CO for CHP engine startup only.

#### 6.1.2.2 CAAQS Modeling Results (With CSSR)

The results of the CAAQS analysis for Normal Operations (including the optional CSSR) are shown in **Tables 6-11 and 6-12. Results with the CHP engines emitting through the CHP engine stacks are in Table 6-11, and results with the CHP engines emitting through the RBD stack are in Table 6-12. Tables 6-13 and 6-14 summarize the results of the CAAQS analyses for the Flare purging with one CHP Engine offline and the CHP Engine Startup and SCR Burn-In scenarios. As seen in Tables 6-11 through 6-14, all impacts are below the CAAQS. Therefore compliance with all CAAQS is demonstrated.**

~~Tables 6-11 and 6-12 summarize the results of the CAAQS analyses for the Flare with the CHP Engines Offline, CHP Engine Startup and SCR Burn-In scenarios. For the CAAQS analysis, the representative ambient background was added to all modeled impacts and compared to the CAAQS. In all cases, the form of the CAAQS is "not to be exceeded", so the maximum modeled concentrations are reported. As seen in Tables 6-10, 6-11 and 6-12, all impacts are below the CAAQS. Therefore compliance with all CAAQS is demonstrated.~~

**Table 6-7 TRRP ISCST3 NAAQS Modeling Results for Normal Operations With CHP Engines ~~With~~ and CSSR (μg/m³)**

| Pollutant | Averaging Period | NAAQS Conc. | Ambient Back-ground | Total Conc. | NAAQS | Percent of NAAQS |
|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | **5.7**[2] ~~4.7~~ | 65.5 | **71.2** ~~70.2~~ | 196.5 | **36.2** ~~35.7~~% |
| | 3-hour | **2.8** ~~2.2~~ | 158.9 | **161.7** ~~161.1~~ | 1,300 | 12.4% |
| | 24-hour | **0.9** ~~0.8~~ | 62.9 | **63.8** ~~63.7~~ | 356 | 17.9% |
| | Annual | 0.08 | 4.0 | 4.1 | 80 | 5.1% |
| CO | 1-hour | **1,127.5** ~~250.8~~ | 689.7 | **1,817.1** ~~940.5~~ | 40,000 | **4.5** ~~2.4~~% |
| | 8-hour | **140.9** ~~40.2~~ | 574.7 | **715.6** ~~614.9~~ | 10,000 | **7.2** ~~6.1~~% |
| $NO_2$[1] | 1-hour | **80.9** ~~42.5~~[3] | 23.8 | **104.7** ~~66.3~~ | 188 | **55.7** ~~35.3~~% |
| | Annual | **1.4** ~~0.4~~ | 3.9 | **5.3** ~~4.3~~ | 100 | **5.3** ~~4.3~~% |
| PM10 | 24-hour | **11.2** ~~10.3~~ | 34.0 | **45.5** ~~44.3~~ | 150 | **30.1** ~~29.6~~% |
| PM2.5 | 24-hour | **8.2** ~~8.1~~ | 16.0 | **24.2** ~~24.1~~ | 35 | **69.1** ~~68.9~~% |
| | Annual | 0.3 | 9.0 | 9.3 | 12 | **77.5** ~~77.8~~% |

[1] 1-hour $NO_2$ impacts multiplied by 0.8 and annual $NO_2$ impacts multiplied by 0.75 to represent Tier 2 $NO_x/NO_2$ conversion.

[2] 99th percentile modeled concentration. Proper form of standard is 3-year average of the 99th percentile of the daily maxima.

[3] 98th percentile modeled concentration. Proper form of standard is 3-year average of the 98th percentile of the daily maxima.

**Table 6-8 TRRP ISCST3 NAAQS Modeling Results for Normal Operations With Rolling Bed Dryer and CSSR (µg/m³)**

| Pollutant | Averaging Period | NAAQS Conc. | Ambient Back-ground | Total Conc. | NAAQS | Percent of NAAQS |
|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | 5.6[2] | 65.5 | 71.1 | 196.5 | 36.2% |
| | 3-hour | 2.9 | 158.9 | 161.8 | 1,300 | 12.4% |
| | 24-hour | 0.9 | 62.9 | 62.9 | 356 | 17.9% |
| | Annual | 0.05 | 4.0 | 4.0 | 80 | 5.0% |
| CO | 1-hour | 1127.5 | 689.7 | 1817.1 | 40,000 | 4.5% |
| | 8-hour | 140.9 | 574.7 | 715.6 | 10,000 | 7.2% |
| $NO_2$[1] | 1-hour | 80.9 | 23.8 | 104.7 | 188 | 55.7% |
| | Annual | 1.4 | 3.9 | 5.3 | 100 | 5.3% |
| PM10 | 24-hour | 11.2 | 34.0 | 45.2 | 150 | 30.1% |
| PM2.5 | 24-hour | 8.2 | 16.0 | 24.2 | 35 | 69.2% |
| | Annual | 0.3 | 9.0 | 9.3 | 12 | 77.6% |

[1] 1-hour $NO_2$ impacts multiplied by 0.8 and annual $NO_2$ impacts multiplied by 0.75 to represent Tier 2 $NO_x/NO_2$ conversion.

[2] 99th percentile modeled concentration. Proper form of standard is 3-year average of the 99th percentile of the daily maxima.

[3] 98th percentile modeled concentration. Proper form of standard is 3-year average of the 98th percentile of the daily maxima.

**Table 6-9 TRRP ISCST3 NAAQS Modeling Results for Flare With One CHP Engine Offline Scenario (μg/m³)**

| Pollutant | Averaging Period | NAAQS Conc. | Ambient Back-ground | Total Conc. | NAAQS | Percent of NAAQS |
|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | **17.4**[2] ~~35.6~~ | 65.5 | **82.9** ~~101.1~~ | 196.5 | **42.2** ~~51.4~~% |
| | 3-hour | **10.0** ~~21.5~~ | 158.9 | **168.9** ~~180.4~~ | 1,300 | **13.0** ~~13.9~~% |
| | 24-hour | **2.7** ~~5.7~~ | 62.9 | **65.6** ~~68.6~~ | 356 | **18.4** ~~19.3~~% |
| | Annual | 0.08 | 4.0 | 4.1 | 80 | 5.1% |
| CO | 1-hour | **1,127.5** ~~243.7~~ | 689.7 | **1,817.1** ~~933.4~~ | 40,000 | **4.5** ~~2.3~~% |
| | 8-hour | **140.9** ~~52.3~~ | 574.7 | **715.6** ~~627.0~~ | 10,000 | **7.2** ~~6.3~~% |
| $NO_2$[1] | 1-hour | **80.9**[3] ~~42.5~~ | 23.8 | **104.7** ~~66.3~~ | 188 | **55.7** ~~35.3~~% |
| | Annual | **1.4** ~~0.4~~ | 3.9 | **5.3** ~~4.3~~ | 100 | **5.3** ~~4.3~~% |

[1] 1-hour $NO_2$ impacts multiplied by 0.8 and annual $NO_2$ impacts multiplied by 0.75 to represent Tier 2 $NO_x/NO_2$ conversion.

[2] 99th percentile modeled concentration. Proper form of standard is 3-year average of the 99th percentile of the daily maxima.

[3] 98th percentile modeled concentration. Proper form of standard is 3-year average of the 98th percentile of the daily maxima.

**Table 6-10 TRRP ISCST3 NAAQS Modeling Results for CHP Engine Startup and SCR Burn-In Scenarios ($\mu g/m^3$)**

| Pollutant | Averaging Period | NAAQS Conc. | Ambient Back-ground | Total Conc. | NAAQS | Percent of NAAQS |
|---|---|---|---|---|---|---|
| **$SO_2$** | **1-hour** | **6.9**[2] | **65.5** | **72.4** | **196.5** | **36.8%** |
| | **3-hour** | **3.7** | **158.9** | **162.6** | **1,300** | **12.5%** |
| | **24-hour** | **1.1** | **62.9** | **64.0** | **356** | **18.0%** |
| CO | 1-hour | **1,127.5** ~~266.9~~ | 689.7 | **1,817.1** ~~956.6~~ | 40,000 | **4.5** ~~2.4~~% |
| | 8-hour | **140.9** ~~74.7~~ | 574.7 | **715.6** ~~649.4~~ | 10,000 | **7.2** ~~6.5~~% |
| $NO_2$[1] | 1-hour | **80.9** ~~44.4~~[3] | 23.8 | **104.7** ~~68.2~~ | 188 | **55.7** ~~36.3~~% |

[1] 1-hour $NO_2$ impacts multiplied by 0.8 and annual $NO_2$ impacts multiplied by 0.75 to represent Tier 2 $NO_x/NO_2$ conversion.

[2] **99th percentile modeled concentration. Proper form of standard is 3-year average of the 99th percentile of the daily maxima.**

[3] **98th percentile modeled concentration. Proper form of standard is 3-year average of the 98th percentile of the daily maxima.**

**Table 6-11 TRRP ISCST3 CAAQS Modeling Results for Normal Operations With CHP Engines and CSSR (µg/m³)**

| Pollutant | Averaging Period | Maximum Conc.[1] | Ambient Back-ground | Total Conc. | CAAQS | Percent of CAAQS |
|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | **6.1** ~~5.4~~ | 191.3 | **197.3** ~~196.7~~ | 655 | **30.1** ~~30.0~~% |
| | 24-hour | **1.1** ~~1.0~~ | 62.9 | **64.0** ~~63.9~~ | 105 | **60.9** ~~60.8~~% |
| CO | 1-hour | **1,141.8** ~~352.1~~ | 689.7 | **1.831.4** ~~1,041.8~~ | 23,000 | **8.0** ~~4.5~~% |
| | 8-hour | **169.7** ~~51.8~~ | 574.7 | **744.4** ~~626.5~~ | 10,000 | **7.4** ~~6.3~~% |
| $NO_2$ | 1-hour | **150.8** ~~49.2~~ | 65.8 | **216.6** ~~115.0~~ | 339 | **63.9** ~~33.9~~% |
| | Annual | **1.4** ~~0.4~~ | 3.9 | **5.3** ~~4.3~~ | 57 | **9.3** ~~7.6~~% |
| PM10 | 24-hour | **12.9** ~~11.0~~ | 34.0 | **46.9** ~~45.0~~ | 50 | **93.80** ~~90.0~~% |
| | Annual | 0.5 | 13.3 | 13.8 | 20 | 69.0% |
| PM2.5 | Annual | 0.3 | 9.0 | 9.3 | 12 | **77.5** ~~77.8~~% |

[1] All short term results are highest modeled value. Annual results are highest annual average.

**Table 6-12 TRRP ISCST3 CAAQS Modeling Results for Normal Operations With Rolling Bed Dryer and CSSR ($\mu g/m^3$)**

| Pollutant | Averaging Period | Maximum Conc.[1] | Ambient Back-ground | Total Conc. | CAAQS | Percent of CAAQS |
|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | 6.8 | 191.3 | 198.0 | 655 | 30.1% |
| | 24-hour | 0.9 | 62.9 | 63.8 | 105 | 60.9% |
| CO | 1-hour | 1,141.8 | 689.7 | 1,831.4 | 23,000 | 8.0% |
| | 8-hour | 169.7 | 574.7 | 744.4 | 10,000 | 7.4% |
| $NO_2$ | 1-hour | 150.8 | 65.8 | 216.6 | 339 | 63.9% |
| | Annual | 1.4 | 3.9 | 5.3 | 57 | 9.3% |
| PM10 | 24-hour | 12.9 | 34.0 | 46.9 | 50 | 93.8% |
| | Annual | 0.5 | 13.3 | 13.8 | 20 | 69.0% |
| PM2.5 | Annual | 0.3 | 9.0 | 9.3 | 12 | 77.5% |

[1] All short term results are highest modeled value. Annual results are highest annual average.

**Table 6-13 TRRP ISCST3 CAAQS Modeling Results for Flare With One CHP Engine~~s~~ Offline Scenario ($\mu g/m^3$)**

| Pollutant | Averaging Period | Maximum Conc.[1] | Ambient Back-ground | Total Conc. | CAAQS | Percent of CAAQS |
|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | 17.5 ~~35.6~~ | 191.3 | 208.7 ~~226.9~~ | 655 | 31.9 ~~34.6~~% |
| | 24-hour | 3.1 ~~6.2~~ | 62.9 | 66.0 ~~69.1~~ | 105 | 62.8 ~~65.8~~% |
| CO | 1-hour | 1,141.8 ~~352.1~~ | 689.7 | 1,831.4 ~~1,041.8~~ | 23,000 | 8.0 ~~4.5~~% |
| | 8-hour | 169.7 ~~55.3~~ | 574.7 | 744.4 ~~630.0~~ | 10,000 | 7.4 ~~6.3~~% |
| $NO_2$ | 1-hour | 150.8 ~~49.2~~ | 65.8 | 216.6 ~~115.0~~ | 339 | 63.9 ~~33.9~~% |
| | Annual | 1.4 ~~0.4~~ | 3.9 | 5.3 ~~4.3~~ | 57 | 9.3 ~~7.6~~% |

[1] All short term results are highest modeled value. Annual results are highest annual average.

**Table 6-14 TRRP ISCST3 CAAQS Modeling Results for CHP Engine Startup and SCR Burn-In Scenarios (μg/m$^3$)**

| Pollutant | Averaging Period | Maximum Conc.[1] | Ambient Back-ground | Total Conc. | CAAQS | Percent of CAAQS |
|---|---|---|---|---|---|---|
| **$SO_2$** | **1-hour** | **7.3** | **191.3** | **198.6** | **655** | **30.3%** |
| | **24-hour** | **1.2** | **62.9** | **64.1** | **105** | **61.1%** |
| CO | 1-hour | **1,141.8** ~~352.1~~ | 689.7 | **1,831.4** ~~1041.8~~ | 23,000 | **8.0** ~~4.5~~% |
| | 8-hour | **169.7** ~~78.8~~ | 574.7 | **744.4** ~~653.5~~ | 10,000 | **7.4** ~~6.5~~% |
| $NO_2$ | 1-hour | **150.8** ~~55.5~~ | 65.8 | **216.6** ~~121.3~~ | 339 | **63.9** ~~35.8~~% |

[1] All short term results are highest modeled value. Annual results are highest annual average.

### 6.1.3 Cumulative Criteria Pollutant Impacts

The County of Santa Barbara RRWMD provided AECOM with the *Gaviota Coast Cumulative Project List* (December 5, 2012) for review to determine the possibility of cumulative impacts between nearby projects and the TRRP. The cumulative projects closest to the TRRP (within approximately five miles) include:

1) Bean Blossom Lot H Residence (approved/under construction): 13,884 square foot single-family residence and guest house on a 109.56 acre parcel (APN 081- 200-032, 14200 Calle Real), ministerial (no CEQA document prepared) – 1.6 miles east of the Tajiguas Landfill;

2) Bean Blossom Lot X Residence (approved/under construction): 17,605 square foot single-family residence and guest house on a 287.36 acre parcel (APN 081- 210-047, 14200 Calle Real), ministerial (no CEQA document prepared) – 2 miles east of the Tajiguas Landfill;

3) Hart Farm Employee Dwelling (building permit withdrawn): 1,600 square foot farm employee dwelling on a 24.24 acre parcel (APN 081-150-033, 14610 Terra Vista Drive), ministerial (no CEQA document prepared) – 0.2 miles south of the Tajiguas Landfill;

4) Hart Single-Family Residence (approved/under construction): 4,885 square foot dwelling and 797 square foot guest house on a 24.24 acre parcel (APN 081- 150-033, 14640 Terra Vista Drive), ministerial (no CEQA document prepared) – 0.2 miles south of the Tajiguas Landfill;

5) Larralde Residence (approved/under construction): 2,914-square foot single-family residence and guest house on a 22 acre parcel (APN 081-040-028, 2169 Refugio Road), ministerial (no CEQA document prepared) – 4.2 miles northeast of the Tajiguas Landfill;

6) Simon Residence (approved): 2,800 square foot single-family residence and guest house on a 47.70 acre parcel (APN 081-150-028, 15000 Calle Real), ministerial (no CEQA document prepared) – 1.1 miles west of the Tajiguas Landfill;

7) Gaviota Holdings Habitat Restoration (under review): implementation of a habitat restoration plan on 60 acres (APN 079-200-005, 8555 U.S. Highway 101) to offset 7.45 acres of unpermitted habitat removal, Mitigated Negative Declaration (MND) in preparation – 3.8 miles west of the Tajiguas Landfill;

8) Shell Hercules Remediation and Slope Stabilization (under review): continuation of site remediation of a State Superfund site (APN 081-150-041, 14730 Calle Real) for poly-cyclic biphenyls, mercury and hydrocarbons, MND completed by Department of Toxics Substances Control – 0.2 miles west of the Tajiguas Landfill;

9) Gaviota Marine Terminal and Oil Storage Terminal Demolition (demolition complete, soil investigation in progress): demolition of oil storage facilities on APN 081-130-060 – 4.2 miles west of the Tajiguas Landfill;

10) Santa Barbara County Rail Siding Project (under review by Caltrans): segments of parallel railroad tracks along the Surfliner Route – likely within 3 miles of the Landfill; and

11) Baron Ranch Trail Extension (under Forest Service NEPA review): 3.5 mile extension of the County's existing Baron Ranch Trail into the Los Padres National Forest – 0.5 miles northeast of the Tajiguas Landfill.

#### 6.1.3.1 Cumulative Construction Impacts

As discussed in Section 4.1.1, the County generally considers temporary construction emissions insignificant, and quantitative thresholds for construction emissions have not been established. Additionally, as discussed in Section 6.1.1, the maximum emissions during the TRRP's 19-month construction period would not exceed the established emissions thresholds that would require offsets, and in most cases are well below the thresholds. As such, the proposed Project would not result in any individual air quality impacts during construction. A review of the identified nearby projects in relation to the construction of the TRRP concluded the following:

- The first six cumulative projects listed above are single-family residences, with the exception of the third project, for which the building permit was withdrawn. Emissions generated during construction of individual single-family residences are anticipated to be minor and unlikely to cause potentially significant adverse cumulative impacts in combination with construction emissions for the Project.
- The seventh cumulative project (Gaviota Holdings Habitat Restoration) is currently under review and an MND is being prepared. Because an MND is being prepared for this

project, its potential air quality impacts during construction are expected to be less than significant and would not be anticipated to cause potentially significant adverse cumulative impacts in combination with construction emissions for the Project.

- The eighth cumulative project (Shell Hercules Remediation and Slope Stabilization) is also currently under review and an MND is being prepared. Therefore, this project would not be anticipated to cause potentially significant adverse cumulative impacts in combination with construction emissions for the Project.
- The ninth cumulative project (Gaviota Marine Terminal and Oil Storage Terminal Demolition) would primarily include soil investigation because demolition activities have been completed. Soil investigation activities would not be anticipated to generate substantial emissions from construction activities. Therefore, this project would not be anticipated to cause potentially significant adverse cumulative impacts in combination with construction emissions for the Project.
- The tenth cumulative project (Santa Barbara County Rail Siding Project) is also currently under review. There is insufficient information and data available that could be used to perform a cumulative construction impacts analysis that includes this project. Therefore, evaluating cumulative impacts from this project and the TRRP at this time would be premature.
- The eleventh cumulative project (Baron Ranch Trail Extension) is also under review. There is insufficient information and data available that could be used to perform a cumulative construction impacts analysis that includes this project. Therefore, evaluating cumulative impacts from this project and the TRRP at this time would be premature.

Based on the foregoing discussions, significant adverse cumulative air quality impacts from construction of the proposed Project, when considered with other nearby reasonably foreseeable planned projects, would not be expected to occur. Therefore, the proposed Project would not cause a cumulatively considerable increase in emissions and, therefore, the potential cumulative air quality impacts would be considered less than significant.

#### 6.1.3.2 Cumulative Operation Impacts

As discussed in Section 6.1.1 and shown in Tables 6-2 through 6-5, the maximum daily emissions during operation of the TRRP would not exceed the County’s established CEQA significance thresholds. As such, the proposed Project would not result in any individual air quality impacts during operation.

Cumulative air quality impacts are the effect of long-term emissions of the proposed Project on the projected regional air quality or localized air pollution problems in the County. As discussed in the County's CEQA Guidelines (*Guidelines for the Implementation of the California Environmental Quality Act of 1970, As Amended* (revised 2010)), the cumulative contribution of project emissions to regional levels should be compared with existing programs and plans, including the SBCAPCD 2010 Clean Air Plan. To evaluate the cumulative impacts of localized pollutants, the contribution of the project's emissions to background levels should be considered. Due to the County's non-attainment status for ozone and the regional nature of the pollutant, if a project's total emissions of the ozone precursors, $NO_x$ or ROC, exceed the long-term threshold, then the project's cumulative impacts will be considered significant. For projects that do not have significant ozone precursor emissions or localized pollutant impacts, emissions have been taken into account in the Clean Air Plan growth projections and therefore, cumulative impacts may be considered to be insignificant. As shown in Sections 6.1.1 and 6.1.2 above, the TRRP has been shown to be below all applicable emissions thresholds and to not cause localized pollutant impacts, and hence, may be considered insignificant on a cumulative basis as well.

Although the TRRP can be considered to be insignificant on a cumulative basis based on the current County CEQA Guidelines, a review of the Project in relation to the identified nearby projects would draw a similar set of conclusions as was made relative to construction impacts. Since none of the identified projects are expected to have significant impacts or are not sufficiently developed to tell, significant adverse cumulative air quality impacts from operation of the proposed Project, when considered with other nearby reasonably foreseeable planned projects, would not be expected to occur. Therefore, the proposed Project would not cause a cumulatively considerable increase in emissions and the potential cumulative air quality impacts would be considered less than significant.

#### 6.1.3.3 Air Dispersion Modeling

As discussed in section 6.1.2, ambient air quality impacts from TRRP emissions are not expected to exceed any applicable NAAQS or CAAQS even when the regional ambient background concentrations are considered. Additionally, what impacts there are from TRRP sources are limited to the area adjacent to the fence lines where the public would not be expected to be present. As discussed in the previous section, emissions from the cumulative projects are anticipated to be small and, therefore, would not be anticipated to cause significant impacts to ambient air quality. Therefore, emissions from the proposed Project would not be anticipated to cause significant cumulative impacts to ambient air quality.

### 6.1.4 Recommended Mitigation

Impacts on criteria pollutants are anticipated to be less than significant. Therefore, mitigation measures are not required. Project design features have been incorporated to reduce emissions to the extent practicable. For instance, the Project’s engines will meet EPA Tier 4 emissions standards and the Project will utilize an electric chipper/grinder rather than a diesel-fired engine. Dust control measures will also be implemented.

### 6.1.5 Conclusions

The thresholds of significance for criteria pollutant emissions are provided below. Below each threshold, the significance of potential criteria pollutant impacts of the proposed TRRP is provided. Table 6-1**5** provides a summary of criteria pollutant emissions impacts of the proposed TRRP as well as the criteria pollutant emissions impacts identified in the previous EIRs for the currently permitted Tajiguas Landfill. Each of the criteria is discussed below the table.

**Table 6-15 Summary of Criteria Pollutant Emissions Impacts**

| Impact Category | Currently Permitted Landfill | Proposed TRRP[1] |
|---|---|---|
| Construction Emissions | Less than significant for all criteria pollutants | Less than significant for all criteria pollutants |
| Operation Emissions | | |
| Maximum Daily On-site and Off-site Sources | Significant and unavoidable impacts for $NO_x$, ROC and CO | Less than significant for all criteria pollutants |
| Motor Vehicle Exhaust Emissions Only | Significant and unavoidable impact for $NO_x$; less than significant for ROC and CO | Less than significant for all criteria pollutants |
| NAAQS | Less than significant for all criteria pollutants[2] | Less than significant for all criteria pollutants |
| CAAQS | Significant and unavoidable impacts for 1-hour $NO_2$ and 24-hour PM10; less than significant for all other criteria pollutants | Less than significant for all criteria pollutants |

[1] Impact determinations for the TRRP would be the same with or without the optional CSSR element.

[2] The $NO_x$ emissions of the permitted Landfill Expansion Project were not identified as significant with respect to the NAAQS. However, the Landfill Expansion Project was not subject to the EPA's most recent 1-hour $NO_2$ NAAQS, which went into effect in April 2010.

If the combined emissions from all construction equipment used to construct a stationary source which requires an Authority to Construct permit have the potential to exceed 25 tons of any pollutant, except carbon monoxide, in a 12-month period, the owner of the stationary source shall provide offsets under the provisions of Rule 804 and shall demonstrate that no ambient air quality standard will be violated.

- As discussed above in Section 6.1.1.1, construction emissions would not exceed the 25-ton threshold of any pollutant over a 12-month period. Therefore, impacts related to construction emissions generated by the project would be Class III, less than significant.

Interferes with progress toward the attainment of the ozone standard by releasing emissions which equal or exceed the established long-term quantitative thresholds for $NO_x$ and ROC;

- As discussed above in Section 6.1.1.2, emissions from all operation sources both with and without the optional CSSR element would not exceed the maximum daily thresholds for $NO_x$ and ROC.  Therefore, impacts related to the attainment of ozone would be Class III, less than significant.

Emits (from all sources, except registered portable equipment) greater than the daily trigger for offsets in the SBCAPCD NSR Rule (55 pounds per day for $NO_x$ or ROC; 80 pounds per day for PM10);

- As discussed above in Section 6.1.1.2, $NO_x$, ROC and PM10 emissions from all operation sources both with and without the optional CSSR element would not exceed the thresholds.  Therefore, impacts would be Class III, less than significant.

Emits greater than 25 pounds per day of $NO_x$ or ROC (motor vehicle trips only);

- As discussed above in Section 6.1.1.2, emissions from motor vehicle trips both with and without the optional CSSR element would not exceed 25 pounds per day for $NO_x$ and ROC.  Therefore, impacts related to motor vehicle emissions would be Class III, less than significant.

Equals or exceeds the State or Federal ambient air quality standards for any criteria pollutant (as determined by modeling);

- As discussed in Sections 6.1.2.1 and 6.1.2.2, operation emissions would not result in exceedances of the NAAQS or CAAQS.  Therefore, impacts related to the exceedance of ambient air quality standards would be Class III, less than significant.

Causes or contributes to a violation of a State or Federal air quality standard (except ozone);

- As discussed in Sections 6.1.2.1 and 6.1.2.2, operation emissions would not result in exceedances of the NAAQS or CAAQS.  Therefore, impacts related to the exceedance of ambient air quality standards would be Class III, less than significant.

Inconsistent with adopted State and Federal Air Quality Plans (e.g., the SBCAPCD 2010 Clean Air Plan)

- The SBCAPCD 2010 Clean Air Plan relies on the land use and population projections provided in the Santa Barbara County Association of Governments' Regional Growth Forecast.  The TRRP would not induce population growth that would cause an exceedance of future growth projections on which the SBCAPCD’s 2010 Clean Air Plan is based.  The incremental emissions associated with the TRRP are below significance thresholds, and as a population related project, should be within the Plan’s growth related emissions projections. In addition, the TRRP would be constructed within the boundaries of the existing Tajiguas Landfill and therefore would be consistent with the existing land use of the site. The TRRP would not inhibit the effectiveness of transportation control measures established by the Clean Air Plan. Development of the TRRP would extend the operating lifespan of the Tajiguas Landfill, thereby reducing emissions from vehicle miles traveled associated with hauling waste to landfills farther away. Therefore, the TRRP would be consistent with the 2010 Clean Air Plan and impacts related to this issue would be Class III, less than significant.

## 6.2 Health Risk Assessment

An HRA was performed accounting for the proposed Project source TAC emissions only (including CSSR), and a facility-wide HRA, which included both existing and proposed Landfill sources, was completed.

### 6.2.1 Impact Analysis

As noted in Section 5.3.2, the HRA provides results for the point of maximum impact (PMI) for Acute HI impacts, as well as the maximum exposed individual resident (MEIR) and maximum exposed individual worker (MEIW) for cancer and non-carcinogenic chronic health risk impacts. The MEIR was identified based on location of the nearest planned residence (APN 081-150-034) and the MEIW is the Alisal Resort and Ranch, several miles North of the landfill. A summary of cancer risk and non-cancer health impacts values at the Acute HI PMI, MEIR and the MEIW are presented for TRRP only in Table 6-1**6**. Table 6-1**7** summarizes the health risk impacts for the facility-wide (both existing and proposed Landfill sources) HRA. As discussed in Section 5.3.2, the fishing and beef/dairy pathway were added to the facility-wide HRA based on the extent of the impact area and hence are included in the results in Table 6-1**7**.

Acute health impacts due to the operation of TRRP at the PMI were determined to be an HI of **0.49** ~~0.55~~. Cancer risk at the MEIR **(Receptor 808)** was determined to be **0.92** ~~1.66~~ in-one-million. Non-cancer chronic and acute health impacts at the MEIR were determined to be a HI of **0.02** ~~0.03~~ and 0.14, respectively. Cancer risk at the MEIW **(Receptor 2940)**, based on a worker exposure, was determined to be 0.03 in-one million, which is well below the SBCAPCD CEQA threshold. Non-cancer chronic and acute health impacts at the MEIW were less than those estimated at the MEIR.

The facility-wide HRA for TRRP indicates a cancer risk at the MEIR of **5.86** ~~6.91~~ in-one-million. Non-cancer chronic and acute health impacts at the MEIR were determined to be a HI of **0.11** ~~0.13~~ and **0.62** ~~0.66~~, respectively. Cancer risk at the MEIW, based on a worker exposure, was determined to be **0.24** ~~0.23~~ in-one million. Non-cancer chronic and acute health impacts at the MEIW were the less than those estimated at the MEIR.

**Table 6-1~~6~~ Summary of Maximum Health Risk Impacts for TRRP Only with CSSR**

| Receptor Type | | Maximum Cancer Risk (per million) | Maximum Acute Hazard Index | Maximum Chronic Hazard Index |
|---|---|---|---|---|
| PMI | | N/R | **0.49** ~~0.55~~ | N/R |
| MEIR[2] | Adult | **0.92** ~~1.66~~ | 0.14 | **0.02** ~~0.03~~ |
| | Child | **0.22** ~~0.40~~ | N/A | N/A |
| MEIW[3] | | 0.03 | **0.01** ~~0.02~~ | < 0.01 |

[1] PMI: Point of maximum impact at any off-site location.
[2] MEIR: Maximum exposed individual at an existing or planned residential receptor; 70-year adult exposure scenario and 9-year child exposure scenario for cancer risk
[3] MEIW: Maximum exposed individual at an existing occupational worker receptor; 40-year adult worker exposure scenario
N/R – PMI for long term effects not reported; N/A – Child HI impacts are Not Applicable.

**Table 6-17 Summary of Maximum Facility-Wide Health Risk Impacts for Future Operations of Tajiguas Landfill Sources With TRRP and CSSR**

| Receptor Type | | Maximum Cancer Risk (per million) | Maximum Acute Hazard Index | Maximum Chronic Hazard Index |
|---|---|---|---|---|
| PMI[1] | | N/R | **1.56** ~~1.27~~ | N/R |
| MEIR[2] | Adult | **5.86** ~~6.91~~ | **0.62** ~~0.66~~ | **0.11** ~~0.13~~ |
| | Child | **1.35** ~~1.59~~ | N/A | N/A |
| MEIW[3] | | **0.24** ~~0.23~~ | 0.06 | 0.03 |
| Significance Threshold | | 10 | 1 | 1 |
| Exceed Threshold (Yes/No)? | | No | Yes[4] | No |

[1] PMI: Point of maximum impact at any off-site location.
[2] MEIR: Maximum exposed individual at an existing or planned residential receptor; 70-year adult exposure scenario and 9-year child exposure scenario for cancer risk
[3] MEIW: Maximum exposed individual at an existing occupational worker receptor; 40-year adult worker exposure scenario
[4] Not considered significant since location not reasonably accessible to the public (See Section 6.2.1).
N/R – PMI for long term effects not reported; N/A – Child HI impacts are Not Applicable.

Per SBCAPCD guidance (2014c), up to three air quality health risk isopleth plots may be required: (a) cancer risk results equal or greater than 10.0 in-one-million; (b) chronic non-cancer risk results with a HI greater than or equal to 1.0; and (c) acute non-cancer risks with HI greater than or equal to 1.0. The facility-wide HRA results for cancer risk and acute non-cancer risk are plotted in Figures 6-1 and 6-2, respectively. An isopleth plot of non-cancer chronic risk was not required as the HRA results did not equal or exceed a HI of 1.0 beyond the property boundary.

Cancer risk is not considered significant since there are no residential or worker receptors within the areas shown inside the isopleth on Figure 6-1 (i.e., the risk is less than 10 in-one million). Although the Acute HI at the PMI is shown in Table 6-1**7** to be greater than 1.0, Figure 6-2 shows that this impact only occurs in areas very close to the property boundary, in complex/steep terrain with dense vegetation. This area is not reasonably accessible by the public. Access into this area is by landfill staff to conduct facility functions such as groundwater monitoring. Therefore, the facility-wide toxic air contaminant emissions are not considered to result in a significant health risk impact. Figures 6-1 and 6-2 are provided for disclosure purposes only.

### 6.2.2 Recommended Mitigation

The biofilters on the MRF and AD Facility buildings will substantially reduce TAC emissions. Further mitigation would not be required as proposed Project TAC emissions would not be expected to adversely affect public health.

### 6.2.3 Conclusions

A significant impact related to TAC emissions may occur when a proposed project, individually or cumulatively, equals or exceeds the SBCAPCD health risk significance thresholds (10 excess cancer cases per million people and/or a hazard index of 1.0) at locations that are reasonably accessible to the public. As discussed above, the cancer risk at the MEIR due to Project sources alone was determined to be **0.92** ~~1.66~~ in-a-million, and the chronic non-cancer and acute HIs were determined to be 0.03 and 0.14, respectively. These values are all below the applicable CEQA thresholds for the TRRP, including the CSSR element. Therefore, impacts related to TACs and health risks from the proposed Project sources would be Class III, less than significant.

For the facility-wide HRA (both existing and proposed Landfill sources), the PMI for Acute HI is **1.56** ~~1.27~~, but values over 1.0 only occurred in areas considered to be not reasonably accessible to the public. The cancer risk at the MEIR was determined to be **5.86** ~~6.91~~-in a-million, attributed primarily to the existing flare at the Tajiguas Landfill. The non-cancer chronic and acute HIs at the MEIR were determined to be **0.11** ~~0.13~~ and **0.62** ~~0.66~~, respectively. Therefore, impacts related to TAC emissions and health risks from the facility-wide HRA would be Class III, less than significant.

**Figure 6-1 70-Year Cancer Risk Isopleth Greater than 10.0 in-one-million for Future Operations at Tajiguas Landfill with TRRP and CSSR**

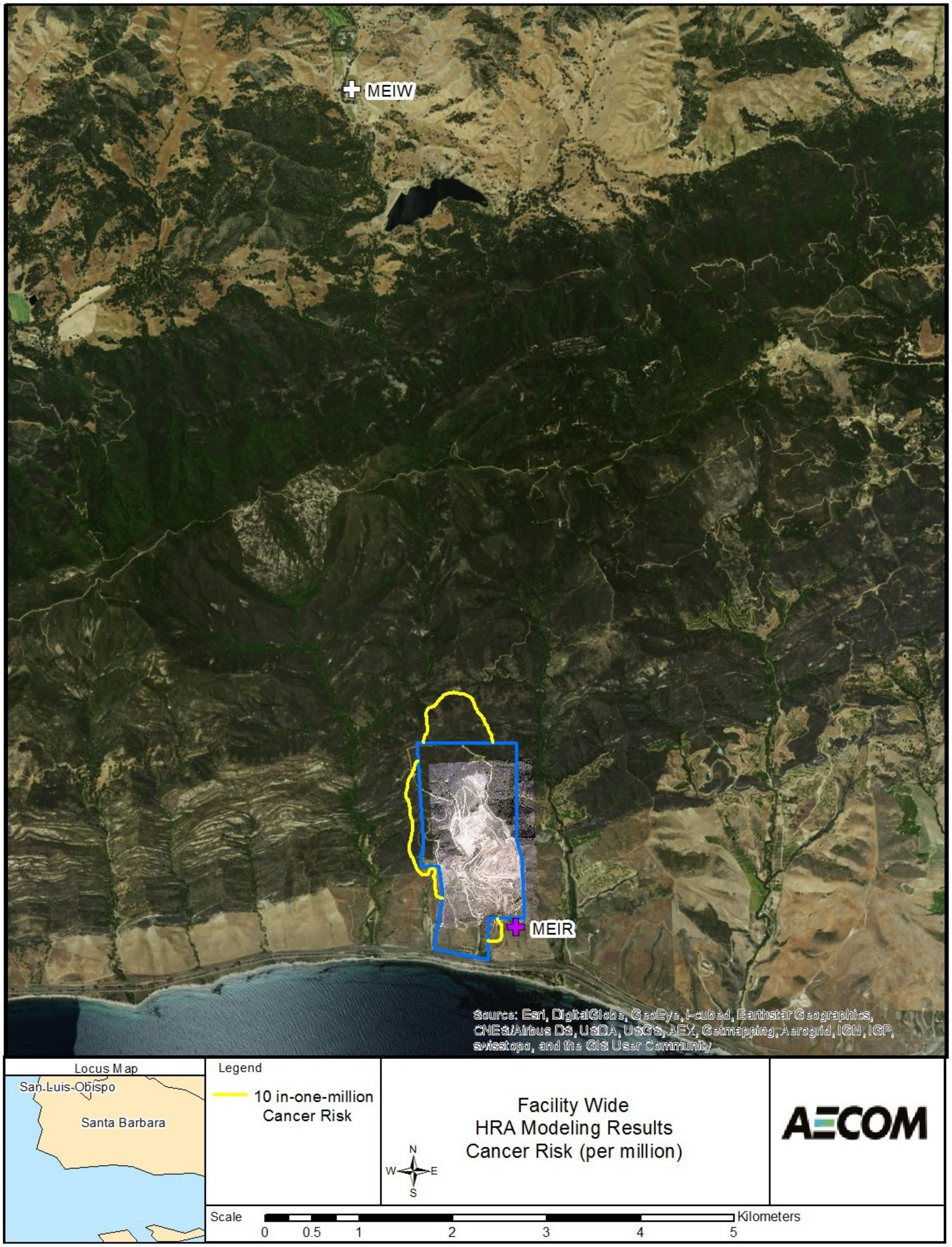
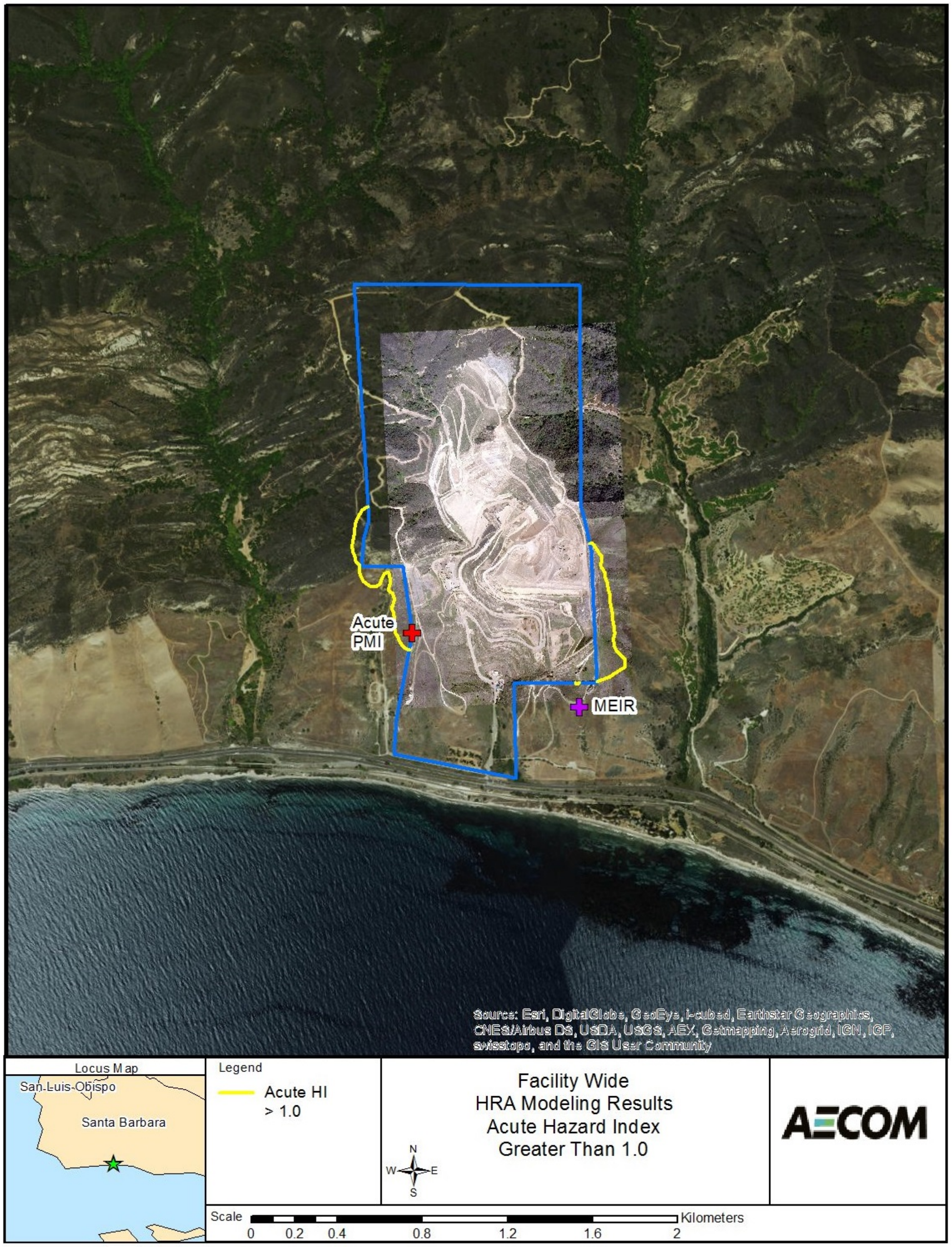


**Figure 6-2 Acute Hazard Index Isopleth Greater than 1.0 for Future Operations at Tajiguas Landfill with TRRP and CSSR**



## 6.3 Greenhouse Gases

Permitted waste disposal at the Tajiguas Landfill is a source of landfill gas (containing GHGs including $CH_4$ and $CO_2$). GHGs are also generated by waste disposal activities through fuel combustion on site and off site. The CalRecycle EIR (CalRecycle, 2011) states "GHG impacts are considered to be exclusively cumulative impacts; there are no non-cumulative GHG emission impacts from a climate change perspective."

To this end, the following is an analysis of GHG impacts associated with the waste diversion from the landfill, and with construction and operation of the proposed Project. Calculations for this analysis can be found in Attachment E.

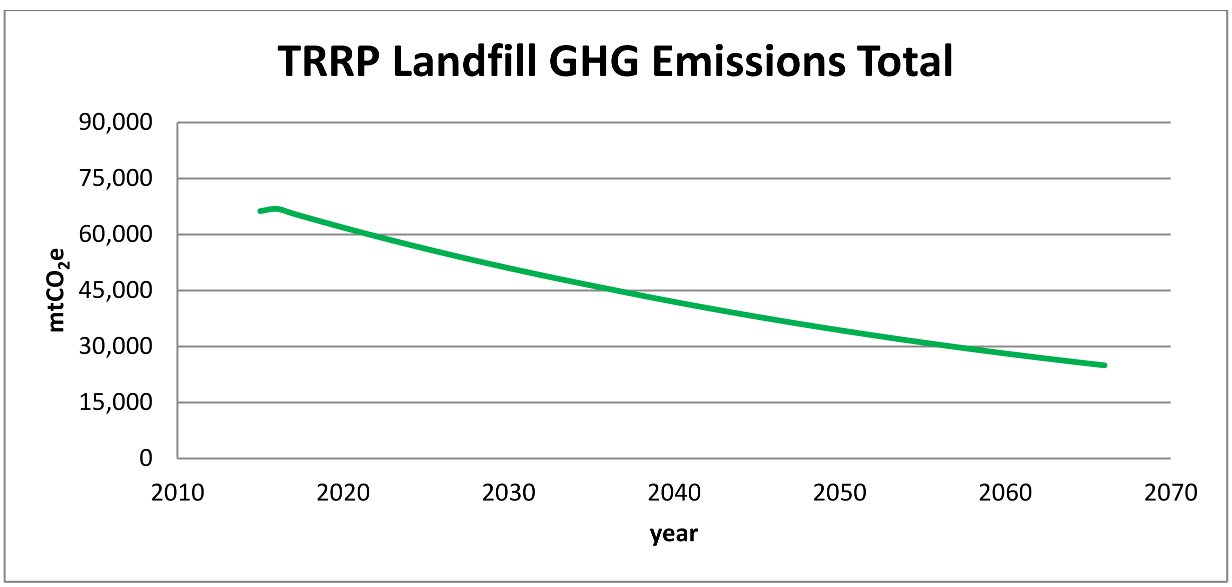
$CO_2$ emissions emitted from a landfill are biogenic, which are considered a part of the natural carbon cycles. For this reason biogenic $CO_2$ emissions are excluded from the GHG accounting in this analysis. As discussed in Section 5.4.1, when naturally occurring $CO_2$ emissions are released as a result of an industrial process they should not be counted as a pollutant generated by the facility.

### 6.3.1 GHG Emissions Estimates

#### 6.3.1.1 Landfill Greenhouse Gas Emissions after Waste Diversion

Figure 6-3 shows the projected total GHG emissions produced from 2015 to 2066 with implementation of the TRRP. Total GHG emissions from 2015 to 2066 are estimated to be 2,246,000 MT $CO_2e$ with estimated amortized annual emissions of 43,190 MT $CO_2e$. As shown in the figure, with implementation of the TRRP, GHG emissions would decrease every year.

**Figure 6-3 TRRP Landfill GHG Emissions Total**



#### 6.3.1.2 Construction GHG Emissions

Table 6-1**8** shows the estimated total GHG emissions generated during the Project's 19 months of construction using the methodologies described in Section 5.4.2, *Construction Greenhouse Gas Emission Calculations*. The emissions reported in Table 6-1**8** are unmitigated. As shown in Table 6-1**8**, the total estimated GHG emissions generated during the Project's 19-month construction time period would be approximately 2,190 MT $CO_2$e.

**Table 6-18 Construction Greenhouse Gas Emission Summary**

| Pollutant | Total Emissions (MT[1]) |
|---|---|
| $CO_2$ | 2,152 |
| $CH_4$ | 0.58 |
| $N_2O$ | 0.07 |
| Total $CO_2$e[2] | 2,190 |

[1] MT = metric ton = 1,000 kilograms = pounds x 453.6 g/lb/1,000,000 g/MT
[2] $CO_2$e = $CO_2$ equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$ (rounded)

#### 6.3.1.3 Operation GHG Emissions

GHG emissions generated during operation of the Project were calculated both with and without the optional CSSR element. Operation GHG emissions associated with the Project were calculated from the direct fuel combustion emissions as well as the offset of indirect emissions associated with electricity exported back to the SCE grid.

Direct Fuel Combustion Operation GHG Emissions

Table 6-1**9** shows direct GHG emissions generated from direct fuel combustion each year during operation of the proposed Project without the optional CSSR component and Table 6-**20** shows direct GHG emissions generated from direct fuel combustion each year during operation of the proposed Project with the optional CSSR component. The GHG emissions shown in Tables 6-1**9** and 6-**20** were estimated using the methodologies described in Section 5.4.3, *Operation Greenhouse Gas Emission Calculations*. As shown in Table 6-1**9**, operation of the proposed Project without the optional CSSR element would generate an estimated **5,076** ~~3,179~~ MT $CO_2$e per year of direct GHG emissions. As shown in Table 6-**20**, the operation of the proposed Project with the optional element would generate an estimated **5,524** ~~3,610~~ MT $CO_2$e per year of direct GHG emissions.

The fuel combustion emissions from the CHP engines and the flare can generally be considered to be a reduction in $CO_2$e emissions that would be produced from the natural decomposition of waste. As waste breaks down in the anaerobic conditions that exist in a landfill, the organic waste decomposes primarily to $CH_4$. The Project diverts that waste into useful generation and produces biogenic $CO_2$ as a byproduct rather than $CH_4$. The net emissions as $CO_2$ rather than $CH_4$ yields a significant reduction in carbon dioxide equivalent emissions since $CH_4$ has a GWP of 25 and the GWP of $CO_2$ is 1. The majority of fuel combustion emissions associated with this Project are $CO_2$ emissions that would otherwise be $CH_4$ emissions.

**Table 6-19 Direct Annual Operation GHG Emissions Without Optional CSSR Element**

| Source | Emissions (MT/year)[1] | | | |
|---|---|---|---|---|
| | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_2e$[2]** |
| ***On-site Sources*** | | | | |
| CHP Engines Combustion | ***8,900*** *~~8,717~~* | **0.21** ~~0.16~~ | <0.1 | **1.215** ~~1,219~~ |
| CHP Engines Pass-through $CO_2$ | ***4,655*** *~~5,945~~* | -- | -- | **628** ~~620~~ |
| Flare Combustion | ***477*** *~~936~~* | <0.1 | <0.1 | **67** ~~65~~ |
| Flare Pass-through $CO_2$ | ***293*** *~~638~~* | -- | -- | **40** ~~0~~ |
| **Emergency Generator** | **1,163** | **<0.1** | **<0.1** | **1,174** |
| MRF Facility Equipment | **119** ~~1,229~~ | <0.1 | <0.1 | **120** ~~1,241~~ |
| AD Facility Equipment | **76** ~~59~~ | <0.1 | <0.1 | **77** ~~60~~ |
| Composting Equipment Exhaust | **51** ~~178~~ | <0.1 | <0.1 | **51** ~~180~~ |
| Motor Vehicle Exhaust | 18 | <0.1 | <0.1 | 19 |
| **Total On-site GHG Emissions** | **3,361** **~~1,484~~** | **0.34** | **<0.1** **~~0.03~~** | **3,390** **~~1,513~~** |
| ***Off-site Sources*** | | | | |
| Motor Vehicle Exhaust | 1,561 | 2 | <0.3 | 1,686 |
| **Total Off-site GHG Emissions** | **1,561** | **2** | **<0.3** | **1,686** |
| ***Total GHG Emissions (On-site + Off-site)*** | ***4,922*** ***~~3,045~~*** | ***3*** | **<0.3** | ***5,076*** ***~~3,198~~*** |

[1] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT. All values rounded to the nearest whole metric ton. Values may not sum to the totals due to rounding.

[2] $CO_2e$ = $CO_2$-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

*Underlined Italic text* represents biogenic emissions **of which 86.5% were** excluded from $CO_2e$ and total emissions

**Table 6-20 Direct Annual Operation GHG Emissions With Optional CSSR Element**

| **Source** | **Emissions (MT/year)**[1] | | | |
|---|---|---|---|---|
| | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_2e$**[2] |
| ***On-site Sources*** | | | | |
| CHP Engines Combustion | ***8,900*** ~~*8,717*~~ | 0.2**1** | <0.1 | **1,215** ~~9~~ |
| CHP Engines Pass-through $CO_2$ | ***4,655*** ~~*5,945*~~ | -- | -- | **628** ~~0~~ |
| Flare Combustion | ***477*** ~~*936*~~ | **<**0.1 | <0.1 | **67** ~~5~~ |
| Flare Pass-through $CO_2$ | ***293*** ~~*638*~~ | -- | -- | **40** ~~0~~ |
| **Emergency Generator** | **1,163** | **<0.1** | **<0.1** | **1,174** |
| MRF Facility Equipment | **119** ~~1,229~~ | <0.1 | <0.1 | **120** ~~1,241~~ |
| AD Facility Equipment | **76** ~~59~~ | <0.1 | <0.1 | **77** ~~60~~ |
| Composting Equipment Exhaust | **51** ~~178~~ | <0.1 | <0.1 | **51** ~~180~~ |
| Motor Vehicle Exhaust | 34 | <0.1 | <0.1 | 36 |
| **Total On-site GHG Emissions** | **3,377** ~~**1,501**~~ | 0.3**5** | <0.1 | **3,407** ~~**1,529**~~ |
| ***Off-site Source*** | | | | |
| Motor Vehicle Exhaust | 1,951 | 3 | <0.3 | 2,117 |
| **Total Off-site GHG Emissions** | **1,951** | **3** | **<0.3** | **2,117** |
| ***Total GHG Emissions (On-site + Off-site)*** | ***5,329*** ~~***3,452***~~ | ***4*** | **0.4** | ***5,524*** ~~***3,646***~~ |

[1] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT. All values rounded to the nearest whole metric ton. Values may not sum to the totals due to rounding.

[2] $CO_2e$ = $CO_2$-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

*Underlined Italic text* represents biogenic emissions **of which 86.5% were** excluded from $CO_2e$ and total emissions

Indirect GHG Emissions Offset from Export of Electricity

GHG emissions generated by operation of the Project would be offset by the Project's production and export of electricity to the SCE grid. The estimated annual electricity generated by the Project, as well as the annual electricity consumed by the Project, are provided in Table 6-**21**.

As shown in Table 6-**21**, the Project would result in an estimated net export of approximately 8,095 MWh per year. Based on SCE's average emissions-to-energy intensity of about 631 lb $CO_2$/MWh[6] and the Project's net export of 8,095 MWh per year to the grid, approximately 2,316 MT of $CO_2$ per year would be avoided as a result of the Project's electricity generation. The GHG emissions avoided by the Project were calculated as follows:

631 lb $CO_2$ / MWh X 8,095 MWh = 5,106,854 lb $CO_2$ / 2,205 lb / MT = 2,316 MT $CO_2$

Fugitive $CH_4$ Emissions from Composting Windrows

The estimated $CH_4$ emissions produced from the composting of the digested waste is approximately 26 MT each year or approximately 650 MT $CO_2$e. It was assumed that these emissions would be produced during the operation time period of the MRF, AD Facility and energy generation from 2017 to 2036.

**Table 6-21 On-site Electricity Generation, Consumption and Net Export**

| Electricity Source Type | MWh |
|---|---|
| *Electricity Generated* | |
| Estimated Annual AD Generation (Gross) | 14,032 |
| Estimated Annual Solar Generation (Gross) | 873 |
| ***Total Annual Generation (Gross)*** | ***14,905*** |
| *Electricity Consumed* | |
| Estimated Annual AD Electrical Consumption | 1,038 |
| Estimated Annual MRF Electrical Consumption | 4,308 |
| Estimated Annual Consumption by Other Site Needs | 1,465 |
| ***Total Annual Consumption*** | ***6,810*** |
| **Net Export to the Grid Annually** | **8,095** |

### 6.3.2 Comparison of Existing Conditions and TRRP Greenhouse Gas Emissions

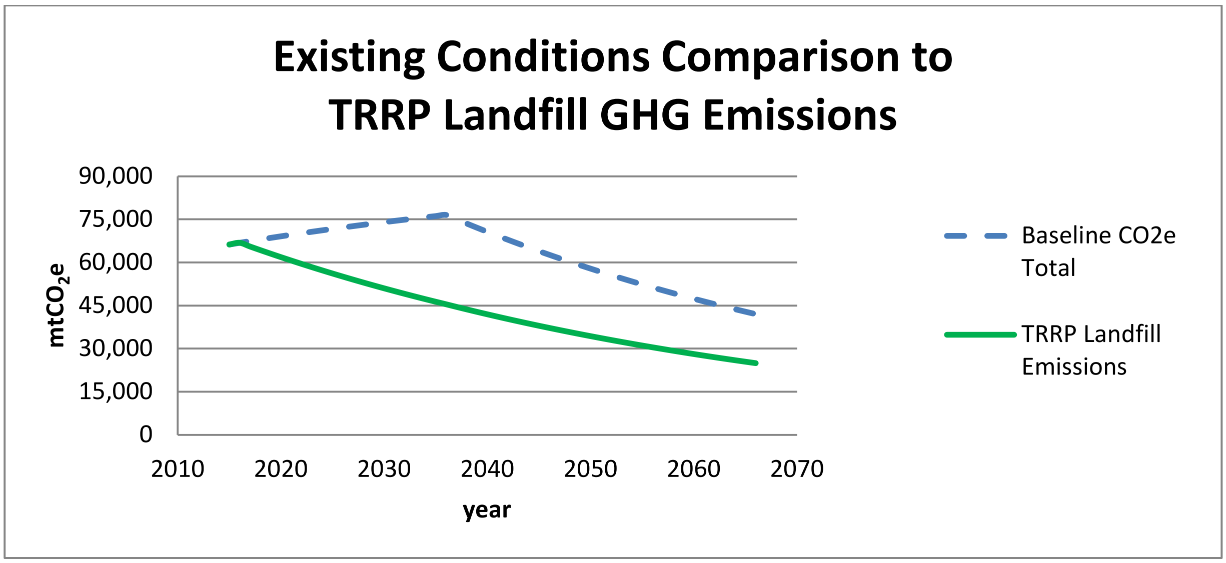
To understand the true GHG impact of the TRRP, the emissions discussed above must be compared with the existing conditions at Tajiguas Landfill. The primary driver of GHG emissions reduction is the diversion of organic waste from the landfill to the proposed TRRP. Figure 6-4

[6] Reported from the Climate Registry 2007

shows a comparison of projected existing conditions with projected conditions with implementation of the TRRP.

As shown in Figure 6-4, by diverting organic waste from the Landfill to the TRRP, the Landfill's GHG emissions will be reduced by about 1,042,000 MT $CO_2$e compared to current conditions between the time the TRRP would become operational in 2017 through 2066 (closure plus 30 years). This equates to an average annual reduction of 20,030 MT $CO_2$e.

**Figure 6-4 Existing Conditions Comparison to TRRP Landfill GHG Emissions**



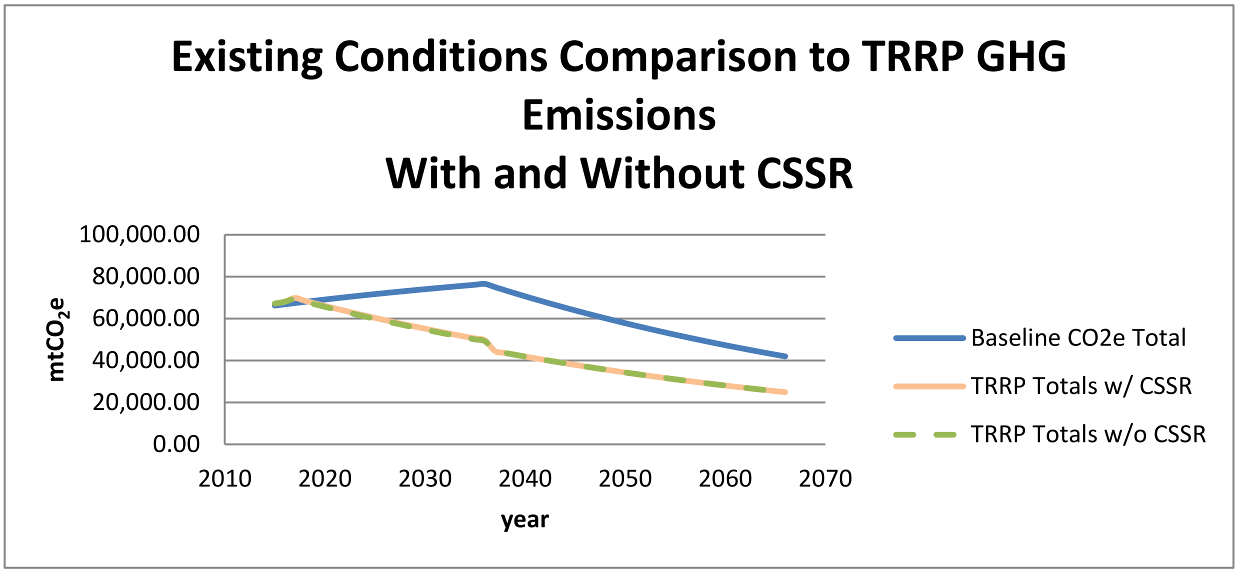

Layered onto the GHG emissions reduction associated with the waste diversion there are also construction emissions and operations emissions. There are two scenarios associated with construction and operations; one without the optional CSSR element and one with the optional CSSR element. Figure 6-5 shows a comparison of existing conditions to TRRP including landfill emissions, construction and operations both with and without the optional CSSR element.

Tables 6-2**2** and 6-2**3** summarize the lifetime GHG emissions and the 52-year amortized emissions with and without the optional CSSR element.

Compared to operation of the Landfill under existing conditions, construction and operation of the TRRP without the optional CSSR element will result in a net reduction in the Landfill's GHG emissions by about **972,839** ~~1,002,000~~ MT $CO_2$e between 2015 and 2066, which equals a **18,708** ~~19,270~~ MT $CO_2$e reduction annually. The spike in TRRP totals that occurs at the beginning of the TRRP line and surpasses existing conditions is due to the GHG emissions generated during construction of the TRRP.

TRRP GHG emissions totals from construction and operations with the optional CSSR element will reduce GHG emissions by about **<u>963,876</u>** ~~199,000~~ MT $CO_2$e between 2015 and 2066, which equals an **<u>18,536</u>** ~~19,100~~ MT $CO_2$e reduction annually as compared to existing conditions. Again, the spike in TRRP totals at the beginning of the line is due to, the brief period of construction emissions.

**Figure 6-5 Existing Conditions Comparison to TRRP GHG Emissions Totals With and Without CSSR**




### 6.3.3 Recommended Mitigation Measures

Mitigation would not be required as the Project would result in an overall reduction of GHG emissions.

### 6.3.4 Conclusions

While the initial project construction would increase GHG emissions from direct fuel combustion, these emissions will be substantially offset by the waste diversion and energy generation of TRRP. Construction emissions will result in an estimated 2,190 MT $CO_2$e over a less than two-year period.

Organic waste diversion from the landfill substantially reduces the GHG emissions compared to existing conditions. The total GHG emissions reduction due to diversion is estimated to be 1,042,000 MT $CO_2$e from 2015-2066, with estimated amortized annual emission reduction of 20,030 MT $CO_2$e.

The diverted organic waste will proceed to an in-vessel AD processing system where organics will breakdown to produce biogas which is comprised of approximately 55 to 60 percent $CH_4$.

The $CH_4$ will be used to create electricity which is exported to the SCE grid. GHG emissions generated, after the exclusion of biogenic $CO_2$, from this process, will range from approximately **5,076** ~~3,180~~ MT $CO_2$e annually when the optional CSSR is not included and **5,524** ~~3,610~~ MT $CO_2$e annually when the optional element is included.

The~~se~~ **GHG** emissions **reductions from organic waste diversion are significantly greater than those from the overall construction and operation making the amortized annual emissions of the project** ~~would be~~ below the GHG emissions screening threshold of **1,000**~~10,000~~ MT $CO_2$e annually. The overall reduction in GHG emissions associated with the Project would be a beneficial impact to global climate change. Therefore, impacts related to GHG emissions and global climate change would be Class IV, beneficial to the environment.

The above GHG analysis does not quantify additional life-cycle GHG reduction benefits associated with the recycling activities of the proposed MRF. A landfill is the end location for resource use. Recycling material (rather than landfill disposal), and reusing it, reduces the need for additional resources (extraction, energy, and production), thereby decreasing emissions in the production system. Using the EPA's Waste Reduction Model (WARM), the RRWMD in consultation with the TRRP vendor has estimated that the additional GHG reduction benefits of recycling materials recovered by the MRF processing activities would be 67,6**75**~~80~~ MT $CO_2$e ~~per year~~ **over the life cycle of the landfill**. The EPA WARM Model is a tool designed to help managers and policy-makers understand and compare the life-cycle GHG and energy implications of materials management options (recycling, source reduction, landfilling, combustion with energy recovery, and composting) for materials commonly found in the waste stream. By comparing a baseline scenario (e.g., landfilling) to an alternate scenario (e.g., recycling), WARM can assess the GHG implications that would occur throughout the material life cycle. Please see ~~Attachment K~~ **Appendix P or the EIR** for the RRWMD/vendor's recycling recovery tonnage assumptions and the EPA's WARM Model and its annual GHG emission reduction estimates for the proposed MRF and the benefits of recycling. As the EPA's WARM model calculation of GHG emission reductions uses different assumptions than the GHG analysis presented above, primarily related to the geographic boundary of the analysis, the WARM estimates of the GHG emission reduction benefits related to recycling are presented separately from the above analysis.

**Table 6-22 Project Total GHG Emissions Without Optional CSSR Element**

| **Project Lifetime Totals** | MT **$CO_2$e** |
|---|---|
| *Baseline (2015-2066)* | *3,288,000* |
| Landfill with TRRP (2015-2066) | 2,246,000 |
| Construction (2015-2016) | 2,190 |
| Operations (2017-2036) | **101,521** ~~63,960~~ |
| Energy Offset from Electricity Export (2017-2036) | (47,550) |
| Digested Compost (2017-2036) | 13,000 |
| *Lifetime Total* | ***2,315,161*** ~~*2,277,600*~~ |
| **Lifetime Difference Between Baseline and Project** | **(972,839 ~~1,010,400~~)** |
| | |
| **52-year Amortized Annual Totals** | **$CO_2$e** |
| *Baseline* | *63,220* |
| Landfill with TRRP | 43,190 |
| Construction | 40 |
| Operations | **1,952** ~~1,230~~ |
| Energy Offset from Electricity Export | (910) |
| Digested Compost | 250 |
| *Annual Total* | ***44,522*** ~~*43,800*~~ |
| **Annual Difference Between Baseline and Project** | **(18,708 ~~19,420~~)** |
| **Significant Impact** | **No** |

**Table 6-23 Project Total GHG Emissions With Optional CSSR Element**

| **Project Lifetime Totals** | **MT $CO_2$e** |
|---|---|
| *Baseline (2015-2066)* | *3,288,000* |
| Landfill (2015-2066) | 2,246,000 |
| Construction (2015-2016) | 2,190 |
| Operations (2017-2036) | **110,484** ~~72,920~~ |
| Energy offset from Electricity Export (2017-2036) | (47,550) |
| Digested Compost (2017-2036) | 13,000 |
| *Lifetime Total* | ***2,324,124*** ~~*2,286,600*~~ |
| **Lifetime Difference Between Baseline and TRRP** | **(963,876 ~~1,001,400~~)** |
| | |
| **52 Year Amortized Annual Totals** | **MT $CO_2$e** |
| *Baseline* | *63,220* |
| Landfill | 43,190 |
| Construction | 40 |
| Operations | **2,125** ~~1,400~~ |
| Energy Offset from Electricity Export | (910) |
| Digested Compost | 250 |
| *Annual Total* | ***44,695*** ~~*43,970*~~ |
| **Difference Between Baseline and Project** | **(18,536 ~~19,250~~)** |
| **Significant Impact?** | **No** |

## 6.4 Odors

The following section presents the results of the odor analysis associated with operation of the proposed Project, performed as described in Section 5.5.

### 6.4.1 Modeling Results

The maximum 10-minute concentration determined by the odor analysis was **41.9** ~~37.9~~ OU/$m^3$, above the guidance concentration of 5 OU/$m^3$, indicating the potential for nuisance air quality impacts to occur due to odorous emissions from the Project. However, the peak concentration occurs on the eastern boundary of the Landfill, in an area where the public will not typically be present because it is not near residences or public trails. Therefore, it would not adversely affect a considerable number of persons. When the TRRP becomes operational, a substantial amount of organic waste will no longer be landfilled as it will be processed in the AD Facility instead. This change will gradually reduce odor emissions from the Landfill. It is expected that the actual odor emissions from the Landfill could be less than the modeled results.

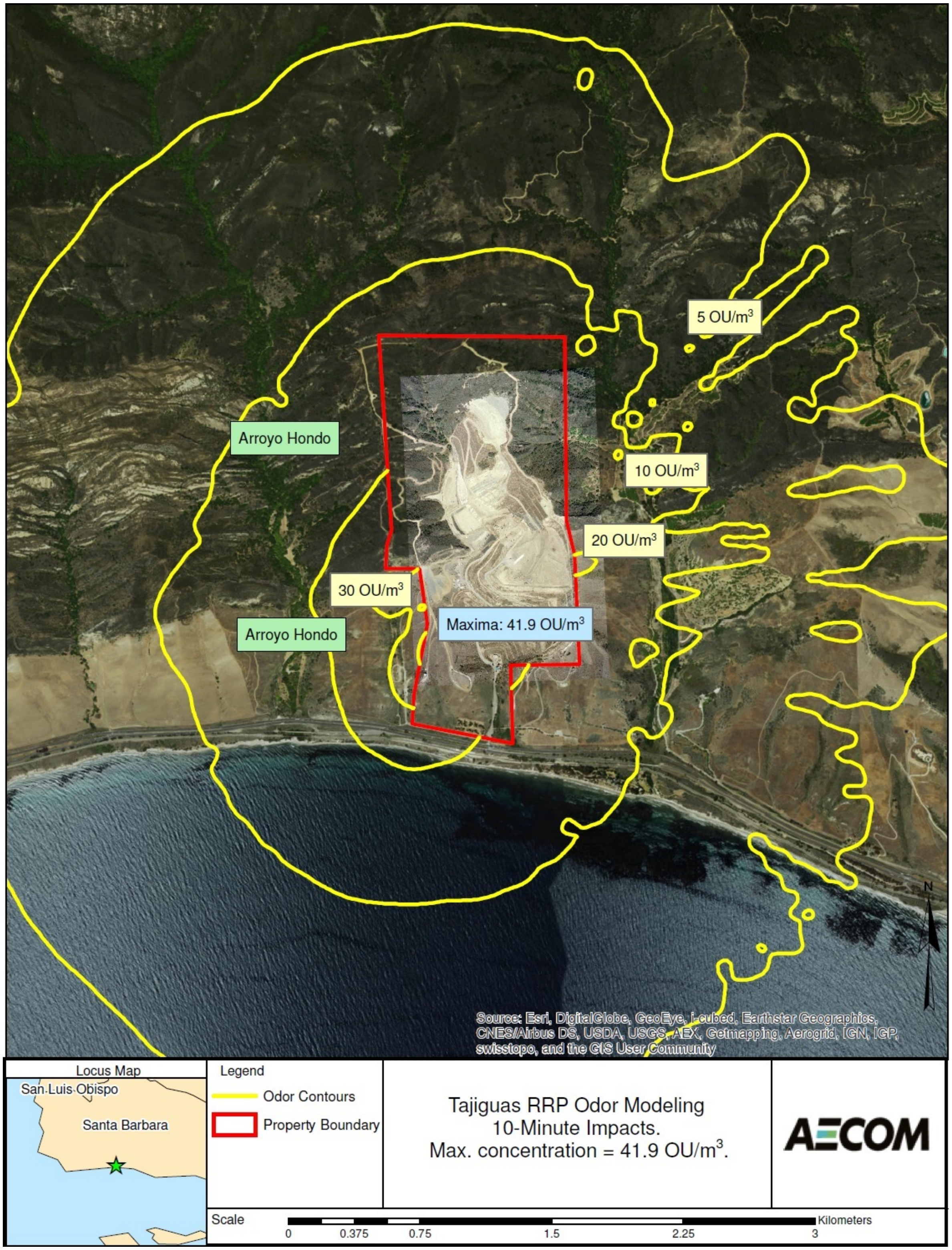
The modeling results were analyzed to determine the impacts to places where the public could reasonably be expected on a relatively frequent basis (i.e., residences and the Baron Ranch hiking trail). While lower than the peak off-site concentration, the peak odor concentrations modeled at these receptor locations were still above 5 $OU/m^3$ (see Table 6-**24**). A contour plot of the maximum 10-minute average concentrations (in OU) in the modeling grid is shown in Figure 6-6. Based on the larger contour values present on the east side of the facility adjacent to the composting area and an analysis of emission source contributions to the modeled results, the composting operation is responsible for a larger impact off-site than the AD Facility and the MRF. As shown in Figure 6-6, the odor concentrations decline dramatically after one mile from the site boundary, further decreasing the potential for odor impacts in residentially-zoned areas.

**Table 6-24 Sensitive Receptor Odor Frequency Analysis**

| Receptor | Max $OU/m^3$ 10 min avg. | $98^{th}$% $OU/m^3$ 10 min avg. | $95^{th}$% $OU/m^3$ 10 min avg. | Hours per Year Over the 10-minute Odor Guideline (5.0 $OU/m^3$) |
|---|---|---|---|---|
| Baron Ranch Hiking Trail | **16.51** ~~16.38~~ | 0.01 | 0.00 | 15 |
| Existing Single Residential Dwelling (Arroyo Quemada Lane) | **13.84** ~~14.95~~ | **2.00** ~~1.88~~ | 1.21 | **15** ~~12~~ |
| Planned Single Residential Dwelling (APN 081-150-034) | **14.28** ~~15.83~~ | **4.35** ~~4.18~~ | **3.02** ~~3.00~~ | **33** ~~30~~ |
| Number of Hours Exceeding Percentile Value | -- | 0 | 0 | -- |

The region surrounding the TRRP is primarily zoned and used for agriculture and is sparsely populated, so population exposure to potential nuisance odor impacts will be very limited. Given the very small potential for exposing residential populations to odor impacts above the 5 $OU/m^3$ guidance concentration, a frequency analysis was conducted of the modeling results at the three receptors modeled to identify the potential frequency of elevated odor concentrations.

**Figure 6-6 Tajiguas Landfill Odor Modeling Contours**



Cumulative frequency distributions of the modeled impacts were generated, and the 95$^{th}$ percentile and 98$^{th}$ percentile odor concentrations were determined. For each of these percentile values, the number of hours exceeding the percentile value was also determined. For example, the 98$^{th}$ percentile represents an odor value which is equal or lower for 98 percent of the hours in a year – 8,585 out of 8,760 hours. The results of this cumulative frequency analysis are given in Table 6-**24**. As noted in Section 4, odors above the 5 OU/m$^3$ guidance level that occur less than two percent of the hours in a year (i.e., 175 hours) would not be considered significant based on the *Institute of Air Quality Management Guidance on the Assessment of Odour for Planning* (Bull *et al*., 2014).

The modeling results indicate that operation of the proposed Project could occasionally create off-site detectable odors above the 5 OU/m$^3$ concentration guidance value used in this analysis at several receptors. Further frequency analysis reveals that the frequency of detectable odors off site, at one nearby receptor, a planned single residential dwelling, could result in odor nuisance complaints, but the concentration guidance value would only be exceeded for less than one percent of the hours (**33** ~~30~~ hours) during a year. These higher values would occur primarily when the winds are from the north (off-shore) and when the compost windrows have recently been turned. Windrow turning would be avoided when the winds are from the north which would be expected to reduce the frequency of the higher values. The other two receptors show only 15 ~~and 12~~ hours per year in which the odors are potentially detected which is less than 2 percent of the time (175 hours). In particular, it is unlikely that an individual would be present at the Baron Ranch hiking trail receptor location for the 15 hours out of a year that the odor concentration would be more than the guidance value. Additionally, the odor concentration would only be over the guidance value at the existing single residential dwelling for **15** ~~12~~ hours out of the year.

In addition to the three receptors listed in Table 6-**24**, the Arroyo Honda Preserve is located west of the Landfill property. The Preserve is a 782-acre canyon that includes hiking trails, some of which are close to the Landfill's western boundary. These hiking trails may experience higher odor impacts than the Baron Ranch hiking trail as shown by the contours presented in Figure 6-6. However, these impacts would occur infrequently since winds are predominately from the north or south and infrequently blow from the east and west, as shown in the wind rose in Figure 5-2. Additionally, the Preserve is only open to the public by reservation on the first and third full weekends of each month and every Monday and Wednesday for school and community groups. Therefore, individuals would be expected to be present on the trails near the Landfill infrequently.

The likelihood that a person in the sparsely populated, agricultural area surrounding the TRRP would experience the peak odor concentration is low because of the small number of people potentially affected, conservative odor emission assumptions, and the low frequency of occurrence of the meteorological conditions and process conditions that produce the highest odor concentrations. Therefore, it is expected that the TRRP would not conflict with SBCAPCD Rule 303, which restricts emissions that would cause nuisance or injury to any considerable number of persons or to the public or property. Odors impacts are therefore classified as less than significant for the TRRP.

As discussed Section 3.6 of 01-EIR-05 for the Tajiguas Landfill Expansion, potential impacts associated with odors emitted from landfill gas emissions and waste haul trucks were considered to be a potentially significant but mitigable nuisance impact. The existing Landfill operation has received no public complaints over the past 10 years (County of Santa Barbara, 2013b). The lack of complaints for the existing operation (which includes landfilling and green waste chipping operations) serves as an indicator that, with mitigation such as the measures listed in Section 6.4.4 that have been incorporated into the proposed Project design, the odor nuisance impacts are likely to be less than significant. Measures to reduce potential odor impacts are identified in Section 6.4.4.

### 6.4.2 Hydrogen Sulfide and Organic Sulfides

$H_2S$ and other organic sulfides are produced during anaerobic conditions in the anaerobic digester. Very little $H_2S$ and organic sulfides generation and emission occur under the aerobic conditions present in an active composting pile. In addition, the digestate used for composting has already undergone anaerobic digestion during which most organic sulfur is reduced to organic sulfides, captured in an activated carbon filter treatment of the biogas and thereafter combusted in the CHP engines and in the flare, converting any residual sulfur compounds to $SO_2$.

The magnitude of fugitive emissions of hydrogen sulfide and organic sulfides from the Project is expected to be small and below the specified thresholds in Rule 310 (which prohibits hydrogen sulfide concentrations at or beyond the property line of 0.06 ppm for an averaging time of 3 minutes and 0.03 ppm for an averaging time of 1 hour). For the proposed Project, $H_2S$ and organic sulfides will mainly be produced during the anaerobic digestion process; however, any gaseous $H_2S$ and organic sulfides produced which are not captured in the activated carbon filter are combusted in the CHP engines. After oxidation in the CHP engines, the emissions are insignificant. Ventilation air from the AD Facility and MRF buildings containing low concentrations of $H_2S$ and organic sulfides will be treated with biofilters which provide removal efficiencies of 99 percent for $H_2S$ and 80 percent for organic sulfides. With this treatment, the $H_2S$ and organic sulfides emissions would be less than significant.

### 6.4.3 Cumulative Odor Impacts

Beyond the Tajiguas Landfill, other developments may contribute to cumulative odor impacts. The odor impact from the proposed Project will be substantially reduced after a distance of 1 mile (1.6 kilometers); therefore, a zone of 2 miles (3.2 kilometers) was reviewed for other cumulative projects. A qualitative cumulative review is provided for existing and future land use developments in Table 6-**25**. Descriptions of these developments are provided in the *Gaviota Coast Cumulative Project List* (December 5, 2012). Cumulative odor impacts are not anticipated to be significant and the Project's contribution to odor impacts would not be considerable.

**Table 6-25 Cumulative Projects Odor Review**

| Development | Location | Odor | Estimated Odor Potential |
|---|---|---|---|
| Simon Residence | 1.1 miles | Products of combustion from construction equipment | Temporary and Insignificant |
| Shell Hercules Remediation and Slope Stabilization | 0.2 miles west | On-going remediation (1994) of hydrocarbons, Superfund Site | Less than significant[1] |
| Hart Farm and Single Dwelling Residence | 0.2 miles southeast | Products of combustion from construction equipment | Temporary and Insignificant |
| [1] Remediation deemed to have less than significant air quality impacts (Drude, 2009) | | | |

### 6.4.4 Recommended Mitigation Measures

Odor impacts would be less than significant and mitigation measures are not required.

Consistent with the Final Program EIR for Statewide AD Facilities (CalRecycle), the following measures have been incorporated into the Project design:

- Establish time limit for on-site retention of undigested substrates (i.e., feed stocks should be processed and placed into the portion of the system where liquid discharge and air emissions can be controlled within 24 or 48 hours of receipt).
- Provide enclosed, negative pressure buildings for indoor receiving and pre-processing. Treat collected foul air in a biofilter or air scrubbing system. (TRRP MRF and AD buildings will be equipped with biofilters and will be kept under negative pressure).
- Establish contingency plans for operating downtime (e.g. equipment malfunction, power outage).
- Manage delivery schedule to facilitate prompt handling of odorous substrates. (Odorous substrates will be handled promptly).
- Providing windrow irrigation immediately after turning events.
- Avoid composting windrow turning when winds are from the north.
- Handle fresh unstable digestate within enclosed building, or mix with green waste and incorporate into a composting operation within the same business day, and/or directly pump to covered, liquid leak-proof containers for transportation. Establish a protocol for monitoring and recording odor events. (The facility will develop an Odor Impact Minimization Plan (OIMP) including the above measures.) Instituting an OIMP, preventative maintenance program and formal odor monitoring/response strategy is currently the best form of mitigation. The proposed measures can be accomplished

through Standard Operating Procedures and Operation and Maintenance Manuals, which are included in the OIMP.

- Establish a protocol for reporting and responding to odor events. (The facility will develop an OIMP, as discussed above).

Due to the intermittent nature of nuisance odor impacts, an adaptive approach is recommended for the OIMP. Based on the location, duration and time of any potential odor complaints, the OIMP should document a clear standard operating and logging procedure. Additional odor minimization techniques can include:

- Installation of physical barriers around the facility, such as berms and vegetation, to minimize odor migration.
- Restricting windrow compost turning events based on weather conditions and prevailing winds.
- Ambient odor monitoring and sampling program for pre and post construction conditions.
- Application of deodorants or cover material on windrows.

### 6.4.5 Conclusions

As discussed in Section 6.4.1, the modeling results indicate that operation of the proposed Project could occasionally create off-site objectionable odors above the selected 5 OU/m$^3$ guidance concentration. However, the frequency of occurences above the guidance concentration level would be low, well below two percent (175 hours) of the hours in a year at specified locations. Additionally, the area surrounding the TRRP is agriculturally zoned, sparsely populated and therefore a considerable amount of persons would not be impacted. Odor impacts are therefore classified as less than significant for the TRRP.

As required by the Final Program EIR for Statewide AD Facilities (CalRecycle, 2011), an OIMP will be established to outline the Project design features and best management practices listed in Section 6.4.4. Several aspects of the OIMP have already been incorporated into the Project; however, an adaptive approach is recommended to manage odor nuisance complaints if they arise.

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# 7.0 Evaluation of Alternatives

This section evaluates potential air quality and GHG impacts from alternatives to the proposed Project. The following seven alternatives have been identified for evaluation:

A. **No Project Alternative**: continued disposal of MSW at the existing, permitted Tajiguas Landfill until the disposal capacity is reached by about (~) 2026. As the County is required to provide waste disposal services for the communities currently served by the Tajiguas Landfill, after ~2026 the County would need to provide other disposal options. Absent implementation of the proposed Project, the County would likely either pursue an expansion of the Tajiguas Landfill (Alternative E) or export waste to another landfill (Alternatives F or G);

B. **Urban Area MRF Alternative 1 (MarBorg Industries MRF)**: the MRF would be located at the MarBorg Industries 620 Quinientos Street facility, and the AD Facility would be located at the Tajiguas Landfill, with disposal of residual waste at the Tajiguas Landfill. Note, some of the current operations at this facility would be displaced and moved to other locations, most likely within Santa Barbara. MarBorg Industries inerts processing and all green-waste handling would likely shift to the Quarantina facility, with the location of leased operations unknown at this time.

C. **Urban Area MRF Alternative 2 (South Coast Recycling and Transfer Station [SCRTS] MRF)**: the MRF would be located at the SCRTS and the AD Facility would be located at the Tajiguas Landfill, with disposal of residual waste at the Tajiguas Landfill;

D. **Off-site Aerobic Composting**: the MRF would be located at the Tajiguas Landfill, and the AD Facility would be replaced with aerobic composting of organics at the Engel & Gray Composting Facility in Santa Maria, with disposal of residual waste at the Tajiguas Landfill;

E. **Tajiguas Landfill Expansion**: expansion of the existing Landfill to provide additional waste disposal capacity to approximately year 2036 (equivalent to the proposed Project);

F. **Waste Export to the Simi Valley Landfill and Recycling Center**: export of MSW to Waste Management Simi Valley Landfill and Recycling Center (proposed for expansion) after the existing permitted Tajiguas Landfill capacity is reached in ~2026;

G. **Waste Export to the Santa Maria Integrated Waste Management Facility**: export of MSW to the City of Santa Maria's proposed new landfill after Tajiguas Landfill capacity is reached in ~2026.

Excluding the Tajiguas Landfill Expansion (E) and the Waste Exportation Alternatives (F and G), each of the alternatives assume continued operation of the Tajiguas Landfill under the operational parameters and solid waste disposal capacity discussed in 01-EIR-05 (Section 2.4, pages 2-23 to 2-60) and 08EIR-00000-00007 and Solid Waste Facility Permit 42-AA-015. Continued operations allowed in the Tajiguas Landfill Solid Waste Facility Permit include a permitted waste disposal capacity of 23.3 million cubic yards, 357 acre permitted area, landfill waste footprint of 118 acres, 1,500 tons/day permitted maximum tonnage, and maximum waste elevation of 620 feet.

## 7.1 Description of Alternatives

### 7.1.1 Alternative A: No-Project Alternative

This alternative assumes that Tajiguas Landfill operations would continue under the operational parameters and design approved and permitted in 2002/2003. Operational parameters include a total permitted area of 357 acres, a permitted waste footprint of 118 acres, a design capacity of 23.3 million cubic yards of waste, a maximum elevation of 620 feet above mean sea level and a maximum daily permitted tonnage of 1,500 tons/day. Based on current operating practices and waste disposal rates, the Landfill is estimated to reach full permitted capacity in the year 2026. The proposed Project would extend the life of the Landfill by approximately 10 years. In comparison, the No Project Alternative would involve Landfill closure after the permitted capacity is reached. Upon closure, the County would need to establish agreements for the disposal of residual MSW (post-recycling) at another landfill. The impacts associated with export of MSW from the Tajiguas Landfill wasteshed (the area from which waste processed at the Tajiguas Landfill originates) to two other suitable landfills are evaluated under Alternatives F and G. Alternatively, the County would need to pursue additional disposal capacity at the Tajiguas Landfill (Alternative E).

### 7.1.2 Alternative B: MarBorg Industries MRF

This Alternative would involve construction and operation of the proposed MRF component of the Resource Recovery Project (including processing of CSSR) at a site owned by MarBorg Industries at the east corner of Quinientos Street and Calle Cesar Chavez located in the City of Santa Barbara (street address 620 Quinientos Street, Santa Barbara, California 93103). The MRF would be located on several parcels (APN 017-113-025 to 017-113--028 and a portion of APN 017-113-031) encompassing a total area of 4.19 acres.

Current uses of this proposed site include a 1.1 acre green-waste chipping and inert materials processing facility, a concrete batch plant for ready-mix concrete (leased to Vulcan), vehicle and equipment storage and inert material storage. Additionally, Lash Construction is a concrete, paving, and asphalt contractor that leases part of the property. MarBorg Industries' green-waste and inerts processing facility operates under a Notification Tier Solid Waste Facility Permit.

The proposed 4.19 acre site is currently developed with approximately 11,000 square feet ($ft^2$) of structures and the remaining areas of the site are paved. The proposed site is zoned M-1/ SD-3, Light Manufacturing with Special District 3 overlay (Coastal Zone). Most of the surrounding properties are also zoned M-1 and are used for storage, offices and/or light industrial use. The parcels located across Calle Cesar Chavez are zoned OM-1 and uses include the Whitcraft Winery and West Marine, a boating parts and accessories store. The proposed site is located approximately 700 feet southeast of MarBorg Industries Construction and Demolition Materials Recovery and Transfer Facility.

At this alternative location, the MRF would consist of a 107,162 $ft^2$ building (net) that would include:

- Truck scale for weighing incoming MSW and CSSR;
- Tipping floor/waste delivery areas (40,000 $ft^2$) to receive an estimated maximum delivery volume of 220,000 tons/year; and 40,000 tons/year of CSSR;
- MRF waste processing (30,000 $ft^2$) and bale storage (10,000 $ft^2$);
- Load-out waste transfer area (23,000 $ft^2$) where the non-salvageable residue would be transferred to the Tajiguas Landfill for disposal. Transfer trucks would sit at grade and would be loaded over the top by loaders with extended forks. Two 18-wheel transfer trucks would be able to be loaded simultaneously.
- Loading dock with dock-high capacity for three container trailers and/or enclosed trucks to receive baled recyclable materials for transport to markets;
- Office/administration/employee/control room (two stories, approximately 2,000 $ft^2$ each for total of 3,872 $ft^2$);
- Visitor/education (1,000 $ft^2$ included as part of the second floor of the office/administration building); and
- Parking for 47 employee/visitor vehicles and 7 bicycles.

The average building height would be approximately 38 feet with a maximum building height of 40 feet. The building would also be designed to accommodate a 41,000 square foot photovoltaic solar panel array on the west sloping roofs that would generate approximately 600 kilowatts (kW).

The MRF would include a negative air pressure air handling and ventilation system designed to capture the dust and odor emissions that are anticipated to be produced from processing the MSW. The air would be filtered through particulate and activated carbon filters before it is discharged, and the system would be sized for sufficient air exchanges and filter capacity so that no untreated air would leave the building. This system will work in conjunction with fast acting doors and a misting system charged with flocculent and deodorizers to minimize the formation of odors and dust inside the building.

The MRF would include an emergency electrical power system consisting of a small 500 kW generator that would provide backup power for emergency lighting and for office operations. A backup system for operation of the MRF equipment would not be provided. In the event of a prolonged electrical outage, certain operations could continue at least temporarily including unloading of collection vehicles, loading of transfer trucks, and loading of commodities trucks. However, the MRF equipment would not be operational, so only manual sorting on the deck could continue. In the event of a prolonged outage, collection trucks would have to be diverted to the MarBorg Industries Quarantina facility, or directly to the Landfill.

The existing uses at the site are assumed to move to other locations in the Santa Barbara area. MarBorg Industries inerts processing and all green-waste handling are assumed to shift to the Quarantina facility. Under this alternative, MSW currently delivered to the Tajiguas Landfill (franchise residential waste, commercial waste and self-haul waste collected at the SCRTS) would instead be directed to the 620 Quinientos Street site to be processed through the MRF. This traffic reflects the tonnage scenario of 220,000 tons/year MSW plus 40,000 tons/year CSSR. Approximately 116 round trips per day would be required (at MRF capacity) by collection trucks (8 ton payloads) to deliver both MSW and CSSR to the facility. Collection trucks would primarily utilize Quarantina Street and Yanonali Street to reach the MRF entrance.

After the waste is tipped, bulky salvageable material such as wood, appliances (white goods), mattresses, tires, and scrap metal would be manually separated from the waste by facility employees and loaded into bins or stock-piled out of the way for recycling or disposal. Spotters would also continuously inspect for hazardous waste, which may have been inadvertently brought to the facility. This material would be removed and stored in a hazardous waste locker for ultimate disposal at a permitted hazardous waste facility. The MRF processing system is comprised of two identical and parallel lines that can each process either MSW or CSSR.

Residue remaining after the sorting has occurred would be conveyed to the load out area for top-loading into transfer trucks and hauling to the Tajiguas Landfill for disposal. Residual waste transfer trucks would be weighed on axle scales as they are being loaded to ensure maximum, yet legal, axle weights. Once loaded, litter control screens would be placed over the top of the trailer, and the vehicles would proceed to the Tajiguas Landfill. Any residual waste not hauled to the Landfill late in the day may be stored overnight in transfer trucks inside the transfer tunnel until it is transported the next day. These loads would be covered overnight.

Recyclables recovered from either the MSW or the CSSR would be baled and the finished bales would be stored inside the MRF building until sufficient quantities have accumulated to load semis and shipping containers at the loading dock and transport the material to local mills or the Ports of Los Angeles and Long Beach.

Under this alternative, the MRF would include processing of CSSR as a project element instead of as an optional element.

Non-recyclable residue remaining after the sorting has occurred would be conveyed to the load out area for top-loading into transfer trucks and hauled to the Tajiguas Landfill for disposal.

The MRF would also be designed so that the organic component of the MSW would be recovered for shipment to the AD Facility to be constructed at the Tajiguas Landfill.

Under the MarBorg Industries MRF Alternative, to process the 700 tons/day, six days a week (220,000 tons/year) of MSW and 130 tons/day, six days a week (40,000 tons/year) of CSSR, a flexible, two line sorting system would be installed. These identical lines would each be capable of sorting 30 tons/hour of MSW or 12 tons/hour of CSSR. The sorting lines would operate 6 days/week, Monday through Saturday, 21 hours/day in 2 long shifts (4 a.m. – 2 p.m., and 2 p.m. – 1 a.m.).

The MRF would be operated by approximately 49 employees per shift, two shifts per day, 6 days/week) for processing both the MSW and the CSSR, along with 6 management, maintenance and administrative employees for a total of 104 employees: sorters (70), traffic spotters (2), loader operators (4), skid-steer loader operators (2), baler operators (2), forklift operators (6), street sweeper operators (2), general manager (1), shift supervisor (2), clerical (2), weigh master (2), mechanic (2), mechanic helpers (4), electrical/Instrumentation (2), marketing manager (0.5) and compliance/safety manager (0.5). The maximum number of employees on site at any one time would be 55. Employee transportation is estimated to involve up to 100 round trips per day.

In addition to the MRF equipment, mobile equipment (also known as rolling stock) would be used to load incoming material onto the MRF processing lines, recyclables into commodities trucks, and organics and residue into transfer trucks.

Baled recyclable materials would be transported from the MRF by truck primarily to the Ports of Los Angeles and Long Beach, and local mills. Diversion from processing the MSW portion of the incoming material is expected to be approximately 60 percent, including organics. Diversion from processing CSSR in the MRF is expected to be 90 percent. Together this provides an overall facility diversion of 65 percent. Outgoing, processed materials would be transported in a fleet of heavy-duty trucks. These would depart during the day for trips to Tajiguas Landfill and during the night for trips to the ports. Transport of recyclable materials and organics would involve 26 truck trips/day at 23-ton capacity each. Post-processing transport of non-salvageable residue to the Tajiguas Landfill would involve up to 14 truck trips/day at 23 ton-capacity each.

Waste would be delivered to the MRF between the hours of 6 a.m. and 6 p.m. Monday through Saturday. Operations inside the facility would occur 24 hours per day, six days per week. The combined MSW and CSSR MRF sorting lines would operate up to 6 days per week, 21 hours per day in 2 shifts.

Transport of recyclables to market would occur daily, as needed, 6 days per week. Transport of organics and residue would occur during the Tajiguas Landfill's permitted operating hours.

The MRF and site lighting needs would be served by SCE and the anticipated electrical demand is 3,276 MWh/year for the office, lighting and temperature control. Approximately 41,000 $ft^2$ of solar panels would be installed on the west facing roof slopes generating approximately 600 kW when the sun is shining. Thus, on days with full output, the solar array could meet the electrical needs of the facility, excluding the actual MRF equipment. The MRF equipment power demand is estimated at 500-750 kW.

Construction of the MRF is projected to take approximately 16.5 to 17 months to complete and would involve the removal of 11,029 $ft^2$ of structural development and 171,898 $ft^2$ of paving. Construction activities would occur from 7 a.m. to 4 p.m. Monday through Friday. Construction activities would include:

- Demolition: 1 month (assumes the concrete batch plant is removed by others);
- Site prep and grading: 1.5 months;
- Foundation piles: 1.5 months;
- Footings: 2 months;
- Building construction: 8 months; and
- Site finish/equipment install: 2.5 months.

Based on preliminary calculations, construction of the site is estimated to require the importation of approximately 13,950 cubic yards of clean fill to achieve the proposed finished floor elevation. There is no known contamination of the site.

The MRF would include a negative pressure air handling and ventilation system designed to capture the dust and odor emissions that are anticipated to be produced from processing the MSW. The air would be filtered through particulate and activated carbon filters before it is discharged, and the system would be sized for sufficient air exchanges and filter capacity so that no untreated air would leave the building. This system will work in conjunction with fast acting doors and a misting system charged with flocculent and deodorizers to minimize the formation of odors and dust inside the building. Additionally, all waste tipping and processing would occur inside the MRF building to mitigate odors.

As noted above, a spray misting system with deodorizer would be installed over the tipping floors and transfer truck loading areas to control dust and odor during loading. A street sweeper would be used to clean the paved surfaces to minimize accumulation of dust and dirt, and therefore minimize the dust kicked up by vehicles, and the dust migrating off site. If a particularly dusty load is received, workers would moisten it with water sprays from hand-held hoses. Negative air pressure and air filtration will also help to control dust.

As noted previously under this alternative, the AD Facility and Composting Area would be constructed at the Tajiguas Landfill. The AD Facility location, size and operating parameters would be the similar to that described for the proposed Project. The organic material recovered from the MSW at the MarBorg Industries MRF would be delivered to the site in transfer trucks or would arrive at the AD Facility as SSOW. Office space for AD facility employees and landfill staff would be provided in a separate building to be located north of the AD Facility.

### 7.1.3 Alternative C: South Coast Recycling and Transfer Station MRF

This Alternative would involve construction and operation of the MRF component of the Resource Recovery Project at the existing County-owned and operated SCRTS site located at 4430 Calle Real in Santa Barbara, California. Under this Alternative the MRF would be integrated with the existing solid waste operations at the SCRTS. Similar to the proposed Project, the AD Facility would be located at the Tajiguas Landfill, with disposal of residual waste also at the Tajiguas Landfill.

The SCRTS has been in operation since 1967. A portion of the site overlays the Foothill Closed Landfill, which operated from the 1940's to 1967. The solid waste operations area is located on 8.3 acres in the central portion of a larger 143.48 acre publicly owned parcel (APN 059-140-023) containing other public and non-profit uses (e.g., County Road Yard, a Corporation Yard which serves General Services and Flood Control, Growing Solutions Restoration Education Institute, a non-profit native plant nursery, and Hearts Therapeutic Equestrian Center, an non-profit therapeutic riding program). Land uses bordering the 143.48 acre parcel include the Santa Barbara County Jail, Santa Barbara County Health and Social Services and training buildings, and the El Sueno Road residential neighborhood to the east.

Under Solid Waste Facility Permit No. 42-AA-0014 issued by CalRecycle, the SCRTS is permitted to transfer up to 550 tons of waste per day, and serves as a central collection point for a large portion of the non-hazardous waste generated on the South Coast. The SCRTS receives commercial roll-off containers, as well as waste brought in by residents and small, non-franchised haulers (e.g., landscapers). Commodities salvaged from the waste stream entering the SCRTS include scrap metal & white goods (major appliances), green and urban wood waste, tires, high grade metals (copper, brass, aluminum), construction and demolition debris (rubble, drywall, carpet, dirt wire, foam pad, ABS plastic), cardboard and paper, cathode ray tubes and other electronic waste.

Commodities brought to the SCRTS by private haulers, curbside recycling trucks, or other County sponsored recycling projects for recycling processing include all of the materials listed above, CSSR and food scraps. Any non-recoverable residuals are disposed of as regular MSW. Green-waste and wood waste are transferred to the Tajiguas Landfill for grinding into mulch. Some of the mulch is returned to the SCRTS for local distribution to the public and commercial customers. The CSSR are loaded into County transfer trailers and hauled to Gold Coast in Ventura, California for separation, bailing, and sold to various commodity purchasers.

The permitted operating hours of the SCRTS are Monday through Saturday from 7 a.m. to 5 p.m. with the exception of New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day. The facility is operated by a daily staff of 26 employees consisting of supervisors, truck drivers, checkers, maintenance workers, shop and scale personnel, mulch personnel, contract laborers and a contract falconer.

At this alternative location, the MRF would consist of a single approximately 86,600 square foot building, with an average height of 49 feet and a maximum height of 61 feet and adjacent associated facilities that would include:

- Two truck scales and scale house (675 $ft^2$) for weighing incoming MSW and CSSR;
- Tipping floor/waste delivery areas (29,460 $ft^2$) to receive an estimated maximum delivery volume of 800 tons of MSW per day (250,000 tons/year) and 40,000 tons/year of CSSR;
- MRF waste processing (35,510 $ft^2$) and bale storage (11,350 $ft^2$);
- Load-out waste and organics transfer area (8,390 $ft^2$) where the non-salvageable residue and the organics separated from the MSW would be transferred to the Tajiguas Landfill for disposal or, for the organics, processing in the AD facility. Transfer trucks would sit below grade and be loaded from above by loaders in a partially enclosed loading bay area into County transfer trailers for delivery to the Tajiguas Landfill. Two 18-wheel transfer trucks would be able to be loaded simultaneously;
- Recyclable load-out area with docks for loading recovered baled recyclable material into trucks for transport to markets;
- Office/administration/employee/visitor center (three story annex [7,700 $ft^2$]);
- Air quality management systems including: tipping floor biofilter (10,890 $ft^2$ and 10 feet in height), load out area biofilter (9,630 $ft^2$ and 10 feet in height) to be accessed by a 12

foot wide, paved access road; two humidification units (6 feet by 16 feet by 6 feet), and two dust collection units (13 feet diameter x 40 feet high);

- Outbound weigh scale and scale house (450 $ft^2$) for recyclable load-out to be exported to the Port of Los Angeles; and
- Parking for 97 employee/visitor vehicles and 10 bicycles.

The MRF building would also include a self-haul MSW drop off area (separated from the remainder of the tipping floor area by a series of concrete k-rail barriers) to replace the existing outdoor drop off area. Surrounding the exterior of the MRF would be storage areas and bins for pre-sorted materials such as electronic waste, medical sharps, rock, metals, treated lumber, tires, dry-wall and mattresses; self-haul green waste and mulch storage.

The MRF building would be located in an existing paved area of the SCRTS site currently used for waste management activities. A portion of the SCRTS site overlies the closed Foothill Landfill. The MRF building would be located outside of the historic refuse footprint.

The MRF would include a high capacity, negative pressure air handling system that would be designed to capture the dust and odor emissions that are anticipated to be produced from processing the mixed MSW. An estimated 3 to 6 changes per hour would be processed through a dust collection unit, two humidification units and two high capacity biofilter systems.

MSW collected by the Public Participant's franchise waste haulers (currently MarBorg Industries and Waste Management) currently disposed of at the Tajiguas Landfill would be delivered to the MRF at the SCRTS, combined with self-haul MSW currently delivered to the SCRTS and would be processed through the MRF. As described for the MRF for the Resource Recovery Project at the Tajiguas Landfill, the MRF waste processing area would include a series of specialized equipment (i.e., size reducer, bag openers, shredders, trommel screens, conveyors, volumetric/density air separators, ballistic separators, magnetic eddy current and optical sorting separators) each designed to size reduce, sort, separate and recover the maximum quantity of available recyclable material from the MSW, while also recovering and cleaning organic waste (food, green and other compostable) material for delivery to the AD Facility at the Tajiguas Landfill.

The capacity of the MRF would be the same as the proposed Project (see Section 3.12.1), approximately 40 tons/hour of MSW for an overall maximum processing capacity of up to 250,000 tons/year of MSW (800 tons/day) (6 days/week at 20 operating hours/day). The MRF would also include processing the CSSR (up to 40,000 tons/year or 130 tons/day) currently delivered to SCRTS by MarBorg Industries.

The MRF would be operated by approximately 24 full-time employees per 8 hour operating shift (2 shifts) for the MSW plus 4 additional maintenance and repair technicians on the second MSW line shift (for a total of 28 employees on the second shift) and 20 employees for processing the CSSR (1 shift). The employees are estimated to include: 1 MRF manager; 1 processing line manager; 1 mechanic; 4 loader/equipment operators; 14 sorters; and 3 laborers for the mixed MSW line. The MRF would initially operate for two 8 hour shifts per day, 5 days per week, 52 weeks per year. A third shift per day comprised of approximately 7 cleaning and maintenance personnel would operate 5 days per week, 52 weeks per year. Shift hours of operation are anticipated to be 7 a.m. – 3:30 p.m.; 3 p.m. – 11:30 p.m.; and, 11 p.m. – 7:30 a.m. If the MRF were operating at full design capacity of 250,000 tons/year of MSW, operating hours would expand to 6 days per week.

Up to 90,000 tons/year (290 tons/day) of the MSW stream and up to 36,000 tons/year (120 tons/day) of the CSSR waste stream would be recovered as recyclable materials to be exported to market.

Mobile equipment would be used to load MSW into the MRF equipment, and load processed organic waste and MSW residue into trucks.

Bailed recyclable materials would be transported from the MRF to off-site markets. The recyclable export trucks (approximate 22 ton capacity) would be contracted from a 3rd party company with its home base at the Port of Los Angeles. It is anticipated the majority of the recyclables would be transported to markets in the Los Angeles area or delivered to the Ports of Los Angeles and Long Beach for distribution to other markets. A total of 18 trips/day would depart from the MRF (13 of these trips would be new and 5 would be existing trips which currently transport CSSR to Gold Coast). Trucks exporting material from the site would likely depart at approximately 9:30 a.m., 6 p.m., and 3:30 a.m. Export from the SCRTS MRF to the Tajiguas Landfill would consist of 13 trucks transporting organics to the AD Facility for processing and 15 transporting residue for disposal (23 of these trips would be new and 5 would be existing trucks currently transporting self-haul MSW collected at SCRTS). The organics and residue would be transported in County owned and operated heavy-duty trucks with an approximate 18.5 ton capacity dedicated to the project. The organics and residue would be delivered to the Tajiguas Landfill during the Landfill's existing, permitted operating hours.

The MRF would operate 24 hours/day, 311 days/year, but would only receive waste during the current permitted SCRTS operating hours of Monday through Saturday from 7 a.m. to 5 p.m., and not including holidays.

All existing facilities, excluding the Maintenance Shop, would be demolished in preparation for construction of the proposed MRF and associated facilities. Demolition would include removal of existing asphalt and concrete paving and parking lots, masonry walls, buildings, office trailers and associated materials and solid waste. Approximately 13,200 cubic yards of cut and 7,500 cubic yards of fill (with approximately 5,700 cubic yards of net soil export), would be required over an approximate 6.2 acre area to produce level pads for the MRF building, parking lots and other facilities.

Construction of the MRF is projected to take approximately 12 months to complete following approximately 3 months of demolition, grading and site preparation. Construction work would generally be conducted during daylight hours, in compliance with the current SCRTS operating hours (7 a.m. to 5 p.m., Monday through Saturday). Non-daylight work hours on weekdays or daytime work on Saturdays and holidays may occur to minimize conflicts with ongoing MSW delivery and consolidation operations.

Similar to the existing transfer station operations, waste processing activities in the MRF would have the potential to generate odor due to the potential presence of decomposing organic waste (putrescible waste). To limit off-site odors, mixed MSW would be tipped inside the enclosed negative pressure MRF building. Air within the building would be filtered through a high volume, biofilter-based air filtration system. In addition, operation of a MRF at the SCRTS site would include development and implementation of an OIMP. The OIMP would provide monitoring and control measures for odor emissions.

The air handling system for the MRF would be equipped with a dust collection system. Hood fans will be installed over the MRF equipment to collect dust in close proximity to the waste processing equipment.

As noted previously under this alternative, the AD Facility and Composting Area would be constructed at the Tajiguas Landfill. The AD Facility location, size and operating parameters would be similar to that described for the proposed Project. The organic material recovered from the MSW at the SCRTS MRF would be delivered to the site in transfer trucks or would arrive at the AD Facility as SSOW. Office space for AD facility employees and Landfill staff would be provided in a separate building to be located north of the AD Facility.

Permitted SCRTS operations would continue with implementation of the proposed MRF at the SCRTS site. No change in the number of County employees working at the site is projected; however, some shift in job types/descriptions may occur. A one-story 750 $ft^2$ addition to the existing maintenance building is proposed to accommodate County employees who would be displaced due to the removal of the existing office space as a result of the MRF construction.

### 7.1.4 Alternative D: Off-site Aerobic Composting

This Alternative would involve processing organic waste recovered in the MRF using open air aerobic composting methods at Engel & Gray's existing composting facility in the City of Santa Maria, instead of enclosed dry fermentation anaerobic digestion at the Tajiguas Landfill. Similar to the proposed project, the MRF would be located at the Tajiguas Landfill, with disposal of residual waste also at the Tajiguas Landfill.

The Engel & Gray facility is comprised of two parcels (APNs 113-120-17, -21) on a 40.15 acre portion of the 161-acre City of Santa Maria Wastewater Treatment Plant (WWTP) facility. The 40.15 acre site is leased to Engel & Gray by the City of Santa Maria. The site is located approximately 0.3 miles south of the State Route 166/Ray Road intersection, and about 2.5 miles west of residential areas located at Black Road. The composting facility is situated adjacent to, and immediately west of the developed portion of the WWTP site. A portion of the area containing the composting facility was previously used for the disposal of treated wastewater effluent. The site zoning is Public Facilities (PF). Surrounding land uses are agricultural lands (row crops), and the City's wastewater treatment plant immediately to the east. About 26 acres of the 40 acre site is used for composting operations, but this area was observed to be under expansion during a July 24, 2013 site visit by RRWMD personnel.

The site operates under Solid Waste Facility Permit 42-AA-0053, which authorizes receipt of up to 52,200 tons per quarter of compostable materials, a site storage capacity of 400,000 cubic yards, and an average permitted daily traffic volume of 75 vehicles/day. The permitted hours of operation are 7 a.m. to 7 p.m., Monday through Sunday. Permitted waste that can be received includes green-waste, agricultural waste, manures, biosolids (sewage sludge), food material and organic feedstock. The typical sources of these materials include: municipal curbside green waste recycling programs, landfill diversion activities, commercial landscapers and tree services, vineyard operators and wineries, row crop producers, and agricultural growers/packers/shippers. The typical sources of manure include: cattle feedlots, confined poultry operations, dairies, horse stables, ranches and other confined livestock or exotic feeding operations. The typical source of biosolids includes: domestic wastewater treatment facilities and municipal waste water treatment facilities. The facility also currently processes food waste from sources such as: the City of Santa Barbara's commercial food waste collection program, Cottage Hospital, Santa Barbara School District, and the University of California at Santa Barbara (UCSB).

Waste Discharge Requirements (Order 99-11) issued by the Central Coast Regional Water Quality Control Board limits materials on-site to 100,000 cubic yards of feedstock and actively composting materials, and 100,000 cubic yards of finished compost. Typically, the volume of feedstock and finished compost present on-site is about 100,000 cubic yards (Engel, 2013).

The Engel & Gray facility uses open air aerobic windrow composting methods. Load checks are conducted upon pick-up and/or unloading of feedstock at the site. Non-compostable waste is separated and stored in a roll-off box and transported to the Santa Maria Landfill. Some materials are pre-processed including separation, grinding and screening. Feedstock are mixed based on their carbon-nitrogen ratio, moisture content and availability, and formed into windrows (about 275 feet long, 18 feet-wide, 7 to 8 feet tall). Feedstock and compost are handled using a Caterpillar 966F wheeled loader. The windrows are turned periodically to maintain temperature and oxygen levels using an 18-foot Scarab windrow turner. A 2,000-gallon water truck is used for dust control and emergency firefighting.

Water is added to the windrows to maintain a moisture content of about 50 to 60 percent by weight. Water is provided from a nearby agricultural well and is applied at a rate of about 90 gallons per cubic yard of feedstock, with an estimated maximum usage of about 110 acre-feet of water per year. The compost is produced using the aerobic (oxygen requiring) windrow method. When the ingredients are mixed, the temperature begins to rise because of the naturally occurring microbes within the feedstock. During this active composting period, the compost enters a high temperature phase. Once the temperature rises above 131$^o$ Fahrenheit, the temperature is maintained, and the windrow is turned at least five times over the next fifteen days to ensure all material is heated. The heating breaks down the organic material and provides for treatment of pathogens and weed seeds that may be present. The high temperature phase is then followed by a lower temperature phase that allows for the compost to stabilize while still decomposing at a lower rate.

The active composting cycle (duration of time from receipt until when the compost is finished and ready for sale) ranges from 60 to 120 days. The maximum storage time for finished compost is about 12 months, with an average storage time of 3 months. Permitted operating hours are from 7 a.m. to 7 p.m., Monday through Sunday. According to the prior environmental review prepared for the project, the facility operates with 2 to 10 employees

Under the proposed Alternative, up to an additional 240 tons/day or 73,600 tons/year (MRF design capacity) of organic waste recovered from MSW at the proposed MRF (to be located at the Tajiguas Landfill) would be transported to the Engel & Gray site for aerobic composting. This could include up to 20,000 tons/year of SSOW from existing and future food waste collection programs. Any program that would increase the amount of SSOW would decrease the amount of MSW processed by the MRF. Assuming transport in 18.5 ton County transfer trucks, a maximum of approximately 13 truck trips per day would be required to transport organic waste to the Engel & Gray site.

### 7.1.5 Alternative E: Tajiguas Landfill Expansion

This Alternative would involve expansion of the Tajiguas Landfill to extend its life by at least 10 years (similar to the proposed Project) from the currently projected closure in approximately 2026 to approximately 2036. The expansion would provide additional disposal capacity to extend its life as compared to the proposed Resource Recovery Project which would reduce the quantity of material being disposed through the recovery of additional recyclable materials and organics and utilize the permitted capacity to achieve the same extension of Landfill life. The Landfill Expansion Alternative has been designed to preserve the existing North Sedimentation basin and to avoid additional impacts to the Pila Creek channel.

Under the Expansion Alternative, the permitted maximum daily tonnage for the Tajiguas Landfill would remain at its current level of 1,500 tons/day. The existing Landfill would be expanded both vertically and horizontally, to provide an additional 3.7 million cubic yards of airspace or 2.2 million tons of waste disposal capacity. The expansion would increase the total disposal capacity from 23.3 million cubic yards to 27 million cubic yards (approximately

12.6 million tons to 16.2 million tons). The final tonnage would depend on a variety of factors, including the amount of cover material used and the effectiveness of waste compaction.

The 3.7 million cubic yards of additional capacity would be provided by expanding the Landfill footprint in the back canyon area of the Landfill property in the area of the Landfill reconfiguration project that was approved in 2009. This expansion would create a total Landfill waste footprint of 131 acres. The expansion would consist of approximately 38 acres of vertical expansion on the existing Landfill waste footprint, approximately 14 acres of horizontal expansion within previously disturbed areas of the Landfill property and approximately one acre of new disturbance.

Under the expansion, the Landfill elevation would not exceed the currently permitted maximum elevation of 620 feet above mean sea level. The overall capacity increase would be achieved by lining and placing additional waste against the existing Landfill cut slope and by additional excavations in the back canyon area increasing the waste fill elevations in the back canyon by approximately 60 feet.

Approximately 300,000 cubic yards of excavation would be required to create the additional capacity and to facilitate the installation of the composite liner. The fill slopes would be constructed with 15-foot wide benches every 40 vertical feet to create overall fill slopes of 2.4:1. The expansion would be developed in phases.

To accommodate the Landfill expansion, additional soil would be needed for daily, intermediate and final cover. This cover material would be obtained by expanding the North Borrow/Stockpile area by approximately 12 additional acres, to the west of the existing borrow/stockpile footprint. The current soil stockpile would continue to be used for permitted Landfill operations and cover requirements.

The waste containment features (i.e., composite liner system) would be constructed in the expansion area similar to those in place at the existing Landfill. The limits of the leachate collection and removal system, protective cover, and Landfill gas management system would be adjusted to include the expansion area. A subdrain system would be constructed in the expansion area as a part of the waste containment unit. The system is designed to collect and control groundwater that intersects the subgrade surface and which may cause cut slope instabilities or seepage pressure on the Landfill liner. The subdrain system would collect the water for Landfill operations use. The Landfill's existing gas collection system would also be expanded to provide gas collection from the new waste disposal areas, and additional monitoring probes would be installed pursuant to regulatory agency requirements. An extension of the existing Landfill access road(s) would be constructed, with a minimum width of 20 feet, to meet County Fire Department requirements. The final decision regarding the specific alignment(s) would be made during final project design, but roadways would be located within the existing disturbed areas or areas to be disturbed during construction of the Landfill Expansion.

No changes would occur to the following Landfill facilities and operations:

- Ancillary facilities (i.e., scale house, maintenance area, offices, etc.);
- Utilities (sewage/wastewater disposal, electricity, telephone and communication, fuel storage);
- Landfill operations (hours, personnel, equipment, security/safety, waste inspection and handling procedures);
- Environmental protection and monitoring;
- Nuisance monitoring and controls (i.e., dust, litter, vectors, birds, noise, odor); and
- Closure, post-closure, and financial assurance; however, the preliminary closure and post-closure plan and financial assurances would need to be updated to reflect the Landfill Expansion.

### 7.1.6 Alternative F: Waste Export to the Simi Valley Landfill and Recycling Center

This Alternative would involve transportation of all MSW generated in the Tajiguas Landfill wasteshed (up to 270,000 tons/year of MSW, maximum of 1,500 tons/day as currently permitted) to Waste Management's Simi Valley Landfill and Recycling Center (SVLRC), currently proposed for expansion, when the Tajiguas Landfill reaches its permitted capacity (approximately 2026). The SVLRC is located at 2801 Madera Road, Simi Valley, California approximately 65 miles from the City of Santa Barbara. The entrance road is located approximately 0.5 miles west of the U.S. Highway 101/Madera Road interchange.

The basis of this Alternative is to provide 10 additional years of MSW disposal capacity, when the Tajiguas Landfill reaches its permitted capacity in approximately 2026. This is equivalent to the 10 year increase in Landfill life provided by the proposed project through reductions in disposal rates associated with increased recycling. Therefore, up to 2.7 million tons of MSW would be exported over this period.

This Alternative includes the following assumptions regarding solid waste management in the wasteshed following closure of the Tajiguas Landfill:

- CSSR would be consolidated at the SCRTS and shipped to the Gold Coast MRF in Ventura for processing and shipment to markets (existing conditions);
- MSW currently collected by the franchise haulers in packer trucks would be consolidated at the existing MarBorg Industries MRF/Transfer Station in Santa Barbara and at the SCRTS[7] and would be transported to the SVLRC in tractor trailers;

[7] Note: The existing Solid Waste Facility Permits for both these locations may need to be revised to accommodate the additional transfer volume and truck trips.

- Self-haul MSW received at the SCRTS would be consolidated at the SCRTS into larger capacity trucks and transported to the SVLRC; and
- Source separated green-waste collected on the south coast would be processed at the Tajiguas Landfill (existing conditions).

A Final EIR for Expansion of the SVLRC was completed in December 2010, and Major Modification No. 8 to CUP-3142 was approved by Ventura County on July 19, 2011 and a revised solid waste facility permit was issued on April 3, 2012 (56-AA-007). However, other permits for regulatory agencies are pending. The permitted operating parameters of the SVLRC include:

- Maximum Permitted Tonnage: 9,250 tons/day (total), 6,000 tons/day (MSW);
- Permitted Traffic Volume: 892 vehicles per day;
- Permitted Area: 887 Acres;
- Disposal Footprint: 368 Acres;
- Design Capacity: 119,600,000 Cubic Yards; and
- Estimated Closure Year: 2052.

When fully approved, the life of the SVLRC would be extended to approximately the year 2052, based on the maximum permitted MSW disposal rate (6,000 tons/day). Current (2008) average daily MSW receipt is 2,521 tons/day, which would increase substantially when the Toland Road Landfill closes in 2027 and MSW from the Toland Road Landfill wasteshed (City of Carpinteria, western Ventura County, Santa Clara River valley) is diverted to the SVLRC. Other regional landfills (i.e., Puente Hills) may also reach their capacity and divert MSW to the SVLRC. The capacity study prepared for the SVLRC Expansion Project EIR indicates the factor limiting future disposal capacity (~post-2027) is the permitted maximum daily MSW receipt (6,000 tons/day), and not diversion from other wastesheds. Given the 98.5 million ton permitted capacity (when approved) of the expanded SVLRC and estimated closure year (2052) at maximum disposal rates, it is anticipated that 2.7 million tons of MSW from the current Tajiguas Landfill wasteshed could be accommodated over the 2026-2036 time period. However, it is possible that the permitted maximum daily MSW receipt may be exceeded due to diversion from other regional landfills.

### 7.1.7 Alternative G: Waste Export to the Santa Maria Integrated Waste Management Facility

This Alternative would involve transportation of all MSW generated in the Tajiguas Landfill wasteshed (up to 270,000 tons/year of MSW, maximum of 1,500 tons/day as currently permitted) to the proposed Santa Maria Integrated Waste Management Facility (Santa Maria IWMF), when the Tajiguas Landfill reaches its permitted capacity (approximately 2026). The Santa Maria IWMF is proposed to be located on a 1,774 acre site, approximately 7 miles south of the Santa Maria city center (approximately 70 miles from the City of Santa Barbara) and one mile east of U.S. Highway 101.

The basis of this Alternative is to provide 10 additional years of MSW disposal capacity, when the Tajiguas Landfill reaches its permitted capacity in approximately 2026. This is equivalent to the 10 year increase in Landfill life provided by the proposed project through reductions in disposal rates associated with increased recycling. Therefore, up to 2.7 million tons of MSW would be exported over this period.

This Alternative includes the following assumptions regarding solid waste management in the wasteshed following closure of the Tajiguas Landfill:

- CSSR would be consolidated at the SCRTS and shipped to the Gold Coast MRF in Ventura for processing and shipment to markets (existing conditions);
- Self-haul MSW received at the SCRTS would be consolidated at the SCRTS into larger capacity trucks and transported to the Santa Maria IWMF;
- MSW currently collected by the franchise haulers in packer trucks would be consolidated at the existing MarBorg Industries MRF/Transfer Station in Santa Barbara and at the SCRTS[8] and would be transported to the Santa Maria IWMF in tractor trailers; and
- Source separated green-waste collected on the south coast would be processed at the Tajiguas Landfill (existing conditions).

The City of Santa Maria plans to construct a new Class III municipal solid waste landfill (Santa Maria IWMF) to replace the existing Santa Maria Regional Landfill. A Final EIR (SCH# #2006091069) was completed in April 2010, the project was approved by City Council, and a solid waste facility permit (42-AA-0076) from CalRecycle has been issued. However, as noted below permits from other regulatory agencies are pending. The permitted operating parameters of the Santa Maria IWMF include:

- Maximum Permitted Disposal Tonnage: 1600 tons/day;
- Permitted Traffic Volume: 277 vehicles per day;
- Permitted Area: 617 acres;
- Disposal Footprint: 286 acres;
- Design Capacity: 130,850,000 cubic yards; and
- Estimated Closure Year: 2105.

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[8] Note: The existing Solid Waste Facility Permits for both these locations may need to be revised to accommodate the additional transfer volume and truck trips.

The project has received its Solid Waste Facility Permit. The Waste Discharge Requirements have been under development by the Central Coast Regional Water Quality Control Board for almost two years and have not yet been issued. A Permit to Operate has not yet been approved by the SBCAPCD. Permits are also pending from the U.S. Army Corps of Engineers and Caltrans. The City anticipates that the Santa Maria IWMF will be operational in approximately 2019.

If fully approved, the Santa Maria IWMF would provide about 90 years of MSW disposal capacity (130,850,000 cubic yards) for the Santa Maria regional wasteshed, which includes northern Santa Barbara County (including the communities of Santa Maria, Guadalupe, Los Alamos, Casmalia, Sisquoc, Garey, Orcutt) and southern San Luis Obispo County (Nipomo). The Final EIR prepared for the Santa Maria IWMF identified that the facility could accommodate MSW from the Tajiguas Landfill wasteshed (southern Santa Barbara County and Santa Ynez Valley).

## 7.2 Methodology for Evaluating Impacts from Alternatives

Air quality impacts from the alternatives were evaluated either qualitatively or quantitatively. Impacts during construction of all of the alternatives were evaluated qualitatively. All impacts during operation of the alternatives involving alternative MRF locations were evaluated quantitatively, and criteria pollutant and greenhouse gas emissions were evaluated quantitatively for Alternatives D, F and G. The approach taken for each alternative is summarized below.

- Alternative A: All operation impacts were evaluated qualitatively.
- Alternative B: All operation impacts were evaluated quantitatively.
- Alternative C: All operation impacts were evaluated quantitatively.
- Alternative D: Operation criteria pollutant and greenhouse gas emissions were evaluated quantitatively. Operation ambient air quality, health risks and odor impacts were evaluated qualitatively.
- Alternative E: All operation impacts were evaluated qualitatively.
- Alternative F: Operation criteria pollutant and greenhouse gas emissions from motor vehicles were evaluated quantitatively. Operation ambient air quality, health risk and odor impacts were evaluated qualitatively.
- Alternative G: Operation criteria pollutant and greenhouse gas emissions from motor vehicles were evaluated quantitatively. Operation ambient air quality, health risk and odor impacts were evaluated qualitatively.

Methods and models used for quantitative evaluations of operation air quality impacts from the alternatives are described in the following subsections.

### 7.2.1 Alternative B: MarBorg Industries MRF

#### 7.2.1.1 Criteria Pollutant Emissions

Emissions from the following sources that would occur during operation of the proposed Project would not occur during operation of Alternative B:

- Exhaust from off-road equipment used in the MRF at the Tajiguas Landfill;
- Fugitive particulate matter from transferring MSW and CSSR into the MRF at the Tajiguas Landfill; and
- Exhaust and fugitive particulate matter from tractor/trailers transporting recyclables to the Ports of Los Angeles and Long Beach from the Tajiguas Landfill. Additionally, the number of one-way worker commuting trips to and from the Tajiguas Landfill for operation of the remaining components of the proposed Project with the optional CSSR element would be reduced from 66 to 4 per day.

Emissions from all other sources during operation of the proposed Project would be the same during operation of Alternative B.

Emissions from the following additional sources would occur during operation of Alternative B:

- Exhaust from the following equipment used in the MRF at the MarBorg Industries site:
    - Two 235-hp Caterpillar 966 loaders;
    - Three 50-hp forklifts;
    - One 78-hp skid steer loader;
    - One 50-hp boom lift;
    - One street sweeper with a 56-hp auxiliary engine; and
    - One roll-off truck.
- Exhaust during testing and maintenance of a 540-hp stand-by emergency generator;
- Fugitive particulate matter emissions from transferring up to 830 tons/day of MSW and CSSR into the MRF at the MarBorg Industries site, and from transferring 211 tons/day of organics and 260 tons/day of residuals into trucks for export from the MRF at the MarBorg Industries site;
- Exhaust and fugitive particulate matter emissions from 160 employee vehicle one-way trips per day to and from the MRF at the MarBorg Industries site;

- Exhaust and fugitive particulate matter emissions from 14 diesel-fueled tractor/trailer round trips per day to export recyclables to the Ports of Los Angeles and Long Beach from the MarBorg Industries site[9];
- Exhaust and fugitive particulate matter emissions from 26 CNG-fueled tractor/trailer round trips per day to export organics and residuals to the Tajiguas Landfill from the MRF at the MarBorg Industries site;
- Exhaust and fugitive particulate matter emissions from 116 diesel-fueled collection vehicle round trips per day to deliver MSW and CSSR to the MRF at the MarBorg Industries site instead of to the Tajiguas Landfill[10]; and
- Exhaust and fugitive particulate matter emissions from one fuel truck round trip per day to refuel equipment operating at the MRF.

Detailed criteria pollutant emission calculations are provided in Attachment F.

Except for the forklifts, the equipment that would be used in the MRF at the MarBorg Industries site would be equipped with diesel-fueled engines that meet Tier 4 emission standards. The forklifts would be equipped with propane-fueled engines that would meet 2010 emission standards for large spark-ignition engines. MarBorg Industries anticipates that each piece of equipment would operate 18 hours per day. Exhaust emissions from the diesel-fueled equipment were estimated using the same methods that were used to estimate exhaust emissions from equipment operating in the MRF for the proposed Project. ROC, $NO_x$ and PM10 exhaust emission factors from the forklifts were from the 2011 Carl Moyer Program Guidelines, Table D-14 (ARB, 2011b), and the CO emission factor was the emission standard for 2010+ model year large spark ignition engines. The PM2.5 emission factor for the forklifts was assumed to be equal to the PM10 emission factor. Air in the MRF building would be exhausted through a particulate matter filtration systems located ahead of the charcoal filters with particulate matter control efficiencies of 99.9 percent. Therefore, a control efficiency of 99.9 percent was applied to PM10 and PM2.5 emissions from equipment operating in the MRF.

Exhaust emissions from the roll-off truck and the street sweeper's main engines were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for a T6 Instate Small Truck and a T7 Single Truck, respectively, in 2017 in Santa Barbara County

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9 MarBorg Industries may contract with a carrier with CNG-fueled trucks to transport recyclables to the Ports of Los Angeles and Long Beach. However, because MarBorg Industries has not indicated that CNG-fueled vehicles would be used, it was conservatively assumed that diesel-fueled trucks would be used.

10 A portion of the collection vehicle fleet is currently CNG-fueled, but for a worst case analysis it was assumed that all collection vehicles would be diesel fueled.

at a speed of 5 miles per hour. The daily travel distances were estimated based on a speed of five miles per hour for 18 hours per day (90 miles per day).

The stand-by emergency generator at the MarBorg Industries site would be equipped with an engine that meets Tier 4 emission standards and is anticipated to be operated one-half hour per week for testing and maintenance. Exhaust emissions during testing and maintenance were estimated using the same methods that were used to estimate exhaust emissions from the stand-by emergency generator for the proposed Project.

Fugitive particulate matter emissions from transferring MSW into the MRF and from transferring organics and residuals into trucks at the MarBorg Industries site were estimated using the same emission factors that were used for transferring MSW into the MRF for the proposed Project. Because these transfers would occur inside the MRF building, a control efficiency of 99.9 percent was applied to the PM10 and PM2.5 emissions.

The tractor/trailers used to export recyclables to the Ports of Los Angeles and Long Beach from the MarBorg Industries site would be provided by the broker who purchases the recyclables. These vehicles are assumed to be diesel-fueled because MarBorg Industries has not specifically identified that they would contract with a broker/carrier using a CNG-fueled fleet. The round-trip travel distance between the MarBorg Industries site and the Ports is approximately 232 miles. Exhaust emissions from these tractor/trailers were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for trucks serving the Ports in 2017. Fugitive emissions from these tractor/trailers were calculated using the same emission factors as for off-site vehicles for the proposed Project.

The CNG-fueled vehicles that would transport organics and residuals from the MRF at the MarBorg Industries site to the Tajiguas Landfill would be equipped with the same engines as the tractor/trailers that would be used for the proposed Project, and the same emission factors were used. The round-trip travel distance between the MarBorg Industries site and the Tajiguas Landfill is approximately 56 miles.

Exhaust emissions from the diesel-fueled collection vehicles delivering MSW to the MRF at the MarBorg Industries site were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Solid Waste Collection Vehicles in 2017 in Santa Barbara County. Fugitive emissions from these vehicles were calculated using the same emission factors as for off-site vehicles for the proposed Project. These collection vehicles would be transporting waste to the MarBorg Industries site instead of to the Tajiguas Landfill. RRWMD (2013) has estimated that the one-way travel distances from the centroid of the wasteshed to the Tajiguas Landfill and to the MarBorg Industries site are 23 miles and 4 miles, respectively. Therefore, transporting the MSW to the MarBorg Industries site instead of to the Tajiguas Landfill would reduce the one-way travel distance by 19 miles (23 miles to Tajiguas Landfill – 4 miles to MarBorg Industries site).

Exhaust and fugitive particulate matter emissions from worker trips to and from the MRF at the MarBorg Industries site were estimated using the same emission factors that were used for worker trips for the proposed Project. The daily VMT for worker vehicles was estimated from estimates of the number of workers that are anticipated to commute from various locations in Santa Barbara County and the travel distances to the locations provided by MarBorg Industries. These estimates are in Attachment F.

Exhaust emissions from the diesel-fueled fuel truck used for refueling equipment at the MRF were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T6 Instate Small vehicles in 2017 in Santa Barbara County. Fugitive emissions from these vehicles were calculated using the same emission factors as for off-site vehicles for the proposed Project. MarBorg Industries estimated that the round-trip travel distance for the fuel truck would be 800 feet.

Note that, under Alternative B, the existing MarBorg Industries inerts processing and all green-waste handling would shift to the Quarantina facility. It is unknown where Lash Construction or the Vulcan operation would relocate to, but they would likely remain within the Santa Barbara area. Therefore, emissions from existing operations at the MarBorg Industries site are expected to continue under Alternative B, but they would occur at different locations.

#### 7.2.1.2 Ambient Air Dispersion Modeling

The methodology utilized for the ambient air dispersion modeling is from the SBCAPCD's *Modeling Guidelines for Health Risk Assessments* (APCD Form -15i) (SBCAPCD 2014a) and EPA's GAQM (EPA, 2008). The most recent version of SBCAPCD Modeling Guidance adopts ISCST3 as the preferred general purpose (flat and complex terrain) dispersion model. The modeling for Alternative B was performed using the same methodology as used for the proposed Project, as described in Sections 5.2.1 through 5.2.4, and 5.2.6 and 5.2.7 except as described below. Only the alternate location of the MRF building was modeled as it is assumed that the worst-case impacts at the Tajiguas Landfill (which include the MRF) have already been determined in the proposed Project modeling, and because the two sites are so far away (approximately 28 miles) that the impacts from the two sites would not crossover at any point.

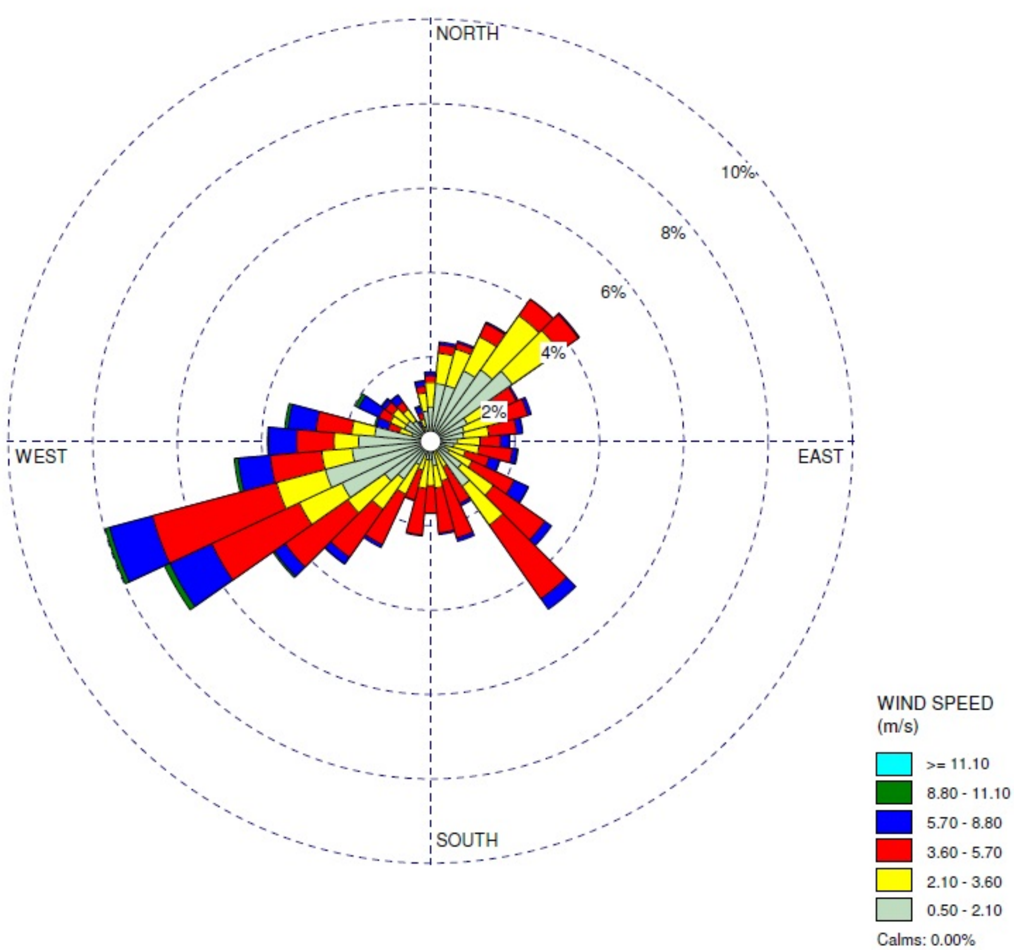
<u>Meteorological Data used in the MarBorg Industries Modeling</u>

The MarBorg Industries modeling was run using one year (1963) of meteorological data provided by SBCAPCD, consisting of surface observations from Santa Barbara Airport, in Santa Barbara, California, and concurrent upper air data from Vandenberg Air Force Base in Vandenberg, California. The location of Santa Barbara Airport relative to the MarBorg Industries site is shown in Figure 7-1. The wind rose for Santa Barbara Airport is shown in Figure 7-2.

**Figure 7-1 Relative Locations of MarBorg Industries and the Santa Barbara Airport**

## Figure 7-2 Santa Barbara Airport 1963 Wind Rose

| WIND ROSE PLOT: | DISPLAY: |
|---|---|
| **Santa Barbara Airport**<br>**1963 Wind Rose** | **Wind Speed**<br>**Direction (blowing from)** |




| COMMENTS: | DATA PERIOD: | COMPANY NAME: | |
|---|---|---|---|
| | **Start Date: 1/1/1963 - 00:00**<br>**End Date: 12/31/1963 - 23:00** | **AECOM** | |
| | | MODELER:<br>**M. Kaplan** | AECOM |
| | CALM WINDS:<br>**0.00%** | TOTAL COUNT:<br>**8760 hrs.** | |
| | AVG. WIND SPEED:<br>**2.95 m/s** | DATE:<br>**6/16/2014** | PROJECT NO.: |

WRPLOT View - Lakes Environmental Software

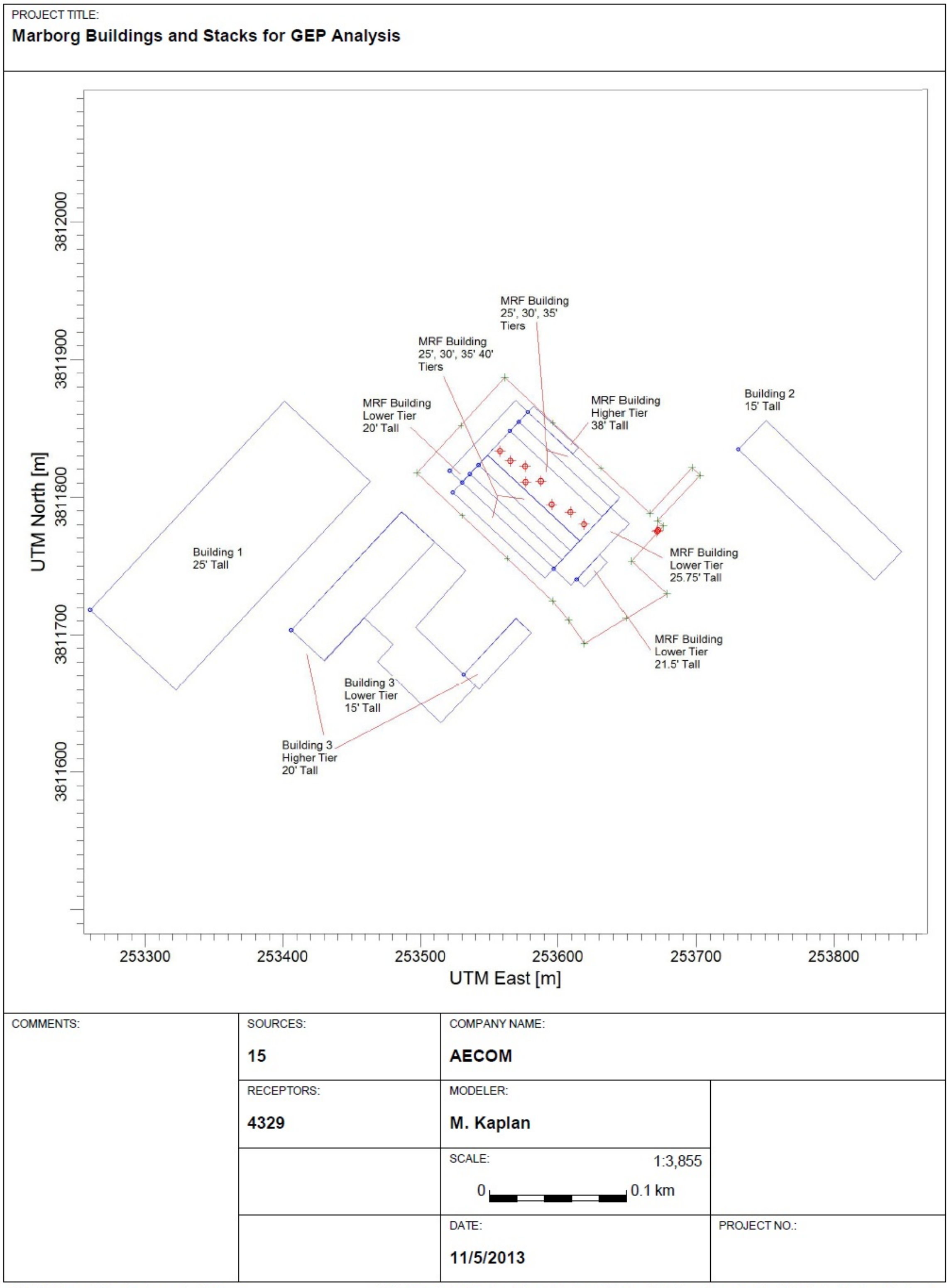
Good Engineering Practice Stack Height

The GEP stack height definition is given in Section 5.2.3 of this document. A summary of the GEP stack height analyses for all MarBorg Industries point emission sources is provided in Table 7-1. All proposed stacks are less than the GEP formula height and therefore potentially subject to building downwash. Wind direction-specific building dimensions for input to ISCST3 were developed with the EPA's Building Profile Input Processor (BPIP-PRIME). The BPIP input and output files are provided in the modeling archive (Attachment D). The buildings included in the BPIP analysis are shown in Figure 7-3.

**Table 7-1 Summary of GEP Analysis for MarBorg Industries Sources**

| Emission Source | Model Source Name | Stack Height (m) | Controlling Buildings / Structures | Building Height (m) | Projected Width (m) | GEP Formula Height (m) |
|---|---|---|---|---|---|---|
| Sort Exhaust 1 | STCK1 | 8.53 | MRF Building | 12.19 | 26.24 | 30.47 |
| Sort Exhaust 2 | STCK2 | 8.53 | MRF Building | 12.19 | 25.85 | 30.47 |
| Garage Exh. 1 | STCK3 | 8.53 | MRF Building | 12.19 | 18.06 | 30.47 |
| Garage Exh. 2 | STCK4 | 8.53 | MRF Building | 12.19 | 31.57 | 30.47 |
| Sort Exhaust 3 | STCK5 | 8.53 | MRF Building | 12.19 | 16.89 | 30.47 |
| Garage Exh. 3 | STCK6 | 8.53 | MRF Building | 12.19 | 28.54 | 30.47 |
| Garage Exh. 4 | STCK7 | 8.53 | MRF Building | 12.19 | 21.98 | 30.47 |
| Garage Exh. 5 | STCK8 | 8.53 | MRF Building | 12.19 | 21.98 | 30.47 |
| Emergency Generator | EMGEN | 3.05 | MRF Building | 12.19 | 73.03 | 30.47 |
| Diesel Tank | DSLTANK | 1.22 | MRF Building | 12.19 | 71.54 | 30.47 |

## Figure 7-3 Buildings Included in the MarBorg Industries GEP Analysis



Receptor Grid

A comprehensive Cartesian receptor grid was developed for use in the ISCST3 modeling. The most recent version of EPA's AERMAP terrain processor (version 11103) was used. The grid was centered at the approximate center of the MarBorg Industries site emission sources and extended out 10 kilometers from that location. The receptors were spaced at the following intervals in accordance with the recommendations in Section 2.8 of the SBCAPCD modeling guidelines:

- 50-m increment along the property line;
- 100-m increment out to 2 kilometers;
- 250-m increment between 2 and 5 kilometers from the property line; and
- 500-m increment between 5 and 10 kilometers from the property line.

All receptor coordinates were in NAD83, UTM Zone 11. A total of 4,329 receptors were used in the analysis. The receptor grid used in the analysis is shown in Figure 7-4.

Sources and Emission Data

All emission sources associated with the MarBorg Industries MRF building were included in the modeling. These include combustion related emission sources located inside and outside the MRF building. The following subsections provide a description of the MarBorg Industries sources. Attachment D contains the characteristics of the point and area sources. Short term and annual emissions for each source are contained in Attachment F.

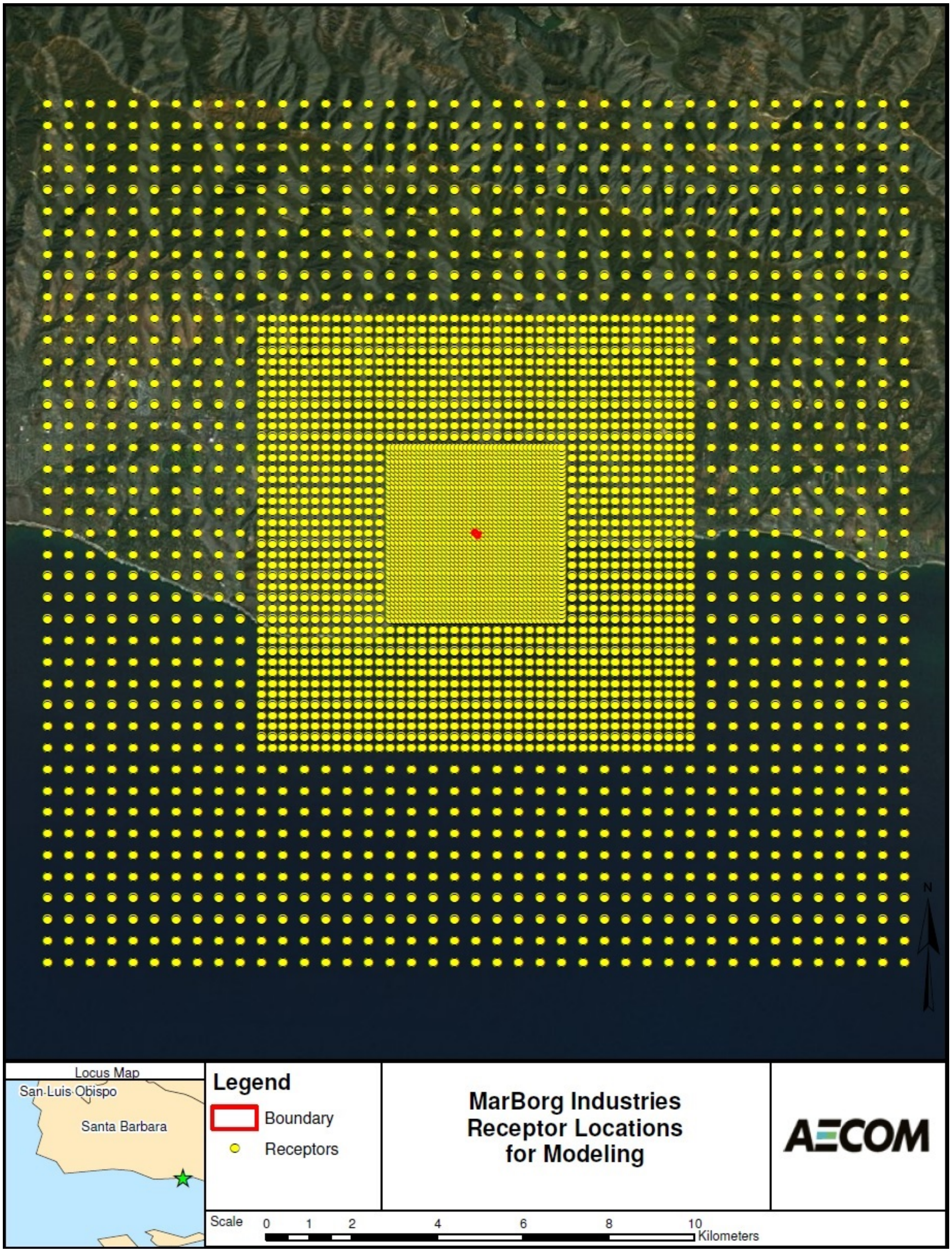
*Point Sources*

MRF exhaust stacks (Sources STCK1 through STCK8): These sources represent emissions from inside the MRF vented through eight stacks located on top of the MRF building roof. These sources are assumed to be active for 18 hours per day, from 5 a.m. to 11 p.m. for all pieces of equipment except the collection trucks, which are assumed to operate 11 hours per day (5 a.m. to 6 p.m.).

*Area Sources*

Outdoor Roll off Truck (Source ROLLOFF), Forklift (Source FORKLIFT), and Outdoor Sweeper (Source SWEEPER): These sources represent the emissions from the roll off truck, street sweeper and forklifts over the course of the day. These sources are active from 5 a.m. to 11 p.m. daily. The release height was assumed to be half the height of the vehicle (5 feet, 1.524 meters). The initial sigma-z = plume height / 2.15 = 0.762 meters.

**Figure 7-4  Receptor Grid used in MarBorg Industries ISCST3 Modeling Analysis**



*Volume (Road) Sources*

Road In (Source RDIN0050-RDIN0068) and Road Out (RDOU0088-RDOU0098): These sources represent the emissions from the diesel-fueled collection trucks arriving and departing throughout the day. These emissions occur from 5 a.m. to 6 p.m. daily. The truck height was assumed to be 10 feet (3 meters) and the truck width was assumed to be 2 meters. The initial sigma-z to represent the plume disturbance of the vehicle was calculated based on the road source formula for vehicles: Plume height. = vehicle height. x 1.7 = 5.1 meters, sigma-z = plume height / 4.3 = 1.19 meters. The initial sigma-y to represent the plume disturbance of the vehicle was calculated based on the road source formula for vehicles: Plume width = vehicle width + 6 meters = 8 meters, sigma-y = plume width / 2.15 = 3.72 meters.

Representative Ambient Background Concentrations

The appropriate ambient background for each pollutant was added to the modeled impacts from the Alternative to account for impacts from non-Alternative sources, since there were no other sources in the immediate vicinity of the MRF. The background concentrations for the years 2010 through 2012 used in this analysis are summarized in Table 7-2. CO, 1-hour $NO_2$ and $SO_2$ (CAAQS), 3-hour and 24-hour $SO_2$, annual $NO_2$ and $SO_2$, 24-hour and annual PM10 and annual PM2.5 values are the maximum concentration over the three year period. The 1-hour $NO_2$ and 24-hour PM2.5 (NAAQS) values are the 98$^{th}$ percentile for each year averaged over the three year period. The 1-hour $SO_2$ (NAAQS) values are the 99$^{th}$ percentile for each year averaged over the 3-year period.

The relative locations of MarBorg Industries and the monitors used in the modeling are shown in Figure 7-5.

#### 7.2.1.3 Health Risk Assessment

Toxic Air Contaminant Emission Calculation Methodology

On-site TAC emissions at the MarBorg Industries site during operation of Alternative B would include DPM emissions from diesel-fueled engines, which represent TAC emissions with potential cancer and chronic non-cancer health effects from diesel-fueled engines for health risk assessments. As for the proposed Project, PM10 emissions from the diesel-fueled engines were used to represent DPM emissions. The methodologies for estimating PM10 emissions from diesel-fueled engines are described in Section 7.2.1.1.

On-site DPM emissions from collection vehicles were also estimated for use in the HRA. Emissions from these vehicles while operating inside the MRF building were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Solid Waste Collection Vehicles in 2017 in Santa Barbara County traveling at five miles per hour. The travel distance inside the MRF building was estimated as twice the distance between the tipping floor area entrance and exit to include vehicle maneuvering inside the building. Idling emissions from the collection vehicles inside the MRF building were estimated using idling emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Vehicles in Santa Barbara County in 2017 and an assumed idling time of five minutes per vehicle.

On-site DPM emissions from the collection vehicles traveling outside the MRF building were calculated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Solid Waste Collection Vehicles in 2017 in Santa Barbara County traveling at 15 miles per hour. Emissions, in grams per mile per hour, were calculated by dividing the daily number of collection vehicles (116 vehicles per day) by the daily delivery time (13 hours per day) to calculate the number of vehicles per hour and then multiplying the number of vehicles per hour by the vehicle PM10 emission factor, in grams per mile per vehicle.

Diesel-fueled engine emission factors for TACs with potential acute effects were determined based on the factors presented in the document entitled *AB 2588 Emission Factors for Diesel Fuel Internal Combustion*, VCAPCD, 2003. Hourly emissions were determined by multiplying the emission factors (lb/gal) by the hourly fuel consumption rate of the engines (gal/hour). The hourly emissions from facility indoor sources are limited to the periods of 5:00 a.m. to 6:00 p.m. and 6:00 p.m. to 11:00 p.m. during a day. The hourly TACs emissions with acute effects for the facility outdoor roll-off trucks and outdoor street sweepers are limited to the periods of 5:00 a.m. to 11:00 p.m. during a day. The hourly TACs emissions with acute effects from the emergency generators were limited to the periods of 10:00 a.m. to 4:00 p.m. during a day. The hourly TACs emissions with acute effects from the collection vehicles outside the facility were limited to the periods of 5:00 a.m. to 6:00 p.m. during a day.

Details of the TAC emission calculations for DPM and acute emissions are in Attachment F.

Methodology for Evaluating Cancer Risk and Non-Cancer Health Hazards

The HRA evaluated the facility for cancer risk and non-cancer health hazards. The health risk methodology is based on the OEHHA Guidance Manual (2003). Carcinogenic risks and potential non-carcinogenic chronic health effects were calculated using the annual concentrations with flagpole height of 1.5 meters above ground level. Acute health risks were evaluated using speciated TACs because DPM does not have an acute REL for diesel-fueled engine exhaust. Acute non-cancer health hazards were determined using the predicted maximum 1-hour concentrations at 1.5 meters above ground-level. The latest OEHHA cancer potency factors and chronic and acute RELs for each TAC were used. The approved health values are incorporated into HARP Version 1.4f. The HARP software performs the necessary risk calculations following the OEHHA Risk Assessment Guidelines and the ARB Interim Risk Management Policy for risk management decisions.

**Table 7-2 Ambient Background Concentrations for MarBorg Industries Site[1]**

| Pollutant | Averaging Period | Concentration (ppb) | | | Concentration (μg/m$^3$) | | | Background (μg/m$^3$) |
|---|---|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 | |
| CO | 1 hour | 2 | 2 | 1.6 | 2,299 | 2,299 | 1,839 | 2,299 |
| | 8 hour | 0.6 | 0.6 | 0.6 | 689.7 | 689.7 | 689.7 | 689.7 |
| $NO_2$ | 1 hour (NAAQS) | 0.032 | 0.031 | 0.032 | 60.2 | 58.3 | 60.2 | 59.6 |
| | 1 hour (CAAQS) | 0.044 | 0.052 | 0.041 | 82.8 | 97.8 | 77.1 | 97.8 |
| | Annual | 0.006 | 0.006 | 0.006 | 11.3 | 12.0 | 12.1 | 12.1 |
| $SO_2$ | 1 hour (NAAQS) | 0.004 | 0.002 | 0.002 | 10.5 | 5.2 | 5.2 | 7.0 |
| | 1 hour (CAAQS) | 0.005 | 0.003 | 0.002 | 13.1 | 7.9 | 5.2 | 13.1 |
| | 3 hour | 0.003 | 0.002 | 0.002 | 7.9 | 5.2 | 5.2 | 7.9 |
| | 24 hour | 0.002 | 0.001 | 0.001 | 5.2 | 2.6 | 2.6 | 5.2 |
| | Annual | 0.000 | 0.001 | 0.001 | 0.7 | 2.5 | 2.6 | 2.6 |
| PM10 | 24 hour | --- | --- | --- | 45.2 | 70.0 | 48.0 | 70.0 |
| | Annual | --- | --- | --- | 16.9 | 18.4 | 18.4 | 18.4 |
| PM2.5 | 24 hour (NAAQS) | --- | --- | --- | 12.0 | 19.0 | 17.0 | 16.0 |
| | Annual | --- | --- | --- | 8.2 | 8.4 | 9.0 | 9.0 |

[1] All data taken from the EPA AIRS database: http://www.epa.gov/airdata/ad_rep_mon.html, except 24-hour and annual PM10 and 24-hour PM2.5 which are from the ARB Select 8 database: http://www.arb.ca.gov/adam/select8/sc8start.php. All concentrations are from the 380 N. Fairview Avenue monitor in Goleta, except 24-hour PM2.5 which is taken from 700 E. Canon Perdido, and all $SO_2$ periods which are taken from the UCSB West Campus Arco Tank monitor in Isla Vista.

## Figure 7-5 Relative Locations of MarBorg Industries and Ambient Air Quality Monitors

The following HARP modeling options were used for the risk analysis to estimate cancer and non-cancer impacts at the maximum impact location on the same receptor grid (Figure 7-4) as the criteria pollutant modeling.  AECOM plotted the calculated risk for each option below and selected the highest residential or worker risk based on the entire receptor grid.

- 70-year Resident Cancer Risk – Derived (Adjusted) Method;
- 9-year (Child Resident) Cancer Risk – Derived (OEHHA) Method;
- 40-year Worker Cancer Risk – Point Estimate;
- Chronic HI – Derived (OEHHA) Method; and
- Acute HI – Simple Acute HI.

The Derived (OEHHA) risk analysis method uses the high-end point-estimates of exposure for the two dominant (driving) exposure pathways, while the remaining exposure pathways use average point estimates.  The Derived (Adjusted) method is identical to the Derived (OEHHA) method but uses the breathing rate at the $80^{th}$ percentile of exposure rather than the high-end point-estimate when the inhalation pathway is one of the dominant exposure pathways.  The cancer risk estimates using the Derived equations/methods are based on a 70-year exposure (resident).  The point-estimate analysis uses a single value rather than a distribution of values in the dose equation for each exposure pathway.  The off-site worker exposure duration assumed a standard work schedule since the facility will operate full time, per OEHHA guidance (2003).  For the cancer and chronic HI impacts for workers, the HARP modeling option “modeled GLC and default exposure assumptions” was used.  This includes the highly conservative 40-year exposure duration for the worker receptors along with an OEHHA-defined $95^{th}$ percentile breathing rate of 393 l/kg-day.  Child cancer risk was evaluated for a 9-year exposure scenario.

The modeled exposure pathways consisted of all pathways recommended for a health risk assessment.  Exposure pathways that were enabled include homegrown produce (using urban default ingestion fractions), dermal absorption, soil ingestion, pigs, eggs and poultry, and mother’s milk in addition to the inhalation pathway.  Exposure routes for the ingestion of local fish, or beef/dairy, and drinking water were not considered in this risk analysis because there are no such areas within Alternative B’s area of influence.  Long-term risks (i.e., cancer and chronic non-carcinogenic HI) were calculated at the identified off-site receptors.

*Exposure Assumptions*

The chief exposure assumptions are continuous exposure to the TAC concentrations produced by continuous emissions at the maximum emission rates over a 70-year period at each receptor location to estimate lifetime residential cancer risks and over a 40-year period to estimate worker cancer risks.  The actual risks are not expected to be any higher than the predicted risks and are likely to be substantially lower.  The cancer risk for an inhaled TAC is estimated by multiplying the exposure concentration by the breathing rate (l/kg-day) times the inhalation cancer potency factor $(mg/kg\text{-}day)^{-1}$.

*Analytical Uncertainties*

Sources of uncertainty in the assessment of risks to public health include emissions estimates, dispersion modeling, exposure characteristics, and extrapolation of toxicity data in animals to humans used to develop unit risk factors (cancer) and RELs (non-cancer). To address this uncertainty, highly conservative assumptions were used in this HRA. In aggregate, these assumptions overestimate the predicted risks such that actual risks are unlikely to be higher, but could be considerably lower or non-existent. See Section 5.3.2.4 for further discussion of the uncertainties involved.

### 7.2.1.4 Greenhouse Gases

GHG emissions would be generated during operation of Alternative B by the following sources:

- Exhaust from the two Jenbacher/GE CHP engines combusting biogas produced in the anaerobic digesters at the Tajiguas Landfill was considered. However, the biogenic $CO_2$ produced is ultimately excluded and only the trace $CH_4$ and $N_2O$ emissions are included in the final analysis;
- Exhaust from the flare at the Tajiguas Landfill combusting biogas produced in the anaerobic digesters when an anaerobic digester vessel is purged before opening and when a CHP engine is offline was considered. However, the biogenic $CO_2$ produced is ultimately excluded and only the trace $CH_4$ and $N_2O$ emissions are included in the final analysis;
- Exhaust from the diesel-fueled standby emergency generator at the MarBorg Industries site;
- Exhaust from diesel-fueled off-road equipment used in the MRF at the MarBorg Industries site, the AD Facility at the Tajiguas Landfill and equipment used in the composting process at the Tajiguas Landfill;
- Exhaust from the propane-fueled forklifts used in the MRF at the MarBorg Industries site; and
- Exhaust from motor vehicles operating on site and off site.

GHG emissions from these sources, except for the propane-fueled forklifts, were estimated using the same procedures that were used to estimate GHG emissions for the proposed Project. The $CO_2$ emission factor for the propane-fueled forklifts was from Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for liquefied petroleum gas (LPG), and the $CH_4$ and $N_2O$ emission factors were from Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for petroleum fuels. Details of the GHG emission calculations are in Attachment F.

#### 7.2.1.5 Odors

Odorous emissions would be generated during operation of Alternative B by the following sources:

- Exhaust from the anaerobic digestion building at the Tajiguas Landfill;
- Composting windrows including recently turned windrows at the Tajiguas Landfill; and
- Exhaust from the MRF building at the MarBorg Industries MRF.

For the exhaust of the MarBorg Industries MRF building, similar odor concentrations were used as the proposed Project. All building ventilation air will be treated using carbon adsorption units. These units can have very high odor removal efficiencies, up to 99 percent. Based on the expected odor contaminants, MarBorg Industries recommended using an odor removal efficiency of 95 percent. After treatment the exhaust air is discharged at roof level from various locations. Details of the odor emission calculations are provided in Attachment J.

The existing facilities and uses, which may currently generate odors at the MarBorg Industries site, are expected to be relocated.

### 7.2.2 Alternative C: South Coast Recycling and Transfer Station MRF

#### 7.2.2.1 Criteria Pollutant Emissions

Emissions from the following sources that would occur during operation of the proposed Project would not occur during operation of Alternative C:

- Exhaust from the diesel-fueled standby emergency generator, which would not be installed at the Tajiguas Landfill;
- Exhaust from off-road equipment used in the MRF at the Tajiguas Landfill;
- Fugitive particulate matter from transferring MSW and CSSR into the MRF at the Tajiguas Landfill; and
- Exhaust and fugitive particulate matter from tractor/trailers transporting recyclables to the Ports of Los Angeles and Long Beach from the Tajiguas Landfill.

Additionally, the number of one-way worker commuting trips to and from the Tajiguas Landfill for operation of the remaining components of the proposed Project with the optional CSSR element would be reduced from 66 to 4 per day.

Emissions from all other sources during operation of the proposed Project would be the same during operation of Alternative C.

Emissions from the following additional sources[11] would occur during operation of Alternative C:

- Exhaust from the following equipment used in the MRF at the SCRTS site:
  - Two 260-hp Volvo L110G Loaders;
  - One 173-hp Volvo L90G Loader;
  - One 56-hp Volvo L20F Loader;
  - Three 57-hp Toyota 6,000 lb Forklifts;
  - One 63-hp Tennant 800 Sweeper; and
  - One 173-hp Caterpillar M322D Material Handler.
- Fugitive particulate matter emissions from transferring 930 tons/day of MSW and CSSR into the MRF at the SCRTS, and from transferring 240 tons/day of organics and 290 tons/day of residuals into trucks for export from the MRF at the SCRTS;
- Exhaust and fugitive particulate matter emissions from 18 CNG-fueled tractor/trailer round trips per day to export recyclables to the Ports of Los Angeles and Long Beach from the SCRTS. Five of these round trips would replace round trips that currently occur for transporting recyclables to the Gold Coast Recycling and Transfer Station in Ventura;
- Exhaust and fugitive particulate matter emissions from 23 diesel-fueled tractor/trailer round trips per day to export organics and residuals to the Tajiguas Landfill from the MRF at the SCRTS; and
- Exhaust and fugitive particulate matter emissions from 76 diesel-fueled collection vehicle round trips per day to deliver MSW to the MRF at the SCRTS instead of to the Tajiguas Landfill[12].

Detailed criteria pollutant emission calculations are in Attachment G.

The equipment that would be used in the MRF at the SCRTS would be equipped with engines that meet Tier 4 emission standards. The vendor's engineering staff anticipates that each piece of equipment would operate 16 hours per day except the Tennant sweeper would operate up to 24 hours per day. Exhaust emissions were estimated using the same methods that were used to estimate exhaust emissions from equipment operating in the MRF for the

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[11] Note: The SCRTS MRF is not proposed to include a back-up emergency generator due to the anticipated reliability of the SCE power at this location.

[12] A portion of the collection vehicle fleet is currently CNG-fueled, but for a worst case analysis it was assumed that all collection vehicles would be diesel fueled.

proposed Project. Air in the MRF building would be exhausted through particulate matter filtration systems located ahead of the biofilters with particulate matter control efficiencies of 99.9 percent. Therefore, a control efficiency of 99.9 percent was applied to PM10 and PM2.5 emissions from equipment operating in the MRF.

Fugitive particulate matter emissions from transferring MSW into the MRF and from transferring organics and residuals into trucks at the SCRTS were estimated using the same emission factors that were used for transferring MSW into the MRF for the proposed Project. Because these transfers would occur inside the MRF building, a control efficiency of 99.9 percent was applied to the PM10 and PM2.5 emissions.

The CNG-fueled vehicles that would transport recyclables to the Ports of Los Angeles and Long Beach would be equipped with the same engines as the tractor/trailers that would be used for the proposed Project, and the same emission factors were used. The round-trip travel distance between the SCRTS and the Ports of Los Angeles and Long Beach is approximately 236 miles, and the round-trip travel distance between the SCRTS and the Tajiguas Landfill is approximately 44 miles. The round-trip travel distance between the SCRTS and the Gold Coast Recycling and Transfer Station in Ventura is approximately 78 miles. Therefore, the net increase in mileage for the tractor/trailers transporting recyclables to the Ports of Los Angeles and Long Beach instead of the Gold Coast Recycling and Transfer Station would be 158 miles (236 miles for Ports – 78 miles for Gold Coast Recycling and Transfer Station).

Exhaust emissions from the diesel-fueled collection vehicles delivering MSW to the MRF at the SCRTS and from the diesel-fueled tractor/trailers transporting organics and residuals to the Tajiguas Landfill were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Solid Waste Collection Vehicles and for T7 Tractors in 2017 in Santa Barbara County. Fugitive emissions from these vehicles were calculated using the same emission factors as for off-site vehicles for the proposed Project. The collection vehicles would be transporting waste to the SCRTS instead of to the Tajiguas Landfill. RRWMD has estimated that the one-way travel distances from the centroid of the wasteshed to the Tajiguas Landfill and to the SCRTS are 23 miles and 3 miles, respectively. Therefore, transporting the MSW to the SCRTS instead of to the Tajiguas Landfill would reduce the one-way travel distance by 20 miles (23 miles to Tajiguas Landfill – 3 miles to the SCRTS). The round-trip travel distance between the SCRTS and the Tajiguas Landfill is approximately 44 miles.

#### 7.2.2.2 Ambient Air Dispersion Modeling

Ambient air dispersion modeling was used to both determine the impacts of criteria pollutants, and also to provide for the dispersion input files for the Health Risk Assessment (HRA). The methodology utilized for the ambient air dispersion modeling is from the SBCAPCD's *Modeling Guidelines for Health Risk Assessments* (APCD Form -15i) (SBCAPCD 2014a) and EPA's GAQM (EPA, 2008). The most recent version of SBCAPCD Modeling Guidance adopts

ISCST3 as the preferred general purpose (flat and complex terrain) dispersion model. The modeling for Alternative C was performed using the same methodology as used for the proposed Project, as described in Sections 5.2.1 through 5.2.4, and 5.2.6 and 5.2.7 except as described below. Only the alternate location of the MRF building was modeled as it is assumed that the worst-case impacts at the Tajiguas Landfill (which include the MRF) have already been determined in the proposed Project modeling, and because the two sites are so far away (approximately 20 miles) that the impacts from the two sites would not crossover at any point.

An important difference between the modeling of the criteria pollutants and the modeling of health risks is the sources that are included. The existing SCRTS sources were not included in the AQIA of the criteria pollutants. Instead of including these sources in the AQIA, the maximum air pollutant background levels that were observed at local monitoring stations were added to the results of the Project modelling. This approach is generally conservative as it accounts for existing emissions at the maximum observed levels. However, a HRA integrates the TAC emissions to determine the overall health impacts. There are no background data for TACs available in this area. Therefore, based on the SBCAPCD modeling guidelines for HRAs (SBCAPCD, 2014a), emissions of TACs from the existing SCRTS sources were included in the dispersion modeling that is used as an "onramp" for the HRA model. In other words, only emissions from newly proposed Project equipment were included in the AQIA, while all sources, both existing and proposed, were included in the SCRTS facility-wide HRA.

This section gives the proposed Project sources and emissions, and also lists the existing sources at SCRTS that were included in the HRA.

Meteorological Data used in the SCRTS modeling

The SCRTS modeling was run using one year (1963) of meteorological data provided by SBCAPCD, consisting of surface observations from Santa Barbara Airport, in Santa Barbara, California, and concurrent upper air data from Vandenberg Air Force Base in Vandenberg, California. The location of Santa Barbara Airport relative to the SCRTS is shown in Figure 7-6. The wind rose for Santa Barbara Airport was shown in Figure 7-2.

Good Engineering Practice Stack Height

The GEP stack height definition is given in Section 5.2.3 of this document.

A summary of the GEP stack height analyses for all SCRTS point emission sources is provided in Table 7-3. All proposed stacks are less than the GEP formula height and therefore potentially subject to building downwash. Wind direction-specific building dimensions for input to ISCST3 were developed with the EPA's Building Profile Input Processor (BPIP-PRIME). The BPIP input and output files are provided in the modeling archive (Attachment D). The buildings included in the BPIP analysis are shown in Figure 7-7.

**Figure 7-6 Relative Locations of SCRTS and the Santa Barbara Airport**

**Table 7-3 Summary of GEP Analysis for SCRTS**

| Emission Source | Model Source Name | Stack Height (m) | Controlling Buildings / Structures | Building Height (m) | Projected Width (m) | GEP Formula Height (m) |
|---|---|---|---|---|---|---|
| Biofilter A Stack | BIOA_DPM | 18.59 | MRF Building | 18.29 | 87.85 | 45.73 |
| Biofilter B Stack | BIOB_DPM | 18.59 | MRF Building | 18.29 | 87.85 | 45.73 |

<u>Receptor Grid</u>

A comprehensive Cartesian receptor grid was developed for use in the ISCST3 modeling. The most recent version of EPA's AERMAP terrain processor (version 11103) was used. The grid was centered at the approximate center of the SCRTS site emission sources and extended out 10 kilometers from that location. The receptors were spaced at the following intervals in accordance with the recommendations in Section 2.8 of the SBCAPCD modeling guidelines:

- 50-m increment along the property line;
- 100-m increment out to 2 kilometers;
- 250-m increment between 2 and 5 kilometers from the property line; and
- 500-m increment between 5 and 10 kilometers from the property line.

All receptor coordinates were in NAD83, UTM Zone 11. A total of 4,337 receptors were used in the analysis. The receptor grid used in the analysis is shown in Figure 7-8.

<u>Sources and Emission Data</u>

All emission sources associated with the SCRTS MRF building were included in the AQIA modeling. These include combustion related emission sources located inside and outside the MRF building. The following provides a description of the SCRTS sources. Existing sources that will continue at SCRTS are included in the HRA. Attachment D contains the characteristics of the point and area sources. Short term and annual emissions for each source are in Attachment G.

## Figure 7-7 Buildings Included in the SCRTS GEP Analysis

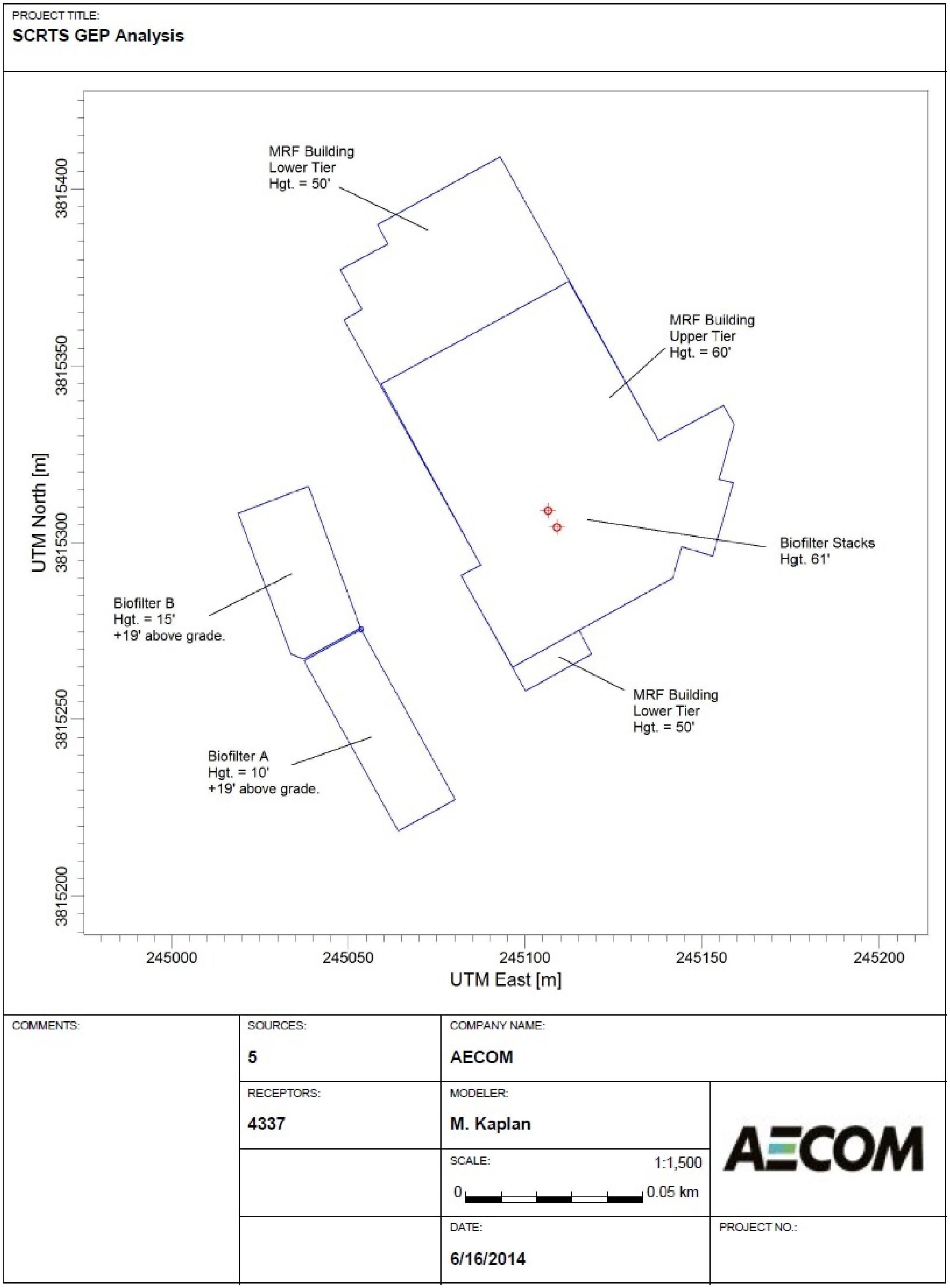
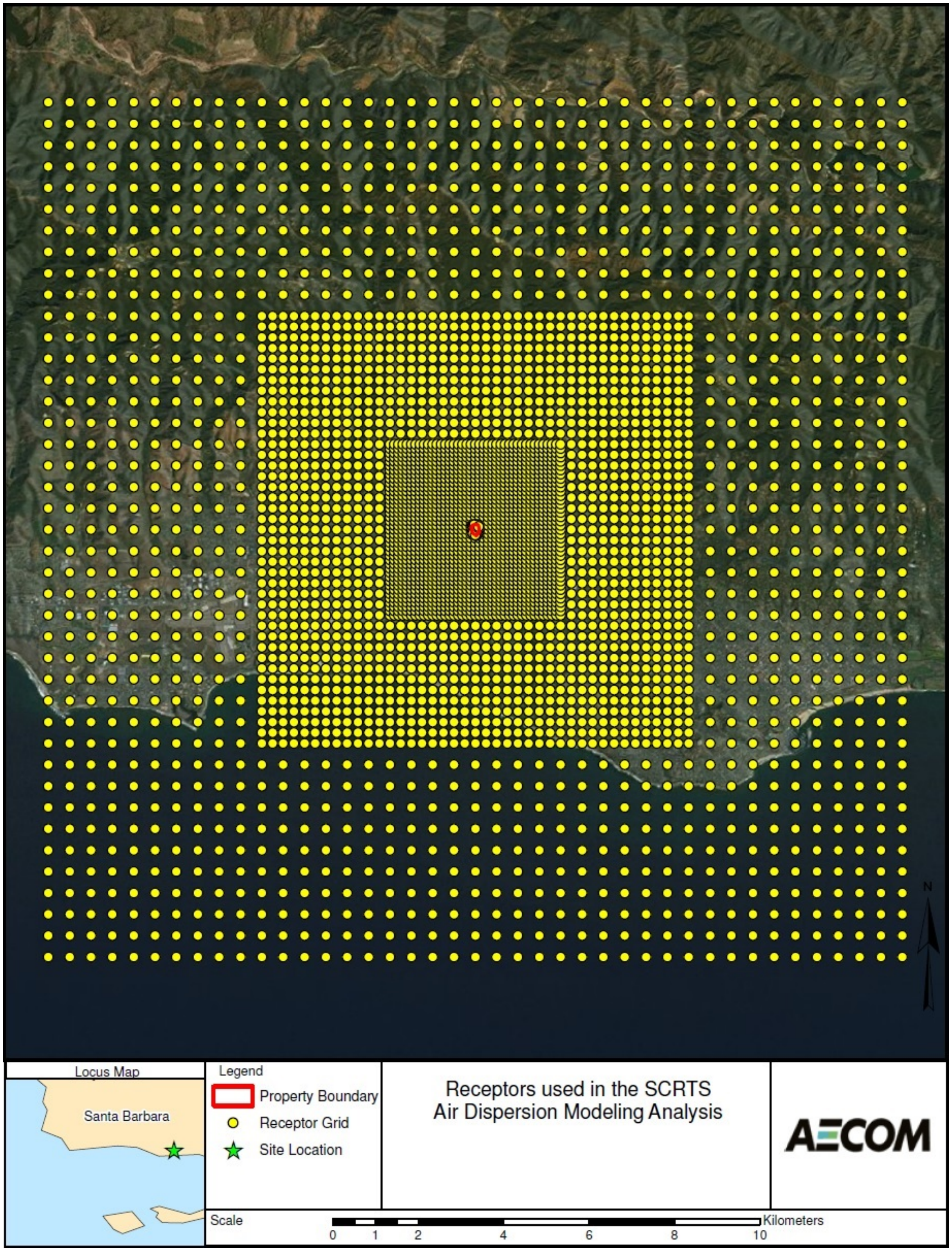


**Figure 7-8 Receptor Grid used in SCRTS ISCST3 Modeling Analysis**



*Point Sources*

Biofilter stacks (Sources BIOA_DPM and BIOB_DPM): These sources represent emissions from the tipping and loading areas within the MRF vented through the two biofilters and then through stacks located on top of the MRF building roof. These sources are assumed to be active for 16 hours per day, from 7 a.m. to 11 p.m. for all pieces of equipment except the sweeper, which is assumed to operate 24 hours per day but splits its time equally between the loading and tipping area. Emissions for the sweeper are divided between the two sources equally.

*Area Sources*

Outside Bin Area (Source OUTSD_BN): This source represents the emissions from the Volvo L20F loader working in the bin area over the course of the day. The loader is active from 7 a.m. to 11 p.m. daily. The release height was assumed to be the top of the vehicle exhaust (8 feet, 2.438 meters). The initial sigma-z to represent the plume disturbance of the vehicle was calculated based on the road source formula for vehicles: Plume height = release height x 1.7 = 4.15 meters, sigma-z = plume height / 2.15 = 1.93 meters. Existing sources in the Outside Bin Area include an additional loader, a shop truck and a water truck. These sources are active from 7 a.m. to 5 p.m. daily. The emissions were summed with the Project emissions for this area.

*Volume (Road) Sources.*

Road In (Source RDIN0063-RDIN0074) and Road Out (RDOU0075-RDOU0099): These sources represent the emissions from the diesel-fueled collection trucks arriving and departing throughout the day. These emissions occur from 7 a.m. to 5 p.m. daily. The truck height was assumed to be 10 feet (3 meters) and the truck width was assumed to be 2 meters. The initial sigma-z to represent the plume disturbance of the vehicle was calculated based on the road source formula for vehicles: Plume height = vehicle height x 1.7 = 5.1 meters, sigma-z = plume height / 4.3 = 1.19 meters. The initial sigma-y to represent the plume disturbance of the vehicle was calculated based on the road source formula for vehicles: Plume width = vehicle width + 6 meters = 8 meters, sigma-y = plume width / 2.15 = 3.72 meters.

Bypass Road (Source BYP0244-BYP0255): This road represents the emissions from existing diesel-fueled trucks that would bypass the MRF and traverse the outside of the MRF building and depart on Road Out, listed above. These emissions occur from 7 a.m. to 5 p.m. daily. This road uses the same source parameters as Road In and out, above.

Representative Ambient Background Concentrations

The appropriate ambient background for each pollutant was added to the modeled impacts from the Alternative to account for impacts from non-Alternative sources, since there were no other sources in the immediate vicinity of the MRF. The background concentrations for the years 2010 through 2012 used in this analysis are summarized in Table 7-4. CO, 1-hour $NO_2$

and $SO_2$ (CAAQS), 3-hour and 24-hour $SO_2$, annual $NO_2$ and $SO_2$, 24-hour and annual PM10 and annual PM2.5 values are the maximum concentration over the three year period. The 1-hour $NO_2$ and 24-hour PM2.5 (NAAQS) values are the 98$^{th}$ percentile for each year averaged over the three year period. The 1-hour $SO_2$ (NAAQS) values are the 99$^{th}$ percentile for each year averaged over the 3-year period.

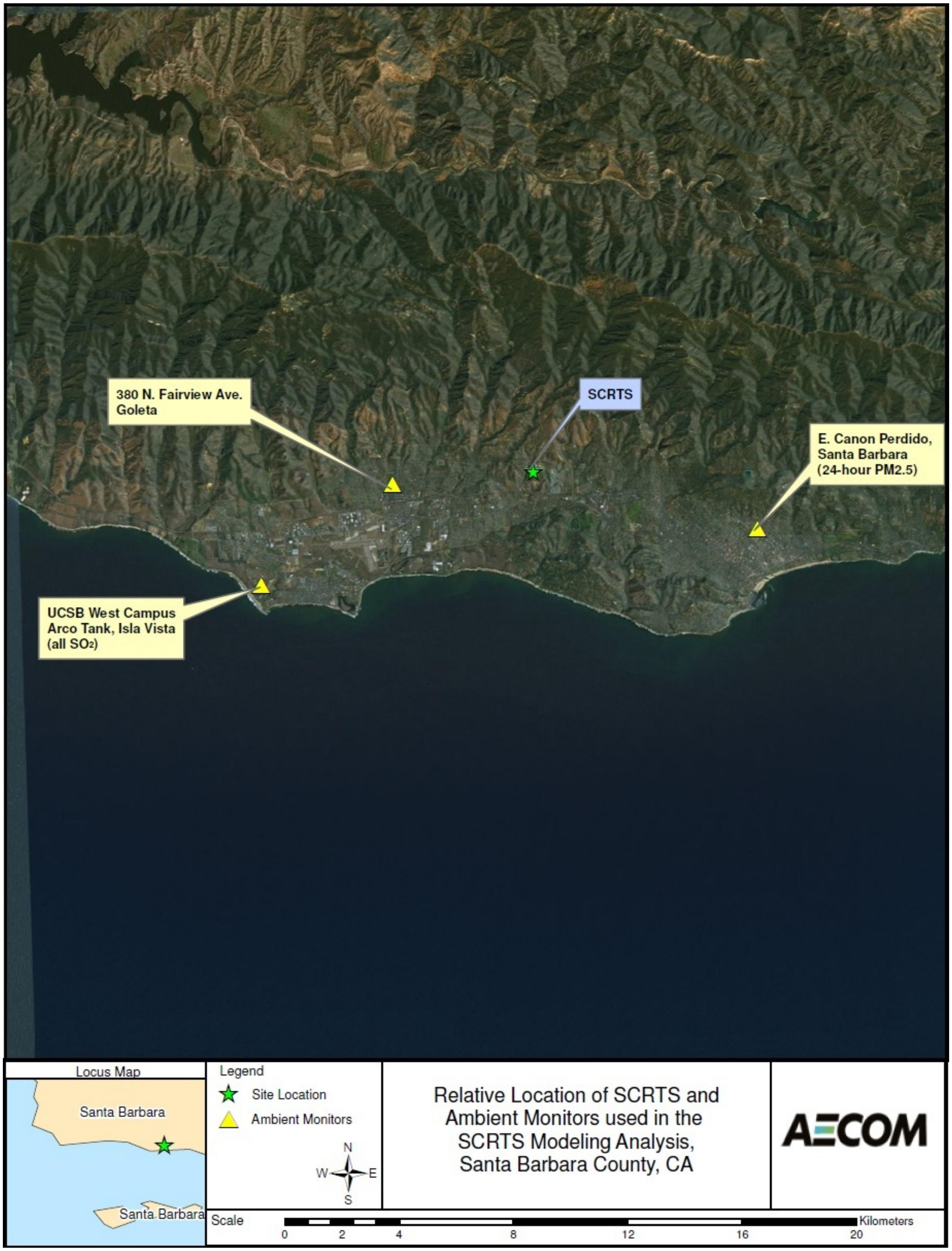
The relative locations of the SCRTS and the monitors used in the modeling are shown in Figure 7-9.

**Table 7-4 Ambient Background Concentrations for SCRTS Site[1]**

| Pollutant | Averaging Period | Concentration (ppb) | | | Concentration (µg/m$^3$) | | | Back-ground (µg/m$^3$) |
|---|---|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 | |
| CO | 1 hour | 2 | 2 | 1.6 | 2,299 | 2,299 | 1,839 | 2,299 |
| | 8 hour | 0.6 | 0.6 | 0.6 | 690 | 690 | 690 | 690 |
| $NO_2$ | 1 hour (NAAQS) | 0.032 | 0.031 | 0.032 | 60.2 | 58.3 | 60.2 | 59.6 |
| | 1 hour (CAAQS) | 0.044 | 0.052 | 0.041 | 82.8 | 97.8 | 77.1 | 97.8 |
| | Annual | 0.006 | 0.006 | 0.006 | 11.3 | 12.0 | 12.1 | 12.1 |
| $SO_2$ | 1 hour (NAAQS) | 0.004 | 0.002 | 0.002 | 10.5 | 5.2 | 5.2 | 7.0 |
| | 1 hour (CAAQS) | 0.005 | 0.003 | 0.002 | 13.1 | 7.9 | 5.2 | 13.1 |
| | 3 hour | 0.003 | 0.002 | 0.002 | 7.9 | 5.2 | 5.2 | 7.9 |
| | 24 hour | 0.002 | 0.001 | 0.001 | 5.2 | 2.6 | 2.6 | 5.2 |
| | Annual | 0.000 | 0.001 | 0.001 | 0.7 | 2.5 | 2.6 | 2.6 |
| PM10 | 24 hour | --- | --- | --- | 45.2 | 70.0 | 48.0 | 70.0 |
| | Annual | --- | --- | --- | 16.9 | 18.4 | 18.4 | 18.4 |
| PM2.5 | 24 hour (NAAQS) | --- | --- | --- | 12.0 | 19.0 | 17.0 | 16.0 |
| | Annual | --- | --- | --- | 8.2 | 8.4 | 9.0 | 9.0 |

[1] All data taken from the EPA AIRS database: http://www.epa.gov/airdata/ad_rep_mon.html, except 24-hour and annual PM10 and 24-hour PM2.5 which are from the ARB Select 8 database: http://www.arb.ca.gov/adam/select8/sc8start.php. All concentrations are from the 380 N. Fairview Avenue monitor in Goleta, except 24-hour PM2.5 which is taken from 700 E. Canon Perdido, and all $SO_2$ periods which are taken from the UCSB West Campus Arco Tank monitor in Isla Vista.

## Figure 7-9 Relative Locations of SCRTS and Ambient Air Quality Monitors



### 7.2.2.3 Health Risk assessment

Toxic Air Contaminant Emission Calculation Methodology

On site TAC emissions at the SCRTS during operation of Alternative C would include DPM emissions from diesel-fueled engines, which represent TAC emissions with potential cancer and chronic non-cancer health effects from diesel-fueled engines for health risk assessments. As for the proposed Project, PM10 emissions from the diesel-fueled engines were used to represent DPM emissions. The methodologies for estimating PM10 emissions from diesel fueled engines are described in Section 7.2.2.1. Details of the TAC emission calculations are in Attachment G.

On-site DPM emissions from collection vehicles were also estimated for use in the HRA. Emissions from these vehicles while operating inside the MRF building were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Solid Waste Collection Vehicles in 2017 in Santa Barbara County traveling at five miles per hour. The travel distance inside the MRF building was estimated as twice the distance between the tipping floor area entrance and exit to include vehicle maneuvering inside the building. Idling emissions from the collection vehicles inside the MRF building were estimated using idling emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Vehicles in Santa Barbara County in 2017 and an assumed idling time of five minutes per vehicle.

On-site DPM emissions from the collection vehicles and from the tractor/trailers exporting organics and residuals to the Tajiguas Landfill while traveling on-site outside the MRF building were calculated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Solid Waste Collection Vehicles and for T7 Tractors in 2017 in Santa Barbara County traveling at 15 miles per hour. Emissions were calculated by dividing the daily number of vehicles (76 collection vehicles and 23 tractor/trailers per day) by the daily delivery time (10 hours per day) to calculate the number of vehicles per hour and then multiplying the number of vehicles per hour by the vehicle PM10 emission factor and the vehicle on-site travel distance.

Diesel-fueled engine emission factors for TACs with potential acute effects emission factors were determined based the factors developed by VCAPCD (2003) for AB2588 for diesel fuel internal combustion engines. Hourly emissions were determined by multiplying the emission factors in pounds per gallons by the hourly fuel consumption rate of the engines. The hourly emissions from these sources are assumed to be active for 16 hours per day, from 7:00 a.m. to 11:00 p.m. for all pieces of equipment except the sweeper, which is assumed to operate 24 hours per day but splits its time equally between the loading and tipping area. Emissions for the sweeper are divided between the two sources equally.

Toxic Air Contaminant Emission Calculation Methodology for Existing Operations at SCRTS

On site TAC emissions at the SCRTS during existing operation include DPM emissions from diesel-fueled engines. As for the Project, PM10 emissions from the diesel-fueled engines were used to represent DPM emissions. DPM emissions from the existing loading equipment were estimated from the emission factors of non-road internal combustion engine standards (40CFR Part 89 Subpart B) based on the model year of the equipment. Hourly TAC emissions were estimated by multiplying emission factors in g/bhp-hr by the maximum rated horsepower and load factor from OFFROAD2011 model. Annual emissions were estimated by multiplying hourly emissions by daily operating hours and annual operating days.

DPM emissions from existing motor vehicles operating in the Outdoor Bin Area (water truck and shop truck) were estimated by multiplying PM10 emission factors from the EMFAC2011 for the vehicle model year traveling at 5 miles per hour in Santa Barbara County in 2017 by the estimated daily travel distance of the vehicles. The model year and estimated travel distances were provided by RRWMD. Annual emissions were estimated by multiplying hourly emissions by daily operating hour and yearly operating days. The daily operations were limited to periods of 7:00 a.m. to 5:00 p.m. during the day.

On-site DPM emissions from existing diesel-fueled vehicles while traveling on-site outside the MRF building were calculated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Tractors in 2017 in Santa Barbara County traveling at 15 miles per hour. Emissions were calculated by dividing the daily number of vehicles (20, based on 2013 records) by the daily delivery time (10 hours per day) to calculate the number of vehicles per hour and then multiplying the number of vehicles per hour by the vehicle PM10 emission factor and the vehicle on-site travel distance. Annual emissions were estimated by multiplying hourly emissions by daily operating hour and yearly operating days. The daily operations were limited to periods of 7:00 a.m. to 5:00 p.m. during the day.

Details of the TAC emission calculations are provided in Attachment G.

Diesel-fueled engine emission factors for TACs with potential acute effects for existing non-road equipment and existing motor vehicles were determined based on the factors presented in the document entitled *AB 2588 Emission Factors for Diesel Fuel Internal Combustion*, VCAPCD, 2003. Hourly emissions were determined by multiplying the emission factors (lb/gal) by the hourly fuel consumption rate of the engines (gal/hour). The hourly emissions from these sources are limited to the periods of 7:00 a.m. to 5:00 p.m. during the day.

Methodology for Evaluating Cancer Risk and Non-Cancer Health Hazards

The HRA evaluated the facility for cancer risk and non-cancer health hazards. The health risk methodology is based on the OEHHA Guidance Manual (2003). Carcinogenic risks and potential non-carcinogenic chronic health effects were calculated using the annual concentrations at flagpole receptors with a height of 1.5 meters above ground level. Acute health risks were evaluated with speciated TACs from DPM as an acute REL for DPM has not been adopted. The latest OEHHA cancer potency factors and chronic REL for DPM were used. The approved health values are incorporated into HARP Version 1.4f. The HARP software performs the necessary risk calculations following the OEHHA Risk Assessment Guidelines and the ARB Interim Risk Management Policy for risk management decisions.

The following HARP modeling options were used for the risk analysis to estimate cancer and non-cancer impacts at the maximum impact location on the same receptor grid (Figure 7-8) as the criteria pollutant modeling. AECOM plotted the calculated risk for each option below and selected the highest residential or worker risk based on the entire receptor grid.

- 70-year Resident Cancer Risk – Derived (Adjusted) Method;
- 9-year (Child Resident) Cancer Risk – Derived (OEHHA) Method;
- 40-year Worker Cancer Risk – Point Estimate;
- Chronic HI – Derived (OEHHA) Method; and
- Acute HI – Simple Acute HI.

The Derived (OEHHA) risk analysis method uses the high-end point-estimates of exposure for the two dominant (driving) exposure pathways, while the remaining exposure pathways use average point estimates. The Derived (Adjusted) method is identical to the Derived (OEHHA) method but uses the breathing rate at the 80$^{th}$ percentile of exposure rather than the high-end point-estimate when the inhalation pathway is one of the dominant exposure pathways. The cancer risk estimates using the Derived equations/methods are based on a 70-year exposure (resident). The point-estimate analysis uses a single value rather than a distribution of values in the dose equation for each exposure pathway. The off-site worker exposure duration assumed a standard work schedule since the facility will operate full time, per OEHHA guidance. For the cancer and chronic HI impacts for workers, the HARP modeling option “modeled GLC and default exposure assumptions” was used. This includes the highly conservative 40-year exposure duration for the worker receptors along with an OEHHA-defined 95$^{th}$ percentile breathing rate of 393 l/kg-day. Child cancer risk was evaluated for a 9-year exposure scenario.

The modeled exposure pathways consisted of all pathways recommended for a health risk assessment. Exposure pathways that were enabled include homegrown produce (using urban default ingestion fractions), dermal absorption, soil ingestion, chicken, eggs and pigs, and mother’s milk in addition to the inhalation pathway. Exposure routes for the ingestion of local fish, or beef/dairy, and drinking water were not considered in this risk analysis because there are no such areas within Alternative C’s area of influence. Long-term risks (i.e., cancer and chronic non-carcinogenic HI) were calculated at the identified off-site receptors.

*Exposure Assumptions*

The chief exposure assumptions are continuous exposure to the TAC concentrations produced by continuous emissions at the maximum emission rates over a 70-year period at each receptor location to estimate lifetime residential cancer risks and over a 40-year period to estimate worker cancer risks. The actual risks are not expected to be any higher than the predicted risks and are likely to be substantially lower. The cancer risk for an inhaled TAC is estimated by multiplying the exposure concentration by the breathing rate (l/kg-day) times the inhalation cancer potency factor $(mg/kg\text{-}day)^{-1}$.

*Analytical Uncertainties*

Sources of uncertainty in the assessment of risks to public health include emissions estimates, dispersion modeling, exposure characteristics, and extrapolation of toxicity data in animals to humans used to develop unit risk factors (cancer) and RELs (non-cancer). To address this uncertainty, highly conservative assumptions were used in this HRA. In aggregate, these assumptions overestimate the predicted risks such that actual risks are unlikely to be higher, but could be considerably lower or non-existent. See Section 5.3.2.4 for further discussion of the uncertainties involved.

#### 7.2.2.4 Greenhouse Gases

GHG emissions would be generated during operation of Alternative C by the following sources:

- Exhaust from the two Jenbacher/GE CHP engines combusting biogas produced in the anaerobic digesters at the Tajiguas Landfill was considered. However, the biogenic $CO_2$ produced is ultimately excluded and only the trace $CH_4$ and $N_2O$ emissions are included in the final analysis;
- Exhaust from the flare at the Tajiguas Landfill combusting biogas produced in the anaerobic digesters when an anaerobic digester vessel is purged before opening and when a CHP engine is offline was considered. However, the biogenic $CO_2$ produced is ultimately excluded and only the trace $CH_4$ and $N_2O$ emissions are included in the final analysis;
- Exhaust from off-road equipment used in the MRF at the SCRTS, the AD Facility at the Tajiguas Landfill and equipment used in the composting process at the Tajiguas Landfill; and
- Exhaust from motor vehicles operating on-site and off-site.

GHG emissions from these sources were estimated using the same procedures that were used to estimate GHG emissions for the proposed Project. Details of the GHG emission calculations are in Attachment G.

#### 7.2.2.5 Odors

Odorous emissions would be generated during operation of Alternative C by the following sources:

- Exhaust from the anaerobic digestion building at the Tajiguas Landfill;

- Composting windrows including recently turned windrows at the Tajiguas Landfill;
- Exhaust from the MRF building at the SCRTS MRF.

For the exhaust of the SCRTS MRF building, similar odor concentrations were used as the proposed Project. All building ventilation air will be treated using two large biofilters. Based on the proposed Project, these units are expected to have an odor removal efficiency of 95 percent. After treatment, the exhaust air is discharged through two stacks. Details of the odor emission calculations are in Attachment J.

### 7.2.3 Alternative D: Off-site Aerobic Composting

#### 7.2.3.1 Criteria Pollutant and Greenhouse Gas Emissions

Emissions from the following sources that would occur during operation of the proposed Project would not occur during operation of Alternative D:

- Exhaust from the CHP engines at the AD facility;
- Exhaust from the flare at the AD facility;
- Exhaust from off-road equipment used in the AD and composting facilities at the Tajiguas Landfill;
- Fugitive particulate matter from material handling at the AD and composting facilities;
- Fugitive ROC emissions from the composting windrows at the Tajiguas Landfill; and
- Exhaust and fugitive particulate matter from tractor/trailers transporting finished compost from the Tajiguas Landfill.

Additionally, the number of one-way worker trips to and from the Tajiguas Landfill for operation of the remaining components of the proposed Project would be reduced from 50 to 46 per day without the optional CSSR element and would be reduced from 66 to 62 per day with the optional CSSR element.

Emissions from all other sources during operation of the proposed Project would be the same during operation of Alternative D.

Emissions from the following additional sources would occur during operation of Alternative D:

- Exhaust and fugitive particulate matter emissions from 13 diesel-fueled tractor/trailer round trips per day to export 240 tons/day of organics from the MRF at the Tajiguas Landfill to the Engel & Gray facility; and
- Emissions from activities at the Engel & Gray facility associated with processing 240 tons/day of organics from the MRF at the Tajiguas Landfill.

Detailed criteria pollutant and GHG emission calculations are in Attachment H.

The emission factors for the diesel-fueled tractors were estimated by dividing total daily emissions by total daily VMT for T7 tractors in 2017 in Santa Barbara County calculated with the EMFAC2011 model (ARB, 2013a). The round-trip travel distance between the Tajiguas Landfill and the Engel & Gray facility is approximately 112 miles.

ROC and $NO_x$ emissions from activities at the Engel & Gray facility associated with composting the 240 tons/day or organics from the MRF were estimated by scaling emissions at the Engel & Gray facility that were estimated in the Conditional Negative Declaration and the Addendum to the Conditional Negative Declaration that were prepared by the City of Santa Maria (1995, 2008) for the facility. These CEQA documents estimated that peak daily on-site and off-site ROC emissions with the facility operating at its permitted capacity would be 3.96 and 0.9 pounds per day, respectively, and that peak daily on-site and off-site $NO_x$ emissions would be 21.52 and 2.54 pounds per day, respectively. The permitted capacity for the facility is 52,200 tons of material to be composted per quarter, which is equivalent to 208,800 tons/year. The 240 tons/day of organics from the MRF is equivalent to 73,600 tons/year, which is equal to 35.52 percent of the Engel & Gray facility's permitted capacity. Therefore, ROC and $NO_x$ emissions from the Conditional Negative Declaration and the Addendum to the Conditional Negative Declaration were multiplied by 0.3552 to estimate ROC and $NO_x$ emissions from activities at the facility to process the organics from the MRF.

The conditional Negative Declaration and the Addendum for the facility did not estimate fugitive ROC emissions from the windrows at the facility. ROC emissions from the composting windrows were therefore estimated using the same approach that was used to estimate ROC emissions from the windrows for the proposed Project, except that uncontrolled emissions were not reduced by the 97 percent resulting from the anaerobic digestion process or by the 90 percent control efficiency from the BACT that would be employed for the proposed Project composting operations.

#### 7.2.3.2 Odors

Odorous emissions would be generated during operation of Alternative D by the following sources:

- Exhaust from the MRF building at the Tajiguas Landfill;
- Open air aerobic composting windrows associated with processing 240 tons/day of organics (from the MRF at the Tajiguas Landfill) at the Engel & Gray composting facility;

The odor emissions from the MRF building at the Tajiguas Landfill will have the same emissions as the proposed Project. Potential odor impacts from the open air aerobic composting source have been qualitatively assessed relative to the proposed Project.

## 7.2.4 Alternative F: Waste Export to the Simi Valley Landfill and Recycling Center

### 7.2.4.1 Criteria Pollutant Emissions

None of the emissions from the proposed Project would occur during operation of Alternative F.

Emissions from the following motor vehicles would occur during operation of Alternative F:

- Exhaust and fugitive particulate matter emissions from 49 diesel-fueled waste collection vehicle round trips per day to transport MSW to the SCRTS, for consolidation prior to export to the Simi Valley Landfill and Recycling Center (SVLRC), instead of to the Tajiguas Landfill;
- Exhaust and fugitive particulate matter emissions from 21 diesel-fueled waste collection vehicle round trips per day to transport MSW to the existing MarBorg Industries MRF/transfer station, for consolidation prior to export to the SVLRC, instead of to the Tajiguas Landfill;
- Exhaust and fugitive particulate matter emissions from 10 new employees (truck drivers) commuting to the SCRTS per day;
- Exhaust and fugitive particulate matter emissions from 21 diesel-fueled tractor/trailer round trips to transport MSW to the SVLRC from the SCRTS;
- Exhaust and fugitive particulate matter emissions from seven diesel-fueled tractor/trailer round trips to transport MSW to the SVLRC instead of to the Tajiguas Landfill from the SCRTS;
- Exhaust and fugitive particulate matter emissions from nine diesel-fueled tractor/trailer round trips to transport MSW to the SVLRC from the MarBorg Industries MRF/transfer station;
- Exhaust and fugitive particulate matter emissions from 15 diesel-fueled tractor/trailer round trips to transport MSW to the SVLRC instead of to the Tajiguas Landfill from the MarBorg Industries MRF/transfer station; and
- Exhaust and fugitive particulate matter emissions from 33 pick-up truck/trailer round trips to direct-haul MSW to the SVLRC instead of to the Tajiguas Landfill.

Detailed criteria pollutant emission calculations are in Attachment I.

Exhaust emissions from the diesel-fueled collection vehicles delivering MSW to the SCRTS and the MarBorg Industries MRF/transfer station were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Solid Waste Collection Vehicles in 2026 in Santa Barbara County. Fugitive particulate matter emissions from these vehicles were calculated using the same emission factors as for off-site vehicle s for the proposed Project.

These collection vehicles would be transporting waste to the SCRTS and the MarBorg Industries MRF/transfer station instead of to the Tajiguas Landfill. RRWMD has estimated that the one-way travel distances from the centroid of the wasteshed to the Tajiguas Landfill, the SCRTS and to the MarBorg Industries MRF/transfer station are 23 miles, 3 miles and 4 miles, respectively. Therefore, transporting the MSW to the SCRTS instead of to the Tajiguas Landfill would reduce the one-way travel distance by 20 miles (23 miles to Tajiguas Landfill – 3 miles to the SCRTS) and transporting MSW to the MarBorg Industries MRF/transfer facility would reduce the one-way travel distance by 19 miles (23 miles to Tajiguas Landfill – 4 miles to the MarBorg Industries MRF/transfer station).

Exhaust and fugitive particulate matter emissions from truck drivers commuting to the SCRTS were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for Light-Duty Truck 1 vehicles in 2026 in Santa Barbara County. Fugitive particulate matter emissions from these vehicles were calculated using the same emission factors as for off-site vehicles for the proposed Project. The daily VMT for truck driver commuting vehicles was estimated from an assumed one-way travel distance of 25 miles.

Exhaust emissions from the diesel-fueled tractor/trailers transporting MSW to the SVLRC were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Tractors in 2026 in Santa Barbara County. Fugitive particulate matter emissions from these vehicles were calculated using the same emission factors as for off-site vehicles for the proposed Project.

The one-way travel distances from the SCRTS and the MarBorg Industries MRF/transfer station to the SVLRC are 72 miles and 66 miles, respectively, and these are the one-way distances that would be traveled by new tractor/trailer trips to transport MSW to the SVLRC. The one-way travel distances from the SCRTS and the MarBorg Industries MRF/transfer station to the Tajiguas Landfill are 20 and 26 miles, respectively. The net one-way travel distances for tractor/trailer trips transporting MSW to the SVLRC from the SCRTS and from the MarBorg Industries MRF/transfer station instead of to the Tajiguas Landfill would be 52 miles (72 miles to SVLRC – 20 miles to Tajiguas Landfill) and 40 miles (66 miles to SVLRC – 26 miles to Tajiguas Landfill), respectively.

Exhaust and fugitive particulate matter emissions from pick-up truck/trailer trips to direct-haul MSW to the SVLRC were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for Light-Heavy Truck 2 vehicles in 2026 in Santa Barbara County. Fugitive particulate matter emissions from these vehicles were calculated using the same emission factors as for off-site vehicles for the proposed Project.

The one-way travel distance from the wasteshed centroid to the SVLRC is 69 miles. Therefore, the net one-way travel distance from the wasteshed centroid to the SVLRC instead of the Tajiguas Landfill for the direct-haul vehicle trips would be 46 miles (69 miles to SVLRC – 23 miles to Tajiguas Landfill).

#### 7.2.4.2 Greenhouse Gases

GHG emissions would be generated during operation of Alternative F by the off-site motor vehicle trips described in Section 7.2.4.1. GHG emissions from these motor vehicle trips were estimated using the same procedures that were used to estimate GHG emissions for motor vehicles for the proposed Project. Details of the GHG emission calculations are in Attachment I.

#### 7.2.4.3 Odors

None of the odorous emissions from the proposed Project would occur during operation of Alternative F. Additional odors from receiving Tajiguas Landfill wasteshed MSW at the SVLRC have been qualitatively evaluated relative to the proposed Project.

### 7.2.5 Alternative G: Waste Export to the Santa Maria Integrated Waste Management Facility

#### 7.2.5.1 Criteria Pollutant Emissions

None of the emissions from the proposed Project would occur during operation of Alternative G.

Emissions from the following motor vehicles would occur during operation of Alternative G:

- Exhaust and fugitive particulate matter emissions from 49 diesel-fueled waste collection vehicle round trips per day to transport MSW to the SCRTS, for consolidation prior to export to the Santa Maria IWMF, instead of to the Tajiguas Landfill;
- Exhaust and fugitive particulate matter emissions from 21 diesel-fueled waste collection vehicle round trips per day to transport MSW to the existing MarBorg Industries MRF/transfer station, for consolidation prior to export to the Santa Maria IWMF, instead of to the Tajiguas Landfill;
- Exhaust and fugitive particulate matter emissions from 10 truck drivers commuting to the SCRTS per day;
- Exhaust and fugitive particulate matter emissions from 21 diesel-fueled tractor/trailer round trips to transport MSW to the Santa Maria IWMF from the SCRTS;
- Exhaust and fugitive particulate matter emissions from seven diesel-fueled tractor/trailer round trips to transport MSW to the Santa Maria IWMF instead of to the Tajiguas Landfill from the SCRTS;
- Exhaust and fugitive particulate matter emissions from nine diesel-fueled tractor/trailer round trips to transport MSW to the Santa Maria IWMF from the MarBorg Industries MRF/transfer station;
- Exhaust and fugitive particulate matter emissions from 15 diesel-fueled tractor/trailer round trips to transport MSW to the Santa Maria IWMF instead of to the Tajiguas Landfill from the MarBorg Industries MRF/transfer station; and

- Exhaust and fugitive particulate matter emissions from 33 pick-up truck/trailer round trips to direct-haul MSW to the Santa Maria IWMF instead of to the Tajiguas Landfill.

Detailed criteria pollutant emission calculations are in Attachment I.

Exhaust emissions from the diesel-fueled collection vehicles delivering MSW to the SCRTS and the MarBorg Industries MRF/transfer station were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Solid Waste Collection Vehicles in 2026 in Santa Barbara County. Fugitive particulate matter emissions from these vehicles were calculated using the same emission factors as for off-site vehicle s for the proposed Project.

These collection vehicles would be transporting waste to the SCRTS and the MarBorg Industries MRF/transfer station instead of to the Tajiguas Landfill. RRWMD has estimated that the one-way travel distances from the centroid of the wasteshed to the Tajiguas Landfill, the SCRTS and to the MarBorg Industries MRF/transfer station are 23 miles, 3 miles and 4 miles, respectively. Therefore, transporting the MSW to the SCRTS instead of to the Tajiguas Landfill would reduce the one-way travel distance by 20 miles (23 miles to Tajiguas Landfill – 3 miles to the SCRTS) and transporting MSW to the MarBorg Industries MRF/transfer facility would reduce the one-way travel distance by 19 miles (23 miles to Tajiguas Landfill – 4 miles to the MarBorg Industries MRF/transfer station).

Exhaust and fugitive particulate matter emissions from truck drivers commuting to the SCRTS were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for Light-Duty Truck 1 vehicles in 2026 in Santa Barbara County. Fugitive particulate matter emissions from these vehicles were calculated using the same emission factors as for off-site vehicle s for the proposed Project. The daily VMT for truck driver commuting vehicles was estimated from an assumed one-way travel distance of 25 miles.

Exhaust emissions from the diesel-fueled tractor/trailers transporting MSW to the Santa Maria IWMF were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for T7 Tractors in 2026 in Santa Barbara County. Fugitive particulate matter emissions from these vehicles were calculated using the same emission factors as for off-site vehicles for the proposed Project.

The one-way travel distances from the SCRTS and the MarBorg Industries MRF/transfer station to the Santa Maria IWMF are 59 miles and 65 miles, respectively, and these are the one-way distances that would be traveled by new tractor/trailer trips to transport MSW to the Santa Maria IWMF. The one-way travel distances from the SCRTS and the MarBorg Industries MRF/transfer station to the Tajiguas Landfill are 20 and 26 miles, respectively. The net one-way travel distances for tractor/trailer trips transporting MSW to the Santa Maria IWMF from the SCRTS and from the MarBorg Industries MRF/transfer station instead of to the Tajiguas Landfill would be 39 miles (59 miles to Santa Maria IWMF – 20 miles to Tajiguas

Landfill) and 39 miles (65 miles to Santa Maria IWMF – 26 miles to Tajiguas Landfill), respectively.

Exhaust and fugitive particulate matter emissions from pick-up truck/trailer trips to direct-haul MSW to the Santa Maria IWMF were estimated using emission factors calculated with the EMFAC2011 model (ARB, 2013a) for Light-Heavy Truck 2 vehicles in 2026 in Santa Barbara County. Fugitive particulate matter emissions from these vehicles were calculated using the same emission factors as for off-site vehicles for the proposed Project.

The one-way travel distance from the wasteshed centroid to the Santa Maria IWMF is 62 miles. Therefore, the net one-way travel distance from the wasteshed centroid to the Santa Maria IWMF instead of the Tajiguas Landfill for the direct-haul vehicle trips would be 39 miles (62 miles to Santa Maria IWMF – 23 miles to Tajiguas Landfill).

#### 7.2.5.2 Greenhouse Gases

GHG emissions would be generated during operation of Alternative G by the off-site motor vehicle trips described in Section 7.2.5.1. GHG emissions from these motor vehicle trips were estimated using the same procedures that were used to estimate GHG emissions for motor vehicles for the proposed Project. Details of the GHG emission calculations are in Attachment I.

#### 7.2.5.3 Odors

None of the odorous emissions from the proposed Project would occur during operation of Alternative G. Additional odors from receiving Tajiguas Landfill wasteshed MSW at the Santa Maria Integrated Waste Management Facility have been qualitatively evaluated relative to the proposed Project.

## 7.3 Impact Analysis

### 7.3.1 Alternative A: No Project Alternative

Under Alternative A, disposal of MSW at the existing, permitted Tajiguas Landfill would continue until the disposal capacity is reached in ~2026. Therefore, air quality impacts from this alternative would be similar to impacts that currently occur from operation of the Tajiguas Landfill until ~2026. As the County is required to provide waste disposal services for the communities currently served by the Tajiguas Landfill, after ~2026 the County would need to provide other disposal options. Absent implementation of the proposed Project, the County would likely either pursue an expansion of the Tajiguas Landfill (Alternative E) or export waste to another landfill (Alternative F or G).

### 7.3.1.1 Criteria Pollutants

Emission Estimates

Construction emissions for the proposed Project would not exceed the thresholds in SBCAPCD Rule 202 D.16 that would require offsets and a demonstration that no ambient air quality standard would be violated. Under Alternative A, the MRF, the AD Facility and the composting facilities would not be constructed at the Tajiguas Landfill and none of the emissions generated during these construction activities would occur. Therefore, there would be no impact from construction emissions under Alternative A.

Emissions during operation of the proposed Project would not exceed applicable significance thresholds. Under Alternative A, none of the operation emissions from the proposed Project would occur. However, 01-EIR-05 (Section 3.11.3.3, pages 3.11-19 to 3.11-28) prepared for the Tajiguas Landfill Expansion Project and 08EIR-00000-00007 (Section 4.3, pages 4.3-6 and 4.3-7) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project concluded that ozone precursor emissions from operation of the Tajiguas Landfill would exceed significance thresholds and cause significant unavoidable impacts. Implementation of the proposed Project is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated emissions and lessen the impacts from ozone precursor emissions. These reductions would not occur under Alternative A.

Ambient Air Quality Impacts

As discussed in section 6.1.2, air quality impacts of the proposed Project are not expected to exceed any applicable NAAQS or CAAQS even when the regional ambient background concentrations are considered. The operation of current sources at the Tajiguas Landfill would continue. Under Alternative A, none of the ambient air quality impacts from the proposed Project would occur. However, 01-EIR-05 (Section 3.11.3.3, pages 3.11-19 to 3.11-28) prepared for the Tajiguas Landfill Expansion Project and 08EIR-00000-00007 (Section 4.3, pages 4.3-6 and 4.3-7) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project concluded that operation of the Tajiguas Landfill would cause exceedances of ambient air quality standards for 1-hour $NO_2$ and 24-hour PM10 and cause significant unavoidable impacts. Implementation of the proposed Project is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated $NO_x$ and PM10 emissions. These reductions would not occur under Alternative A.

Cumulative Criteria Pollutant Impacts

Because none of the construction or operation criteria pollutant emissions from the proposed Project would occur under Alternative A, there would be no cumulative construction or operation impacts from the proposed Project under Alternative A. However, criteria pollutant emissions from current operations at the Tajiguas Landfill would not be reduced under Alternative A, and significant cumulative regional impacts from ozone precursor emissions and localized 1-hour $NO_2$ and 24-hour PM10 air quality impacts would not be reduced.

### 7.3.1.2 Health Risks

As discussed in section 6.2.1, health risks from operation of the proposed Project are not expected to exceed any applicable significance thresholds. Under Alternative A, none of the operation emissions from the proposed Project would occur. The operation of current sources at the Tajiguas Landfill would continue. 01-EIR-05 (Section 3.11.3.3, pages 3.11-19 to 3.11-28) prepared for the Tajiguas Landfill Expansion Project and 08EIR-00000-00007 (Section 4.3, page 4.3-7) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project concluded that operation of the Tajiguas Landfill would cause exceedances of the significance threshold for carcinogenic health risks. However, subsequent to publication of the prior EIR, the risk assessment model, assumptions, and reporting have changed.

An HRA was conducted for this EIR which included the impacts from the existing Tajiguas Landfill sources (see Section 6.2). Cancer and acute non-cancer impacts results indicate that there would be risk levels over the significance thresholds in limited areas near the fenceline (see Figures 6-1 and 6-2). Since these areas are not reasonably accessible to the public and since long term exposure would not be possible in these areas, these results were not considered to show a significant health risk impact. Furthermore, implementation of the proposed Project is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated DPM emissions and health risks. These reductions were accounted for in the facility-wide HRA and would not occur under Alternative A.

Because none of the operation TAC emissions from the proposed Project would occur under Alternative A, there would be no additional health risk impacts from the proposed Project under Alternative A. However, the waste reduction and beneficial reuse related to the Project would not occur as well.

### 7.3.1.3 Greenhouse Gases

As discussed in Section 6.3.3, the proposed Project would result in a reduction in GHG emissions. An analysis of GHGs was prepared as part of the cumulative air quality impact analysis in 08EIR-00000-00007 (Section 4.3.2.6, pages 4.3-9 and 4.3-15) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project. The GHG analysis concluded that because the discretionary approvals required for the Tajiguas Landfill Reconfiguration Project did not involve any changes to the landfill's operational parameters (i.e., daily maximum waste, total waste disposal capacity, permitted disposal area, or permitted traffic) and, therefore did not affect the emissions of greenhouse gases and global climate change associated with the permitted landfill, an impact classification was not assigned to the estimated emissions.

Under Alternative A, none of the construction or operation GHG emissions from the proposed Project would occur. Likewise, under Alternative A, the overall reduction in GHG emissions from waste diversion and energy generation from the proposed Project would not occur. The GHG gas emissions generated under Alternative A would be the same as the GHG emissions generated under the currently permitted Landfill. Therefore, implementation of Alternative A would result in greater GHG emissions than the proposed Project.

#### 7.3.1.4 Odors

Odor impacts associated with the proposed Project were determined to be less than significant. As discussed in Section 3.6 of 01-EIR-05 for the Tajiguas Landfill Expansion Project, potential impacts associated with odors emitted from landfill gas emissions from the currently permitted Landfill were considered to be a potentially significant but mitigable nuisance impact. As discussed in Section 6.4.1 of this Report, the current landfill operations at Tajiguas have not generated any odor complaints. Continuing with landfilling operations under the currently approved operational parameters would not be expected to result in significant odor impacts beyond those which were identified in in Section 3.6 of 01-EIR-05. Therefore, odor impacts under Alternative A would be less than significant with the mitigation previously required in 01-EIR-05.

Because none of the operation odor emissions from the proposed Project would occur under Alternative A, there would be no cumulative odor impacts from the proposed Project under Alternative A.

### 7.3.2 Alternative B: MarBorg Industries MRF

#### 7.3.2.1 Criteria Pollutants

Emission Estimates

Construction emissions for the proposed Project would not exceed the thresholds in SBCAPCD Rule 202 D.16 that would require offsets and a demonstration that no ambient air quality standard would be violated. Most construction activities for the MRF at the MarBorg Industries site would be similar to those for the MRF at the Tajiguas Landfill. However, construction of the MRF at the MarBorg Industries site would also require the removal of 11,029 square feet of structural development and 171,898 square feet of paving, which would not be required for construction of the MRF at the Tajiguas Landfill. As a result, construction emissions for Alternative B are anticipated to be higher than for the proposed Project.

Emissions during operation of the proposed Project would not exceed applicable significance thresholds. Tables 7-5 and 7-6 show maximum daily criteria pollutant emissions generated during operation of Alternative B. Table 7-5 includes emissions from all sources – on-site equipment, on-site vehicles, and off-site vehicles and compares the emissions to the daily triggers for offsets in the SBCAPCD New Source Review Rule (55 pounds per day for $NO_x$ or ROC; 80 pounds per day for PM10). Table 7-6 shows emissions from on-site and off-site vehicles only and compares emissions to Santa Barbara County's threshold of 25 pounds per day of $NO_x$ or ROC for motor vehicle trips only.

**Table 7-5 Maximum Daily Operation Emissions – All Sources, Alternative B**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | **ROC** | **$NO_x$** | **CO** | **$SO_x$** | **PM10** | **PM2.5** |
| **Operations at MarBorg Industries Site** | | | | | | |
| On-Site Equipment and Vehicles | 1.97 | 10.56 | 45.82 | 0.24 | 0.05 | 0.05 |
| Off-Site Vehicles | 6.54 | -58.11 | 51.13 | 0.01 | 4.12 | 1.27 |
| Total Emissions at MRF | 8.51 | -47.55 | 96.95 | 0.25 | 4.17 | 1.32 |
| **Operations at Tajiguas Landfill** | | | | | | |
| On-Site Equipment and Vehicles | 41.80 | 30.00 | 108.01 | 26.93 | 32.46 | 22.32 |
| Off-Site Vehicles | 0.56 | 2.14 | 2.67 | 0.01 | 0.62 | 0.20 |
| Total Emissions at Landfill | 42.36 | 32.14 | 110.68 | 26.94 | 33.08 | 22.52 |
| | | | | | | |
| **Total Emissions** | **50.87** | **-15.41** | **207.63** | **27.19** | **37.25** | **23.84** |
| Santa Barbara County CEQA Threshold[1] | 55 | 55 | -- | -- | 80 | -- |
| Significant Impact (Yes/No) | No | No | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008). These thresholds are based on SBCAPCD's New Source Review Rule.

**Table 7-6 Maximum Daily Operation Emissions – Vehicle Emissions Only, Alternative B**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | ROC | $NO_x$ | CO | $SO_x$ | PM10 | PM2.5 |
| On-Site Vehicles | 0.51 | 1.03 | 0.95 | <0.005 | 7.72 | 0.78 |
| Off-Site Vehicles | 7.10 | -55.98 | 53.80 | 0.02 | 4.74 | 1.47 |
| **Total Emissions** | **7.61** | **-54.95** | **54.75** | **0.02** | **12.46** | **2.25** |
| Santa Barbara County CEQA Threshold[1] | 25 | 25 | -- | -- | -- | -- |
| Significant Impact (Yes/No) | No | No | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008).

The negative $NO_x$ emissions from off-site vehicles shown in Table 7-5 are caused by the reduction in travel distance for collection vehicles to transport MSW to the MarBorg Industries site instead of the Tajiguas Landfill. As shown in Table 7-5, the maximum daily emissions of ROC, $NO_x$ and PM10 from all sources are below the thresholds. Impacts from Alternative B's operation would be less than significant.

As shown in Table 7-6, the maximum daily emissions from vehicles only would not exceed the thresholds established by Santa Barbara County. Therefore, the vehicle emissions from operation of Alternative B would not result in a significant impact.

Table 7-7 shows maximum daily criteria pollutant emissions associated with operation of the MRF under Alternative B and compares it to the operation of the MRF under the proposed Project with the optional CSSR element. Table 7-7 also shows the differences in maximum daily emissions between Alternative B and the proposed Project. The City of Santa Barbara uses the SBCAPCD's significance thresholds of 240 pounds per day for ROC and $NO_x$ emissions and 80 pounds per day of PM10 emissions to evaluate significance. The ROC, $NO_x$ and PM10 emissions from operation of the MRF under Alternative B listed in Table 7-7 are below these thresholds. As shown in Table 7-7, maximum daily emissions of $NO_x$, PM10 and PM2.5 associated with operation of the MRF are lower under Alternative B than under the proposed Project.

**Table 7-7 Maximum Daily MRF Operation Emissions under Alternative B and the Proposed Project**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | ROC | $NO_x$ | CO | $SO_x$ | PM10 | PM2.5 |
| **Alternative B MRF Operations** | | | | | | |
| On-Site Equipment and Vehicles | 1.97 | 10.56 | 45.82 | 0.24 | 0.05 | 0.05 |
| Off-Site Vehicles | 6.54 | -58.11 | 51.13 | 0.01 | 4.12 | 1.27 |
| Total Emissions | 8.51 | -47.55 | 96.95 | 0.25 | 4.17 | 1.32 |
| **Proposed Project MRF Operations** | | | | | | |
| On-Site Equipment and Vehicles | 2.17 | 14.77 | 43.69 | 0.08 | <0.005 | <0.005 |
| Off-Site Vehicles | 5.17 | 2.84 | 28.03 | 0.08 | 4.83 | 1.42 |
| Total Emissions | 7.34 | 17.61 | 71.72 | 0.16 | 4.83 | 1.42 |
| **Differences (Alternative B – Proposed Project)** | **1.17** | **-29.94** | **25.23** | **0.09** | **-0.66** | **-0.10** |

Air Dispersion Modeling

As discussed in Section 6.1.2, air quality impacts of the proposed Project are not expected to exceed any applicable NAAQS or CAAQS even when the regional ambient background concentrations are considered.

ISCST3 was applied with one year of meteorological data to determine maximum impacts in order to evaluate compliance with the NAAQS and CAAQS for Alternative B. All modeling files are provided in Attachment D, the electronic modeling archive.

*NAAQS Modeling Results*

The results of the NAAQS analysis are shown in Table 7-8. The modeled concentrations shown are the "design value" concentration based on the form of the standard:

- For all annual modeling periods, the NAAQS Concentration is the highest modeled annual average impact.
- For 1-hour $NO_2$ and $SO_2$, the NAAQS Concentration is the highest $98^{th}$ and $99^{th}$ percentile modeled impact, respectively. This is a conservative value relative to the forms of those standards, which are the 3-year average of the $98^{th}$ (or $99^{th}$) percentile daily maximum impact. As SBCAPCD only provided one year of meteorological data

and because the ISCST3 model is incapable of producing results in the true form of the standard, the maximum 98th and 99th percentages are reported.

- For 24-hour PM2.5, the form of the standard is the 3-year average of the 98th percentile impact. However, the analysis uses the EPA recommended guidance[13] of adding the 3-year average of the highest modeled concentration at each receptor to the 98th percentile background.
- For all other standards, the form of the standard is "not to be exceeded more than once per year;" therefore, the high-2nd-high impact is reported.

**Table 7-8 MarBorg Industries ISCST3 NAAQS Modeling Results ($\mu g/m^3$)**

| Pollutant | Averaging Period | NAAQS Conc. | Ambient Background | Total Conc. | NAAQS | Percent of NAAQS |
|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | 8.4[2] | 7.0 | 15.4 | 196.5 | 7.8% |
| | 3-hour | 6.5 | 7.9 | 14.4 | 1300 | 1.1% |
| | 24-hour | 1.7 | 5.2 | 6.9 | 356 | 1.9% |
| | Annual | 0.40 | 2.6 | 3.0 | 80 | 3.8% |
| CO | 1-hour | 2,012 | 2,299 | 4,311 | 40,000 | 10.8% |
| | 8-hour | 1,066 | 690 | 1,756 | 10,000 | 17.6% |
| $NO_2$[1] | 1-hour | 223.1[3] | 59.6 | 282.7 | 188 | **150.4%** |
| | Annual | 10.2 | 12.1 | 22.3 | 100 | 22.3% |
| PM10 | 24-hour | 1.7 | 70.0 | 71.7 | 150 | 47.8% |
| PM2.5 | 24-hour | 1.7 | 16.0 | 17.7 | 35 | 50.6% |
| | Annual | 0.36 | 9.0 | 9.4 | 12 | 78.0% |

[1] 1-hour $NO_2$ impacts multiplied by 0.8 and annual $NO_2$ impacts multiplied by 0.75 to represent Tier 2 $NO_x/NO_2$ conversion.

[2] 99th percentile modeled concentration. Proper form of standard is 3-year average of the 99th percentile of the daily maxima.

[3] 98th percentile modeled concentration. Proper form of standard is 3-year average of the 98th percentile of the daily maxima.

[13] http://www.epa.gov/ttn/scram/guidance/clarification/Official%20Signed%20Modeling%20Proc%20for%20Demo%20Compli%20w%20PM2.5.pdf

As shown in the table, the modeled impacts from the MRF sources at the MarBorg Industries site, when combined with the appropriate ambient background, are below the NAAQS except for 1-hour $NO_2$. Furthermore, the modeled impact from operation of Alternative B without adding the background concentration is approximately 119 percent of the 1-hour $NO_2$ NAAQS. Therefore, operation of Alternative B could cause significant localized 1-hour $NO_2$ impacts.

*CAAQS Modeling Results*

The results of the CAAQS analysis are shown in Table 7-9. For the CAAQS analysis, the representative ambient background was added to all modeled impacts and compared to the CAAQS. In all cases, the form of the CAAQS is “not to be exceeded”, so the maximum modeled concentrations are reported. As seen in Table 7-9, all impacts are below the CAAQS except for 24-hour PM10. However, the modeled impact is 1.9 µg/m$^3$, which is only about four percent of the CAAQS of 50 µg/m$^3$, but the background 24-hour PM10 concentration of 70 µg/m$^3$ alone exceeds the CAAQS. Since the modeled impact is only about four percent of the CAAQS, operation of Alternative B is not considered to cause significant localized 24-hour PM10 impacts. As shown in Table 6-7 the modeled 24-hour PM10 concentration for the proposed Project is 8.2 µg/m$^3$, which is higher than the modeled impact for Alternative B, but the background 24-hour PM10 concentration used for the proposed Project at the Tajiguas Landfill is 34 µg/m$^3$, which is below the CAAQS.

**Table 7-9 MarBorg Industries ISCST3 CAAQS Modeling Results (µg/m$^3$)**

| Pollutant | Averaging Period | Maximum Conc. | Ambient Background | Total Conc. | CAAQS | Percent of CAAQS |
|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | 8.4 | 13.1 | 21.5 | 655 | 3.3% |
| | 24-hour | 1.9 | 5.2 | 7.1 | 105 | 6.8% |
| CO | 1-hour | 2,012 | 2,299 | 4,311 | 23,000 | 18.7% |
| | 8-hour | 1,086 | 690 | 1,776 | 10,000 | 17.8% |
| $NO_2$ | 1-hour | 223.1 | 97.8 | 320.9 | 339 | 94.7% |
| | Annual | 10.2 | 12.1 | 22.3 | 57 | 39.1% |
| PM10 | 24-hour | 1.9 | 70.0 | 71.9 | 50 | **143.8%** |
| | Annual | 0.36 | 18.4 | 18.8 | 20 | 93.8% |
| PM2.5 | Annual | 0.36 | 9.0 | 9.4 | 12 | 78.0% |
| [1] All short term results are highest modeled value. Annual results are highest annual average. | | | | | | |

As seen in Table 7-8 and Table 7-9, all modeled impacts for Alternative B are below their respective standards except for the 1-hour $NO_2$ NAAQS and 24-hour PM10 CAAQS. However, as explained, the contribution to 24-hour PM10 by this alternative is relatively small. Therefore, operation of Alternative B could cause significant localized 1-hour $NO_2$ impacts if this alternative is chosen.

The following measures to reduce localized criteria pollutant impacts should be considered for the MRF design at the MarBorg Industries facility if this alternative is selected:

- Use CNG-fueled engines in the street sweeper and roll-off truck;
- Increase the height of the MRF building exhaust stacks or change the stack locations for better dispersion;
- Design the exhausts for vertical discharge instead of horizontal discharge; and
- Relocate the emergency generator farther away from the facility boundary.

Cumulative Criteria Pollutant Impacts

RRWMD provided AECOM with a list of approximately 115 residential projects and 106 non-residential projects within one mile of the MarBorg Industries location that are pending, have been approved or that have building permits. Essentially all of the listed projects are either commercial or residential. The majority of these projects would generate short-term construction emissions similar to that generated during construction of Alternative B and generate long-term vehicle trips and associated emissions.

As discussed in the County's *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008), for projects that do not have significant ozone precursor emissions or localized pollutant impacts, emissions have been taken into account in the AQAP growth projections and therefore, cumulative impacts may be considered to be insignificant. Since ozone precursor ROC and $NO_x$ emissions during operation of Alternative B do not exceed the thresholds, operation of Alternative B would not cause significant cumulative ozone precursor impacts. Although operation of Alternative B could cause localized exceedances of the 1-hour $NO_2$ NAAQS, the emissions from vehicle trips generated by the potential cumulative projects would not be expected to cause or contribute to localized exceedances of ambient air quality standards. Although the emissions are below the thresholds, since a potential localized $NO_2$ impact was modeled, operation of Alternative B could cause or contribute to significant cumulative localized $NO_2$ impacts unless the potential mitigation measures and/or additional engineering changes are adopted.

#### 7.3.2.2 Health Risk Assessment

The HRA provides results for the PMI for Acute HI, the MEIR, and the MEIW. As discussed in Section 6.2.1, operation of the proposed Project would not result in significant impacts related to cancer or non-cancer health risks from TACs. Under Alternative B, health risks from operations at the Tajiguas Landfill would be reduced from the proposed Project because TAC emissions generated by operation of the MRF at the Landfill would not occur.

Unlike the proposed Project and Alternative C, there are no existing operations with emissions that will remain at the MarBorg Industries location if this Alternative is selected for the MRF. Therefore, the HRA for this Alternative B is considered to be a facility-wide HRA and the impacts are compared to the CEQA significance thresholds. For Alternative B, the Acute HI PMI was identified based on the location of the maximum off-site risks, the MEIR was identified based on location of the nearest existing residence (northeast of MarBorg Industries), and the MEIW was based on a receptor closest to an existing business (see Figure 7-10). A summary of cancer risk and non-cancer health impacts values at the Acute HI PMI, MEIR and MEIW receptors are presented in Table 7-10.

As shown in Table 7-10, cancer risks at the MEIR and MEIW were determined to be 5.94 in-one-million and 2.13 in-one-million. Non-cancer chronic health impacts at the MEIR and MEIW were determined to be a HI of less than 0.01 and 0.01. All modeled impacts at the MEIR and the MEIW for Alternative B are below their respective CEQA significance thresholds but higher than the impacts from the proposed Project. The Acute HI PMI (at a location that is reasonably accessible to the public) is 1.18, which is greater than the CEQA significance threshold of 1.0 and the impact is considered to be significant.

**Table 7-10 Summary of Maximum Health Risk Impacts at PMI, MEIR and MEIW for Alternative B**

| Receptor Type | | Maximum Cancer Risk (per million) | Maximum Acute Hazard Index | Maximum Chronic Hazard Index |
|---|---|---|---|---|
| PMI[1] | Adult | N/R | **1.18** | N/R |
| MEIR[2] | Adult | 5.94 | 0.31 | 0.004 |
| | Child | 1.47 | N/A | N/A |
| MEIW[3] | | 2.13 | 0.31 | 0.007 |
| Significance Threshold | | 10 | 1 | 1 |
| Exceed Threshold (Y/N)? | | No | **Yes** | No |

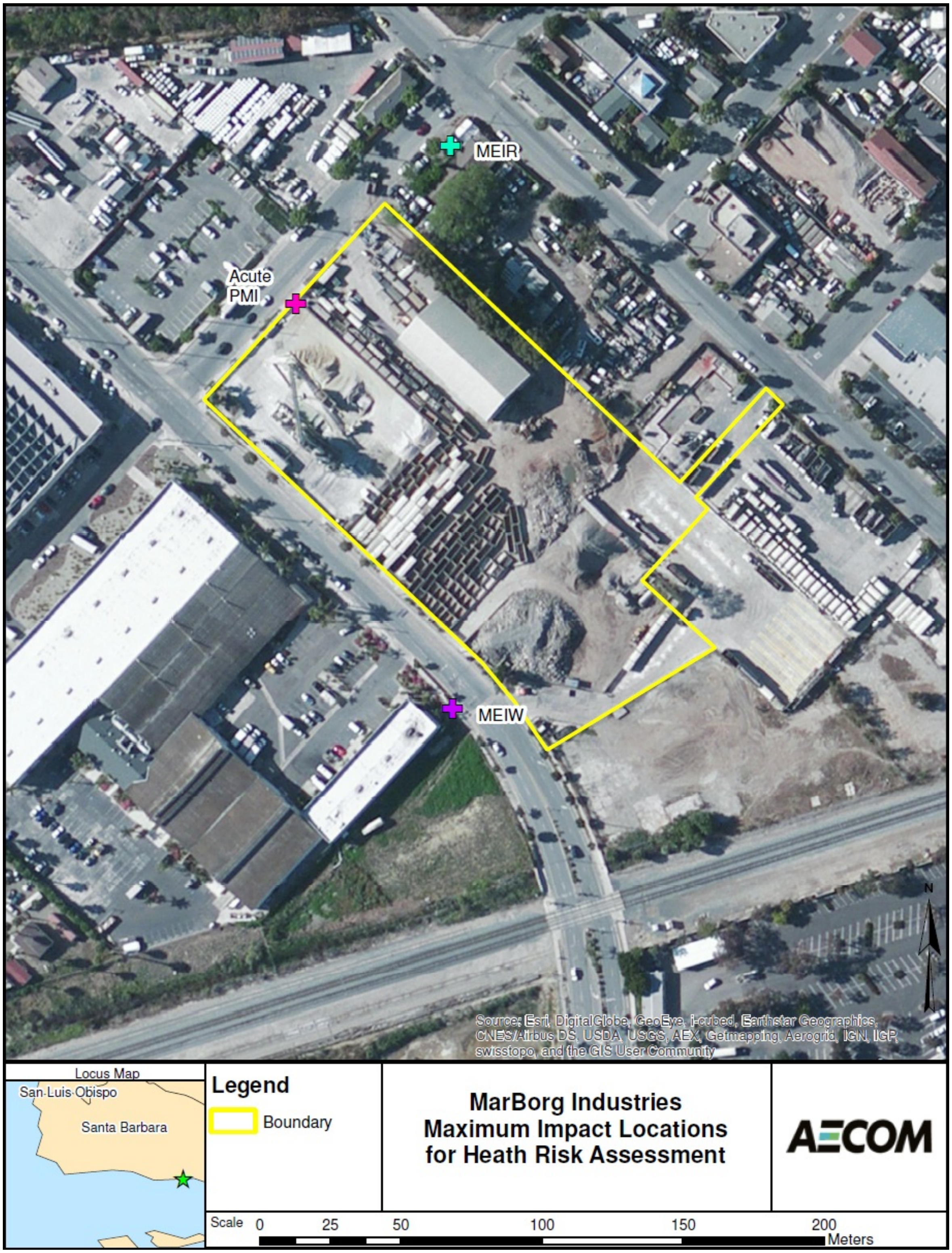
[1] PMI: Point of maximum impact at any off-site location, 70-year adult exposure

[2] MEIR: Maximum exposed individual at an existing residential receptor; 70-year adult exposure scenario and 9-year child exposure scenario for cancer risk

[3] MEIW: Maximum exposed individual at an existing occupational worker receptor; 40-year adult worker exposure scenario

N/R – PMI for long term effects not reported. N/A – Child HI impacts are Not Applicable.

## Figure 7-10 Locations of the Acute HI PMI, MEIR, and MEIW for Alternative B



In accordance with SBCAPCD requirements (SBCAPCD, 2014b, 2014c), Figure 7-11 provides an isopleth plot to show where cancer risks could be above the significance levels. There are no residences within the area inside this isopleth where a 70-year exposure would occur. Therefore, this result is not considered to show a significant carcinogenic health risk, and this figure is provided for disclosure purposes only. The Acute HI PMI receptor is the only receptor above 1.0, therefore a separate figure to show the area above 1.0 is not required.

Since the Acute HI at the PMI exceeds the significance threshold of 1.0, operation of Alternative B could cause significant health risks.

The measures that should be considered to reduce potential localized criteria pollutant impacts should also be considered to reduce potential health risks if this Alternative is selected.

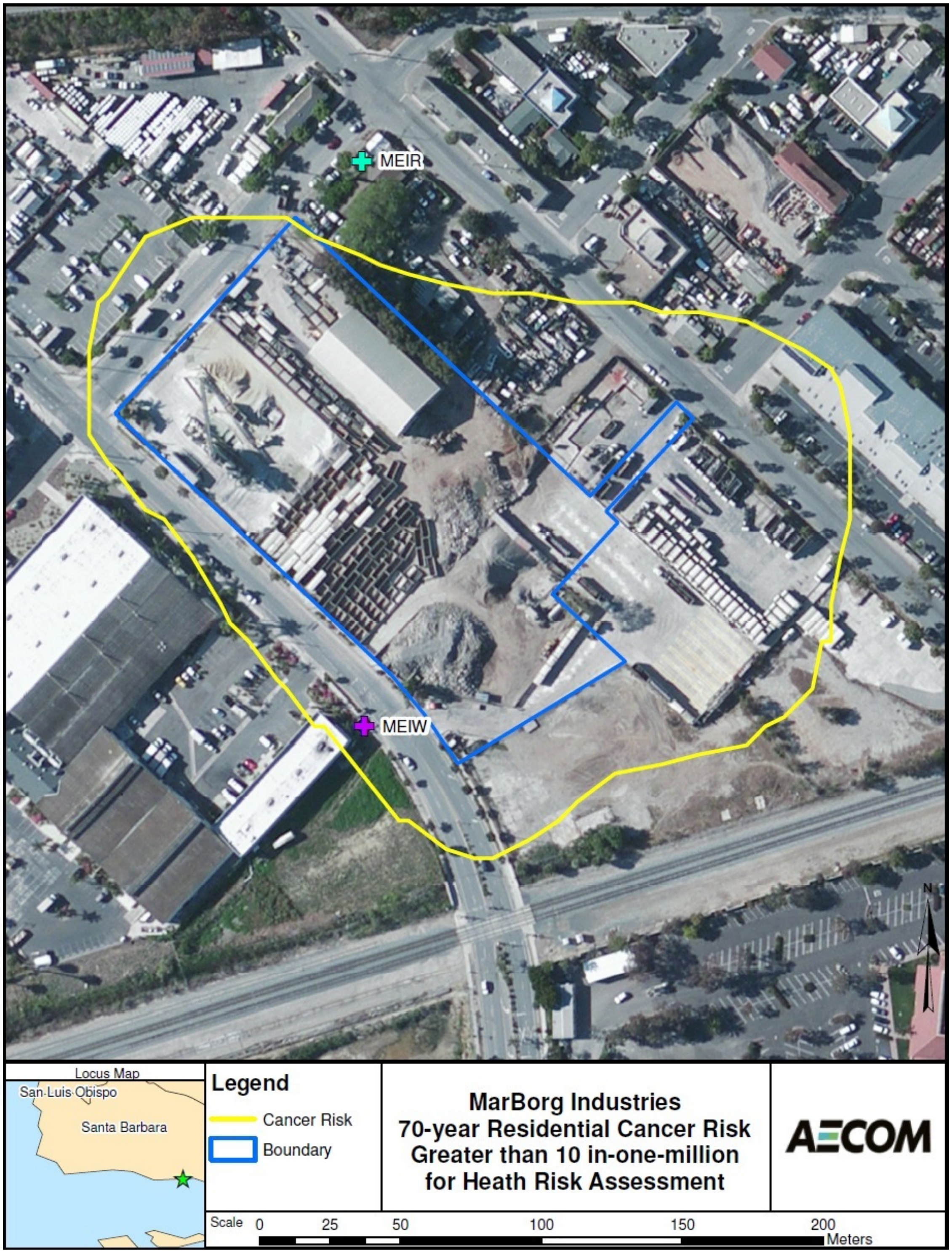
#### 7.3.2.3 Greenhouse Gases

~~Construction GHG emissions for the proposed Project would not exceed thresholds.~~ As discussed above, while construction activities for the MRF at the MarBorg Industries site would be similar to those for the MRF at the Tajiguas Landfill, construction of the MRF at the MarBorg Industries site would also require the removal of 11,029 square feet of structural development and 171,898 square feet of paving, which would not be required for construction of the MRF at the Tajiguas Landfill. As a result, construction GHG emissions for Alternative B are anticipated to be slightly higher than for the proposed Project, but still **low enough to keep the amortized project GHG emissions** below the **significance** threshold **of 1,000 MT $CO_2$e/year**.

~~Operation GHGs for the proposed Project would not exceed thresholds.~~ Alternative B results in similar operation GHG emissions as the proposed Project. The primary differences in GHG emissions between the proposed Project and Alternative B can be attributed to different MRF operations and different travel distances for the transportation of MSW. Table 7-11 below summarizes the GHG emissions for Alternative B.

As shown in Table 7-11, the estimated total annual direct GHGs from the new sources under Alternative B would be approximately 3,455 MT $CO_2$e. Therefore, Alternative B would have slightly lower annual direct GHG emissions than the estimated 3,646 MT $CO_2$e that would be generated by the new sources from the proposed Project with the optional CSSR element. ~~As with the proposed Project, GHG emissions from new sources under Alternative B would be less than the 10,000 MT $CO_2$e threshold.~~

**Figure 7-11 70-year Cancer Risk Isopleth Greater than 10.0 in-one-million for Operations by MarBorg Industries Under Alternative B**




Note: Although the MEIW is shown within the 10 in-one-million isopleth, worker exposure is based on 40 year exposure and this health risk was less than the threshold (see Table 7-10).

**Table 7-11 Greenhouse Gas Annual Emissions Summary, Alternative B**

| Source | Emissions (MT/year)[1] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[2] |
| ***On-site*** | | | | |
| **MRF at MarBorg Industries** | | | | |
| MRF Facility Equipment | 2,452 | 0.14 | 0.06 | 2,474 |
| On-Site Motor Vehicles | 173 | <0.005 | <0.005 | 174 |
| Emergency Generator | 9.8 | <0.005 | <0.005 | 9.9 |
| **Total** | **2,635** | **0.14** | **0.06** | **2,658** |
| **At Tajiguas Landfill** | | | | |
| CHP Engines Combustion | <u>8,718</u> | 0.16 | 0.02 | 9.0 |
| CHP Engines Pass-through $CO_2$ | <u>5,945</u> | | | 0.0 |
| Flare Combustion | <u>936</u> | 0.06 | 0.01 | 4.7 |
| Flare Pass-through $CO_2$ | <u>638</u> | | | 0.0 |
| AD Facility Equipment | 59.5 | <0.005 | <0.005 | 60.0 |
| Composting Equipment Exhaust | 178 | 0.01 | <0.005 | 180 |
| Motor Vehicle Exhaust | 7.6 | <0.005 | <0.005 | 7.9 |
| **Total** | **245** | **0.23** | **0.03** | **262** |
| **On-site Total** | **2,880** | **0.37** | **0.09** | **2,920** |
| ***Off-site*** | | | | |
| **MRF at MarBorg Industries** | | | | |
| Export Motor Vehicle Exhaust | 2,776 | 0.96 | 0.16 | 2,849 |
| Reduction from MSW and CSSR to MarBorg Industries instead of Tajiguas Landfill[3] | -2,507 | -0.02 | -0.09 | -2,533 |
| **Total** | **269** | **0.94** | **0.07** | **316** |
| **At Tajiguas Landfill** | | | | |
| Motor Vehicle Exhaust | 204 | 0.28 | 0.03 | 219 |
| **Total** | **204** | **0.28** | **0.03** | **219** |
| **Off-site Total** | **473** | **1.22** | **0.10** | **535** |
| | | | | |
| **On-site and Off-site Total** | **3,353** | **1.59** | **0.19** | **3,455** |

[1] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT
[2] $CO_2e$ = $CO_2$-equivalent = $CO_2 + 25 \times CH_4 + 298 \times N_2O$ (with biogenic emissions excluded)
[3] The one-way travel distance for delivering MSW and CSSR to the MarBorg Industries facility is 19 miles less than to Tajiguas Landfill
<u>Underlined amounts</u> represents biogenic emissions excluded from totals

As seen in the proposed Project analysis in Section 6.3.3, the reduction in GHG emissions from waste diversion and energy generation is orders of magnitude greater than the emissions from new sources. The same waste diversion and energy generation from the proposed Project would occur under Alternative B, which, over time, would result in an overall reduction in GHG emissions from the Landfill of a similar magnitude to that of the proposed Project. Therefore, as with the proposed Project, Alternative B would result in a beneficial GHG impact due to the reduction in landfill-related GHG emissions.

Unlike Table 7-11, which shows total direct GHG emissions, Table 7-12 shows a comparison of annual GHG emissions associated with operation of the MRF under Alternative B and under the proposed Project. Table 7-12 also shows the differences in the MRF emissions between Alternative B and the proposed Project. As shown in Table 7-12, annual GHG emissions associated with operation of the MRF are lower under Alternative B than under the proposed Project.

**Table 7-12 Differences in Annual MRF Greenhouse Gas Emissions Between Alternative B and the Proposed Project**

| Scenario | Emissions (MT/year)[1] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[2] |
| Alternative B MRF Operations | 2,904 | 1.08 | 0.13 | 2,974 |
| Proposed Project MRF Operations | 2,977 | 2.97 | 0.29 | 3,139 |
| **Differences (Alternative B – Proposed Project)** | **-73** | **-1.89** | **-0.16** | **-165** |

[1] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[2] $CO_2e$ = $CO_2$-equivalent = $CO_2 + 25 \times CH_4 + 298 \times N_2O$

#### 7.3.2.4 Odors

Impact Analysis

As discussed in Section 6.4.3, odor impacts from the proposed Project would be less than significant. Under Alternative B, odor emissions would occur from the AD and composting facilities at the Tajiguas Landfill and from the MRF at the MarBorg Industries site. The Tajiguas Landfill and the MarBorg Industries site are separated by more than 25 miles. Based on the odor dispersion for the proposed Project, potential odors generated by proposed Project facilities will completely diminish within 3 to 5 miles from the source. Therefore, potential odor impacts from operations at the Tajiguas Landfill and at the MarBorg Industries site under Alternative B were analyzed separately.

Under Alternative B, the MRF would not be located at the Tajiguas Landfill, but the AD and composting facilities would remain at the Tajiguas Landfill. Therefore, it is expected that odors generated at the Tajiguas Landfill under Alternative B would be lower than the proposed Project because odors emitted from the MRF would not occur at the Tajiguas Landfill. However, as discussed in Section 6.4, the majority of hours over the odor guideline (5 $OU/m^3$) for the proposed Project are a result of odors emitted from the digestate composting windrows. Therefore, there would not be a substantial difference in odors generated at the Tajiguas Landfill under the proposed Project and Alternative B, and odor impacts from operation of the AD and compost facilities under Alternative B would be less than significant.

The area surrounding the MarBorg Industries MRF location is primarily zoned for light manufacturing and is primarily occupied by offices, storage and light industrial uses. There are several residential buildings just to the north (0.2 miles), and denser residential areas are located farther to the north, north of the U.S. Highway 101. A hotel is located approximately 500 feet south of the alternative MRF site. As with the analysis for the proposed Project, odor modeling was performed for this alternative using a tiered approach, and contour plots were generated to identify the magnitude of odor concentrations. The modeling results showed that odor concentrations would be higher than the 5 $OU/m^3$ guidance value at some locations, and a frequency analysis was conducted at odor-sensitive receptors to quantify the number of hours over the 5 $OU/m^3$ guideline value. Based on the contour plots, areas of higher odor concentration were identified, and three sensitive receptors were selected for the frequency analysis. A contour plot of the maximum 10-minute average concentrations (in $OU/m^3$) in the modeling grid is shown in Figure 7-12. As shown in Figure 7-12, the odor concentrations peak near the fenceline and decline further away from the facility.

Cumulative frequency distributions of the modeled impacts were generated and the 95$^{th}$ percentile and 98$^{th}$ percentile odor concentrations were determined. The results of this cumulative frequency analysis are in Table 7-13.

The modeling results indicate that operation of the MRF at the MarBorg Industries facility could occasionally create off-site detectable odors above the 5 $OU/m^3$ guideline at the three identified receptors. For the second and third receptors (N. Milpas Street and Hilton Resort), the annual number of hours of exceedances would not exceed two percent of the time (175 hours) in a year, and the odor impact from the proposed MRF at the MarBorg Industries site on the two receptors would be less than significant. However, for the receptor near the property (Kimball Street), the annual number of hours of exceedances is predicted to exceed two percent (175 hours in a year). Therefore, there is a potential for nuisance odor complaints to occur near the facility at the MarBorg Industries site and odor impacts near the property could be significant. Additionally, because the area in the vicinity of the MarBorg Industries site is more densely populated than the area in the vicinity of the Tajiguas Landfill, more persons may be impacted by odors from the MRF at the MarBorg Industries site under Alternative B than from the MRF at the Tajiguas Landfill under the proposed Project.

## Figure 7-12 Alternative B Odor Impact Contours

**Table 7-13 Selected Receptor Odor Frequency Analysis, Alternative B**

| Single Point Receptor | Maximum $OU/m^3$ 10 min avg. | 98% $OU/m^3$ 10 min avg. | 95% $OU/m^3$ 10 min avg. | Hours Over the 10-minute Guideline |
|---|---|---|---|---|
| 707 Kimball Street (north, near property) | 22.1 | 11.9 | 5.5 | **499** |
| 106 N. Milpas Street (north, further away) | 17.0 | 0.3 | 0.0 | 37 |
| Hilton Resort (Southeast) | 40.1 | 0.35 | 0.0 | 45 |

Odor impacts for the existing MarBorg Industries C&D facility were qualitatively assessed and determined to be less than significant in the 2006 Initial Study and Negative Declaration prepared for the MarBorg C&D Permit Capacity Increase and the 2007 Air Quality Impact Analysis prepared for the MarBorg C&D Recycling Permit Revised Permit. The addition of the MRF odor sources under Alternative B to the existing odors generated at the MarBorg Industries C&D facility north of U.S. Highway 101 would be expected to increase odor emissions. The following measures to reduce potential odor impacts should be considered for the MRF design at the MarBorg Industries facility if this alternative is selected:

- Keep all waste stored inside and the MRF facility under negative pressure;
- Upgrade the odor treatment system for better odor removal;
- Increase the height of the MRF building exhaust stacks or change the stack locations for better dispersion;
- Design the exhausts for vertical discharge instead of horizontal discharge;
- Develop a protocol for monitoring and recording odor events. Instituting an Odor Impact and Minimization Plan (OIMP), preventative maintenance program and formal odor monitoring/response strategy is currently the best form of mitigation. The proposed measures can be accomplished through Standard Operating Procedures and Operation and Maintenance Manuals which would be included in the OIMP.
- Apply deodorants in response to potential odor complaints; and
- Consider installation of physical barriers around the facility, such as berms and vegetation to minimize odor migration.

Cumulative Odor Impacts

The cumulative projects may contribute to cumulative odor impacts. The cumulative projects are residential and commercial. Odors may be generated by equipment exhaust during construction of these projects, but the impacts would be temporary and are not anticipated to be significant. Although operation of Alternative B could potentially cause significant adverse odor impacts, the emissions from vehicle trips generated by the potential cumulative projects would not be expected to cause significant odor impacts. Therefore, the potentially significant odor impact from the operation of Alternative B would not be expected to be worsened due to odors from the cumulative projects, and could potentially be mitigated to insignificance if the above measures are employed.

### 7.3.3 Alternative C: South Coast Recycling and Transfer Station MRF

#### 7.3.3.1 Criteria Pollutants

Emission Estimates

Construction emissions for the proposed Project would not exceed the thresholds in SBCAPCD Rule 202 D.16 that would require offsets and a demonstration that no ambient air quality standard would be violated. Most construction activities for the MRF at the SCRTS would be similar to those for the proposed Project MRF at the Tajiguas Landfill. However, construction of the MRF at the SCRTS would also require demolition of all existing facilities, excluding the Maintenance Shop, including removal of existing asphalt and concrete paving and parking lots, masonry walls, buildings, office trailers and associated materials and solid waste. Approximately 13,200 cubic yards of cut and 7,500 cubic yards of fill (with approximately 5,700 cubic yards of net soil export), would be required over an approximate 6.2 acre area to produce level pads for the MRF building, parking lots and other facilities. As a result, construction emissions for Alternative C are anticipated to be higher than for the proposed Project.

Emissions during operation of the proposed Project would not exceed applicable significance thresholds. Table 7-14 and Table 7-15 show maximum daily criteria pollutant emissions generated during operation of Alternative C. Table 7-14 includes emissions from all sources – on-site equipment, on-site vehicles, and off-site vehicles and compares the emissions to the daily triggers for offsets in the SBCAPCD New Source Review Rule (55 pounds per day for $NO_x$ or ROC; 80 pounds per day for PM10). Table 7-15 shows emissions from on-site and off-site vehicles only and compares emissions to Santa Barbara County's threshold of 25 pounds per day of $NO_x$ or ROC for motor vehicle trips only.

The negative emissions from off-site vehicles shown in Table 7-14 are caused by the reduction in travel distance for collection vehicles to transport MSW to the SCRTS instead of the Tajiguas Landfill. As shown in Table 7-14, the maximum daily emissions of ROC, $NO_x$ and PM10 from all sources are below the thresholds. Impacts from Alternative C's operation would be less than significant.

As shown in Table 7-15, the maximum daily emissions from vehicles only would not exceed the thresholds established by Santa Barbara County. Therefore, the vehicle emissions from operation of Alternative C would not result in a significant impact.

Table 7-16 shows a comparison of maximum daily criteria pollutant emissions associated with operation of the MRF under Alternative C and operation of the MRF under the proposed Project with the optional CSSR element. Table 7-16 also shows the differences in maximum daily emissions between Alternative C and the proposed Project. As shown in Table 7-16, maximum daily emissions of all criteria pollutants associated with operation of the MRF except CO are lower under Alternative C than under the proposed Project.

**Table 7-14 Maximum Daily Operation Emissions– All Sources, Alternative C**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | **ROC** | **$NO_x$** | **CO** | **$SO_x$** | **PM10** | **PM2.5** |
| **Operations at SCRTS Site** | | | | | | |
| On-Site Equipment and Vehicles | 2.15 | 14.77 | 43.69 | 0.08 | 0.01 | 0.01 |
| Off-Site Vehicles | 4.49 | -60.74 | 30.54 | <0.005 | 3.29 | 0.85 |
| Total Emissions at MRF | 6.64 | -45.97 | 74.23 | 0.08 | 3.30 | 0.86 |
| **Operations at Tajiguas Landfill** | | | | | | |
| On-Site Equipment and Vehicles | 41.80 | 30.00 | 108.01 | 26.93 | 32.46 | 22.32 |
| Off-Site Vehicles | 0.56 | 2.14 | 2.67 | 0.01 | 0.62 | 0.20 |
| Total Emissions at Landfill | 42.36 | 32.14 | 110.68 | 26.94 | 33.08 | 22.52 |
| | | | | | | |
| **Total Emissions** | **49.00** | **-13.83** | **184.91** | **5.61** | **36.38** | **23.38** |
| Santa Barbara County CEQA Threshold[1] | 55 | 55 | -- | -- | 80 | -- |
| Significant Impact (Yes/No) | No | No | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008). These thresholds are based on SBCAPCD's New Source Review Rule.

**Table 7-15 Maximum Daily Operation Emissions – Vehicle Emissions Only, Alternative C**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | ROC | $NO_x$ | CO | $SO_x$ | PM10 | PM2.5 |
| On-Site Vehicles | 0.01 | 0.04 | 0.03 | <0.005 | 7.71 | 0.77 |
| Off-Site Vehicles | 5.05 | -58.60 | 33.21 | 0.01 | 3.91 | 1.05 |
| Total Emissions | 5.06 | -58.56 | 33.24 | 0.01 | 11.62 | 1.82 |
| Santa Barbara County CEQA Threshold[1] | 25 | 25 | -- | -- | -- | -- |
| Significant Impact (Yes/No) | No | No | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008).

**Table 7-16 Maximum Daily MRF Operation Emissions under Alternative C and the Proposed Project**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | ROC | $NO_x$ | CO | $SO_x$ | PM10 | PM2.5 |
| **Alternative C** | | | | | | |
| On-Site Equipment and Vehicles | 2.15 | 14.77 | 43.69 | 0.08 | 0.01 | 0.01 |
| Off-Site Vehicles | 4.49 | -60.74 | 30.54 | <0.005 | 3.29 | 0.85 |
| Total Emissions | 6.64 | -45.97 | 74.23 | 0.08 | 3.30 | 0.86 |
| **Proposed Project** | | | | | | |
| On-Site Equipment and Vehicles | 2.17 | 14.77 | 43.69 | 0.08 | <0.005 | <0.005 |
| Off-Site Vehicles | 5.17 | 2.84 | 28.03 | 0.08 | 4.83 | 1.42 |
| Total Emissions | 7.34 | 17.61 | 71.72 | 0.16 | 4.83 | 1.42 |
| **Differences (Alternative C – Proposed Project)** | **-0.70** | **-28.36** | **2.51** | **-0.08** | **-1.53** | **-0.56** |

Air Dispersion Modeling

As discussed in section 6.1.2, air quality impacts of the proposed Project are not expected to exceed any applicable NAAQS or CAAQS even when the regional ambient background concentrations are considered.

ISCST3 was applied with one year of meteorological data to determine maximum impacts in order to evaluate compliance with the NAAQS and CAAQS for Alternative C. All modeling files are provided in Attachment D, the electronic modeling archive.

*NAAQS Modeling Results*

The results of the NAAQS analysis for Alternative C are shown in Table 7-17. The modeled concentrations shown are the "design value" concentration based on the form of the standard:

- For all annual modeling periods, the NAAQS Concentration is the highest modeled annual average impact.
- For 1-hour $NO_2$ and $SO_2$, the NAAQS Concentration is the highest 98$^{th}$ and 99$^{th}$ percentile modeled impact, respectively. This is a conservative value relative to the forms of those standards, which are the 3-year average of the 98$^{th}$ (or 99$^{th}$) percentile daily maximum impact. As SBCAPCD only provided one year of meteorological data and because the ISCST3 model is incapable of producing results in the true form of the standard, the maximum 98$^{th}$ and 99$^{th}$ percentages are reported.
- For 24-hour PM2.5, the form of the standard is the 3-year average of the 98$^{th}$ percentile impact. However, the analysis uses the EPA recommended guidance[14] of adding the 3-year average of the highest modeled concentration at each receptor to the 98$^{th}$ percentile background.
- For all other standards, the form of the standard is "not to be exceeded more than once per year;" therefore, the high-2$^{nd}$-high impact is reported.

As shown in the table, the modeled impacts from SCRTS sources, when combined with the appropriate ambient background, are below the NAAQS in all cases. Therefore compliance with all NAAQS is demonstrated.

[14]http://www.epa.gov/ttn/scram/guidance/clarification/Official%20Signed%20Modeling%20Proc%20for%20Demo%20Compli%20w%20PM2.5.pdf

**Table 7-17 SCRTS ISCST3 NAAQS Modeling Results (μg/m³)**

| Pollutant | Averaging Period | NAAQS Conc. | Ambient Background | Total Conc. | NAAQS | Percent of NAAQS |
|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | 0.6[2] | 7.0 | 7.6 | 0.6 | 3.9% |
| | 3-hour | 0.3 | 7.9 | 8.2 | 0.3 | 0.6% |
| | 24-hour | 0.1 | 5.2 | 5.3 | 0.1 | 1.5% |
| | Annual | 0.01 | 2.6 | 2.6 | 0.01 | 3.3% |
| CO | 1-hour | 397 | 2,299 | 2,696 | 40,000 | 6.7% |
| | 8-hour | 94 | 690 | 784 | 10,000 | 7.8% |
| $NO_2$[1] | 1-hour | 111.6[3] | 59.6 | 171.2 | 188 | 91.0% |
| | Annual | 3.1 | 12.1 | 15.2 | 100 | 15.2% |
| PM10 | 24-hour | 0.2 | 70.0 | 70.2 | 150 | 46.8% |
| PM2.5 | 24-hour | 0.2 | 16.0 | 16.2 | 35 | 46.2% |
| | Annual | 0.02 | 9.0 | 9.0 | 12 | 75.2% |

[1] 1-hour $NO_2$ impacts multiplied by 0.8 and annual $NO_2$ impacts multiplied by 0.75 to represent Tier 2 $NO_x/NO_2$ conversion.

[2] 99th percentile modeled concentration. Proper form of standard is 3-year average of the 99th percentile of the daily maxima.

[3] 98th percentile modeled concentration. Proper form of standard is 3-year average of the 98th percentile of the daily maxima.

*CAAQS Modeling Results*

The results of the CAAQS analysis are shown in Table 7-18. For the CAAQS analysis, the representative ambient background was added to all modeled impacts and compared to the CAAQS. In all cases, the form of the CAAQS is "not to be exceeded", so the maximum modeled concentrations are reported. As seen in Table 7-18, all impacts are below the CAAQS except for 24-hour PM10. However, the modeled impact is 0.2 μg/m³, which is only about 0.4 percent of the CAAQS of 50 μg/m³, but the background 24-hour PM10 concentration of 70 μg/m³ alone exceeds the CAAQS. Since the modeled impact is only about 0.4 percent of the CAAQS, operation of Alternative C is not considered to cause significant localized 24-hour PM10 impacts. As shown in Table 6-7, the modeled 24-hour PM10 concentration for the proposed Project is 8.2 μg/m³, which is higher than the modeled impact for Alternative C, but the background 24-hour PM10 concentration used for the proposed Project at the Tajiguas Landfill is 34 μg/m³, which is below the CAAQS.

**Table 7-18 SCRTS ISCST3 CAAQS Modeling Results (µg/m$^3$)**

| Pollutant | Averaging Period | Maximum Conc. | Ambient Background | Total Conc. | CAAQS | Percent of CAAQS |
|---|---|---|---|---|---|---|
| $SO_2$ | 1-hour | 0.7 | 13.1 | 13.8 | 655 | 2.1% |
| | 24-hour | 0.1 | 5.2 | 5.3 | 105 | 5.0% |
| CO | 1-hour | 434 | 2,299 | 2,733 | 23,000 | 11.9% |
| | 8-hour | 111 | 690 | 801 | 10,000 | 8.0% |
| $NO_2$ | 1-hour | 121.1 | 97.8 | 218.9 | 339 | 64.6% |
| | Annual | 3.1 | 12.1 | 15.2 | 57 | 26.7% |
| PM10 | 24-hour | 0.2 | 70.0 | 70.2 | 50 | 140.4% |
| | Annual | 0.02 | 18.4 | 18.4 | 20 | 92.1% |
| PM2.5 | Annual | 0.02 | 9.0 | 9.0 | 12 | 75.2% |

[1] All short term results are highest modeled value. Annual results are highest annual average.

As seen in Table 7-17 and Table 7-18, all modeled impacts for Alternative C are below their respective standards, except PM10 24-hour as explained above. Therefore, operation of Alternative C would not cause significant localized impacts.

Cumulative Criteria Pollutant Impacts

RRWMD provided AECOM with a list of 25 projects within approximately 2.5 miles of the SCRTS that are under review, have been approved or are under construction. Essentially all of the listed projects are commercial, residential or institutional. The majority of these projects would generate short-term construction emissions similar to that generated during construction of Alternative C and generate long-term vehicle trips and associated emissions.

As discussed in the County's *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008), for projects that do not have significant ozone precursor emissions or localized pollutant impacts, emissions have been taken into account in the AQAP growth projections and therefore, cumulative impacts may be considered to be insignificant. Since ozone precursor ROC and $NO_x$ emissions during operation of Alternative C do not exceed the thresholds, and operation of Alternative C would not cause significant localized impacts, operation of Alternative C would not contribute to cumulative air quality impacts.

#### 7.3.3.2 Health Risk Assessment

The HRA provides results for the Acute HI PMI, MEIR and MEIW for the sources at SCRTS proposed under this Alternative, as well as the existing sources that would continue operations at this location. As discussed in Section 6.2.1, operation of the proposed Project would not result in significant cancer or non-cancer health risks from TACs. Under Alternative C, health risks from operations at the Tajiguas Landfill would be reduced from the proposed Project because TAC emissions generated by operation of the MRF at the Landfill would not occur.

For Alternative C, the Acute HI PMI receptor was identified based on the location of the maximum off-site risks. The County jail (southwest of the SCRTS) was considered to represent the nearest residence (MEIR) since overnight stays occur, and the MEIW was based on a receptor closest to nearby County maintenance shops (see Figure 7-13).

A summary of cancer risk and non-cancer health impacts for the proposed sources at SCRTS at the Acute HI PMI, MEIR and MEIW are presented in Table 7-19. Cancer risks at the MEIR and MEIW were determined to be 0.42 in-one-million. Non-cancer chronic health impacts at the MEIR and MEIW were all determined to be a HI of less than 0.01. The Acute HI PMI was modeled to be 0.27.

Table 7-20 provides a summary of cancer risk and non-cancer health impacts, for proposed as well as existing sources that would continue operating at SCRTS, at the Acute HI PMI, MEIR and MEIW. Cancer risks at the MEIR and MEIW were determined to be 2.03 in-one-million and 1.35 in-one-million. Non-cancer chronic health impacts at the MEIR and MEIW were all determined to be a HI of less than 0.01. The Acute HI PMI was modeled to be 0.41.

**Table 7-19 Summary of Maximum Project-only Health Risk Impacts at Acute HI PMI, MEIR and MEIW for Alternative C**

| Receptor Type | | Maximum Cancer Risk (per million) | Maximum Acute Hazard Index | Maximum Chronic Hazard Index |
|---|---|---|---|---|
| PMI[1] | Adult | N/R | 0.27 | N/R |
| MEIR[2] | Adult | 0.42 | 0.01 | < 0.01 |
| | Child | 0.11 | N/A | N/A |
| MEIW[3] | | 0.42 | 0.02 | < 0.01 |

[1] PMI: Point of maximum impact at any off-site location.

[2] MEIR: Maximum exposed individual at an existing residential receptor; 70-year adult exposure scenario and 9-year child exposure scenario for cancer risk

[3] MEIW: Maximum exposed individual at an existing occupational worker receptor; 40-year adult worker exposure scenario

N/R – PMI for long term effects not reported. N/A – Child HI impacts are Not Applicable.

**Table 7-20 Summary of Maximum Facility-Wide Health Risk Impacts at Acute HI PMI, MEIR and MEIW for Alternative C**

| Receptor Type | | Maximum Cancer Risk (per million) | Maximum Acute Hazard Index | Maximum Chronic Hazard Index |
|---|---|---|---|---|
| PMI[1] | Adult | N/R | 0.41 | N/R |
| MEIR[2] | Adult | 2.03 | 0.04 | < 0.01 |
| | Child | 0.39 | N/A | N/A |
| MEIW[3] | | 1.35 | 0.05 | < 0.01 |
| Significance Threshold | | 10 | 1 | 1 |
| Exceed Threshold (Yes/No)? | | No | No | No |

[1] PMI: Point of maximum impact at any off-site location

[2] MEIR: Maximum exposed individual at an existing residential receptor; 70-year adult exposure scenario and 9-year child exposure scenario for cancer risk

[3] MEIW: Maximum exposed individual at an existing occupational worker receptor; 40-year adult worker exposure scenario

N/R – PMI for long term effects not reported. N/A – Child HI impacts are Not Applicable.

As shown in Table 7-19 and Table 7-20, all modeled health risk impacts for Alternative C are below their respective CEQA significance thresholds. Per SBCAPCD guidance (SBCAPCD, 2014b, 2014c), Figure 7-14 provides an isopleth plot to show where cancer risks could be above the significance levels near the fenceline. Since there are no residences or work places within the isopleth, long term (9 to 70 year) exposures are not expected to occur in these areas, and hence this result is not considered to be a significant carcinogenic health risk. This figure is provided for disclosure purposes only and Alternative C is not expected to cause significant adverse health risks.

## Figure 7-13 Locations of the Acute HI PMI, MEIR, and MEIW for Alternative C

**Figure 7-14 70-year Cancer Risk Isopleth Greater than 10.0 in-one-million for Operations by SCRTS Under Alternative C**

### 7.3.3.3 Greenhouse Gases

~~Construction GHG emissions for the proposed Project would not exceed thresholds.~~ As discussed above, while construction activities for the MRF at the SCRTS site would be similar to those for the MRF at the Tajiguas Landfill, construction of the MRF at the SCRTS would also require demolition of all existing facilities, excluding the Maintenance Shop, including removal of existing asphalt and concrete paving and parking lots, masonry walls, buildings, office trailers and associated materials and solid waste. Approximately 13,200 cubic yards of cut and 7,500 cubic yards of fill (with approximately 5,700 cubic yards of net soil export), would be required over an approximate 6.2 acre area to produce level pads for the MRF building, parking lots and other facilities. As a result, construction GHG emissions for Alternative C are anticipated to be slightly higher than for the proposed Project, but still **low enough to keep the amortized project GHG emissions** below the significance threshold **of 1,000 MT $CO_2$e/year.**

~~Operation GHGs for the proposed Project would not exceed thresholds.~~ Alternative C results in similar operation GHG emissions as the proposed Project. The primary differences in GHG emissions between the proposed Project and Alternative C can be attributed to different MRF operations and different travel distances for the transportation of MSW. Table 7-21 below summarizes the GHG emissions for Alternative C.

As shown Table 7-21, the estimated total annual direct GHGs from the new sources under Alternative C would be approximately 2,313 MT $CO_2$e. Therefore, Alternative C would have lower annual direct GHG emissions than the estimated 3,646 MT $CO_2$e that would be generated by the new sources from the proposed Project with the optional CSSR element. ~~As with the proposed Project, GHG emissions from new sources under Alternative C would be less than the 10,000 MT $CO_2$e threshold.~~

As seen in the proposed Project analysis in Section 6.3.3, the reduction in GHG emissions from waste diversion and energy generation is orders of magnitude greater than the emissions from new sources. The same waste diversion and energy generation from the Project would occur under Alternative C, which, over time, would result in an overall reduction in GHG emissions from the Landfill of a similar magnitude to that of the proposed Project. Therefore, as with the proposed Project, Alternative C would result in a beneficial GHG impact due to the reduction in landfill-related GHG emissions.

Unlike Table 7-21, which shows total direct GHG emissions, Table 7-22 shows annual direct GHG emissions associated with operation of the MRF under Alternative C and operation of the MRF under the proposed Project. Table 7-22 also shows the differences in emissions between Alternative C and the proposed Project. As shown in Table 7-22, annual direct GHG emissions associated with operation of the MRF are lower under Alternative C than under the proposed Project.

**Table 7-21  Greenhouse Gas Annual Emissions Summary, Alternative C**

| Source | Emissions (MT/year)[1] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[2] |
| ***On-site*** | | | | |
| **MRF at SCRTS** | | | | |
| MRF Facility Equipment | 1,229 | 0.07 | 0.03 | 1,241 |
| **Total** | **1,229** | **0.07** | **0.03** | **1,241** |
| **Tajiguas Landfill** | | | | |
| CHP Engines Combustion | 8,717 | 0.16 | 0.02 | 9.0 |
| CHP Engines Pass-through $CO_2$ | 5,945 | | | 0.0 |
| Flare Combustion | 936 | 0.06 | 0.01 | 4.7 |
| Flare Pass-through $CO_2$ | 638 | | | 0.0 |
| AD Facility Equipment | 59.5 | <0.005 | <0.005 | 60.0 |
| Composting Equipment Exhaust | 178 | 0.01 | <0.005 | 180 |
| Motor Vehicle Exhaust | 7.6 | <0.005 | <0.005 | 7.9 |
| **Total** | **245** | **0.23** | **0.02** | **262** |
| **On-site Total** | **1,474** | **0.30** | **0.05** | **1,503** |
| ***Off-site*** | | | | |
| **MRF at SCRTS** | | | | |
| Export Motor Vehicle Exhaust | 2,205 | 2.4 | 0.24 | 2,338 |
| Reduction from MSW and CSSR to SCRTS instead of Tajiguas Landfill[3] | -1,729 | -0.01 | -0.06 | -1,747 |
| **Total** | **476** | **2.4** | **0.18** | **591** |
| **At Tajiguas Landfill** | | | | |
| Motor Vehicle Exhaust | 204 | 0.28 | 0.03 | 219 |
| **Total** | 204 | **0.28** | **0.03** | **219** |
| **Off-site Total** | **680** | **2.7** | **0.21** | **810** |
| | | | | |
| **On-site and Off-site Total** | **2,154** | **3.0** | **0.26** | **2,313** |

[1] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[2] $CO_2e$ = $CO_2$-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$ (with biogenic emissions excluded)

[3] The one-way travel distance for delivering MSW and CSSR to the SCRTS is 20 miles less than to Tajiguas Landfill

Underlined amounts represents biogenic emissions excluded from totals

**Table 7-22 Differences in Annual MRF Greenhouse Gas Emissions Between Alternative C and the Proposed Project**

| Scenario | Emissions (MT/year)[1] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[2] |
| Alternative C | 1,535 | 3.06 | 0.25 | 1,686 |
| Proposed Project | 2,977 | 2.97 | 0.29 | 3,139 |
| **Differences (Alternative C – Proposed Project)** | **-1,442** | **0.09** | **-0.04** | **-1,453** |

[1] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[2] $CO_2e$ = $CO_2$-equivalent = $CO_2 + 25 \times CH_4 + 298 \times N_2O$

### 7.3.3.4 Odors

Impact Analysis

As discussed in Section 6.4.3, odor impacts from the proposed Project would be less than significant. Under Alternative C odor emissions would occur from the AD and composting facilities at the Tajiguas Landfill and from the MRF at the SCRTS site. The Tajiguas Landfill and the SCRTS site are separated by more than 25 miles. Based on the odor dispersion for the proposed Project, potential odors generated by proposed Project facilities will completely diminish within 2 to 5 miles from the source. Therefore, potential odor impacts from operations at the Tajiguas Landfill and at the SCRTS site under Alternative C were analyzed separately.

Under Alternative C, the MRF would not be located at the Tajiguas Landfill, but the AD and composting facilities would remain at the Tajiguas Landfill. Therefore, it is expected that odors generated at the Tajiguas Landfill under Alternative C would be lower than the proposed Project because odors emitted from the MRF would not occur at the Tajiguas Landfill. However, as discussed in Section 6.4, the majority of hours exceeding the odor guideline (5 $OU/m^3$) for the proposed Project are a result of odors emitted from the digestate composting windrows. Therefore, there would not be a substantial difference in odors generated at the Tajiguas Landfill under the proposed Project and Alternative C and odor impacts from operation of the AD and compost facilities under Alternative C would be less than significant.

The region surrounding SCRTS is primarily zoned for institutional, governmental and residential uses. There are several residential communities in the vicinity. As with the analysis for the proposed Project, odor modeling was performed for this alternative using a tiered approach, and contour plots were generated to identify the magnitude of odor concentrations. The modeling results showed that odor concentrations would be higher than the 5 $OU/m^3$ guidance value at some locations, and a frequency analysis was conducted at odor-sensitive receptors to quantify the number of hours over the 5 OU/$m^3$ guideline value. Based on the contour plots, areas of higher odor concentration were identified, and two sensitive receptors were selected for the frequency analysis. A contour plot of the maximum 10-minute average concentrations (in OU/$m^3$) in the modeling grid is shown in Figure 7-15. Based on the local geography and stack emission release, higher odor impacts are expected to occur on elevated hills and plateaus such as those to the northwest and to the north-northeast of the site. As shown in Figure 7-15, the odor concentrations peak near the fence line and decline further away from the facility.

Cumulative frequency distributions of the modeled impacts were generated and the 95$^{th}$ percentile and 98$^{th}$ percentile odor concentrations were determined. The results of this cumulative frequency analysis are in Table 7-23.

Because the annual number of hours over the guideline value at both receptors would not exceed two percent (175 hours in a year), the odor impact from the proposed MRF at the SCRTS site would be less than significant.

Based on the existing complaint logs and records, between 2008 and 2012 there have been six odor complaints associated with the existing SCRTS operation. Under Alternative C, commingled recyclables and self-haul waste which are currently a potential source of odors and which are currently tipped and transferred outside would be tipped within the MRF. Green waste would continue to be tipped and transferred outdoors. Because the existing commingled recyclables, self-haul waste and additional MSW would be tipped within the proposed negative pressure building with air filtration through two large biofilters under the Alternative C design, the combination of the MRF activities under Alternative C with the other remaining activities (e.g., green waste collection) at the SCRTS facility would not be expected to substantially increase odors and odors may instead be reduced. Therefore, as with the proposed Project, odor impacts under Alternative C would be less than significant.

Cumulative Odor Impacts

The cumulative projects may contribute to cumulative odor impacts. The potential for detectable odors from Alternative C is significantly reduced after a distance of less than 1 mile. The cumulative projects within a distance of approximately 2 miles from the SCRTS are residential, commercial and institutional. Odors may be generated by equipment exhaust during construction of these projects, but the impacts would be temporary and are not anticipated to be significant. The only cumulative project that may generate odors during operation is a proposed fast food restaurant approximately 1 mile from the SCRTS. However, because of the expected substantial reduction in odors over this distance, significant cumulative odor impacts from operation of the fast food restaurant and construction and operation of Alternative C are not expected to occur. Therefore, cumulative odor impacts are not anticipated to be significant and Alternative C's contribution to cumulative odor impacts would not be considerable.

## Figure 7-15 Alternative C Odor Impact Contours

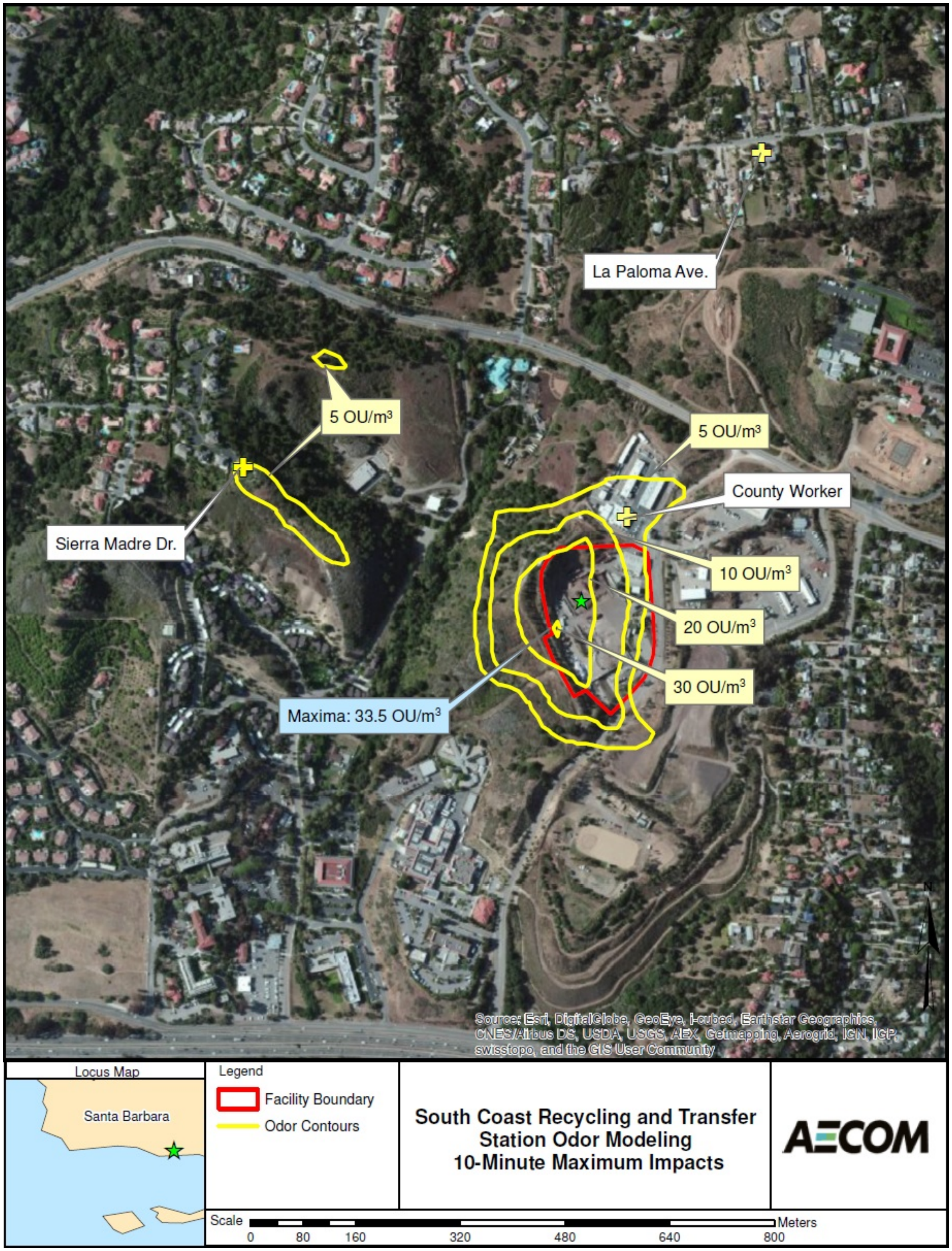


**Table 7-23 Selected Receptor Odor Frequency Analysis, Alternative C**

| Single Point Receptor | Maximum OU/m$^3$ 10 min avg. | 98% OU/m$^3$ 10 min avg. | 95% OU/m$^3$ 10 min avg. | Hours Over the 10-minute Guideline |
|---|---|---|---|---|
| Sierra Madre Drive (West Residential) | 5.4 | 0.9 | 0.1 | 2 |
| La Paloma Avenue (North Residential) | 4.2 | 0.4 | 0.04 | 0 |
| County Worker | 7.9 | 1.5 | 0.1 | 3 |

### 7.3.4 Alternative D: Off-site Aerobic Composting

#### 7.3.4.1 Criteria Pollutants

Emission Estimates

Emissions during operation of the proposed Project would not exceed the thresholds in SBCAPCD Rule 202 D.16 that would require offsets and a demonstration that no ambient air quality standard would be violated. Under Alternative D, the MRF would be constructed at the Tajiguas Landfill, but the AD, Energy and composting facilities would not be constructed. Construction would not be required at the Engel & Gray facility. As a result, construction emissions for Alternative D are anticipated to be lower than for the proposed Project.

Table 7-24 and Table 7-25 show maximum daily criteria pollutant emissions generated during operation of Alternative D without the optional CSSR element. Table 7-24 includes emissions from all sources – on-site equipment, on-site vehicles, on-site composting windrows and off-site vehicles, and compares the emissions to the daily triggers for offsets in the SBCAPCD New Source Review Rule (55 pounds per day for $NO_x$ or ROC; 80 pounds per day for PM10). Table 7-25 shows emissions from on-site and off-site vehicles only without the optional CSSR element and compares emissions to Santa Barbara County's threshold of 25 pounds per day of $NO_x$ or ROC for motor vehicle trips only.

As shown in Table 7-24, the maximum daily emissions of $NO_x$ and PM10 from all sources are below the thresholds, but ROC emissions exceed the threshold. The ROC emissions are primarily from fugitive emissions from the composting windrows. $NO_x$ and PM10 impacts from Alternative D's operation would be less than significant, but ROC emissions would be significant and greater than the proposed Project. As discussed in Section 7.3.2.1, the conditional Negative Declaration and the Addendum for the Engel & Gray facility did not estimate fugitive ROC emissions from the windrows at the facility.

**Table 7-24 Maximum Daily Operation Emissions – All Sources, Alternative D**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | **ROC** | **$NO_x$** | **CO** | **$SO_x$** | **PM10** | **PM2.5** |
| **Operations at Engel & Gray Facility** | | | | | | |
| On-Site Equipment and Vehicles and Compost Windrows | 5,102.74 | 7.59 | NA[2] | NA[2] | NA[2] | NA[2] |
| Off-Site Vehicles | 0.32 | 0.90 | NA[2] | NA[2] | NA[2] | NA[2] |
| Total Emissions at Engel & Gray Facility | 5,103.06 | 8.49 | NA[2] | NA[2] | NA[2] | NA[2] |
| **Operations at Tajiguas Landfill** | | | | | | |
| On-Site Equipment and Vehicles | 2.20 | 14.84 | 43.78 | 0.08 | 7.24 | 0.73 |
| Off-Site Vehicles | 4.78 | 28.62 | 25.36 | 0.12 | 5.44 | 1.77 |
| Total Emissions at Landfill | 6.98 | 43.46 | 69.14 | 0.20 | 12.68 | 2.50 |
| | | | | | | |
| **Total Emissions** | **5,110.04** | **51.95** | **69.14** | **0.20** | **12.68** | **2.50** |
| Santa Barbara County CEQA Threshold[1] | 55 | 55 | -- | -- | 80 | -- |
| Significant Impact (Yes/No) | **Yes** | No | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008). These thresholds are based on SBCAPCD's New Source Review Rule.

[2] NA = Estimate not available

Measures that might be used to reduce ROC emissions from the composting windrows include the GORE Cover Composting System, which has been shown to reduce ROC emissions from biosolids composting windrows by more than 90 percent (Schmidt, Card and Kiehl, 2009), and the use of a "pseudo-biofilter," which is a cover of finished compost over the windrows, which has been shown to reduce ROC emissions from green waste composting windrows by up to 75 percent (CIWMB, 2008). Although these measures may reduce the ROC emissions, the remaining emissions would still exceed the significance threshold.

As shown in Table 7-25, the maximum daily emissions from vehicles only would exceed the threshold established by Santa Barbara County for $NO_X$ emissions. The motor vehicle $NO_x$

emissions are primarily from the diesel-fueled trucks transporting organics from the Landfill to the Engel & Gray facility. Therefore, the vehicle emissions from operation of Alternative D would result in a significant impact from $NO_x$ emissions.

Motor vehicle $NO_x$ emissions could be reduced by using CNG-fueled trucks to transport organics from the Landfill to the Engel & Gray facility. The use of new CNG-fueled trucks would reduce estimated daily motor vehicle $NO_x$ emissions to 8.68 pounds per day, which would be below the significance threshold and less than significant.

**Table 7-25 Maximum Daily Operation Emissions – Vehicle Emissions Only, Alternative D**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | **ROC** | **$NO_x$** | **CO** | **$SO_x$** | **PM10** | **PM2.5** |
| On-Site Vehicles | 0.03 | 0.07 | 0.09 | <0.005 | 7.23 | 0.72 |
| Off-Site Vehicles | 5.09 | 29.52 | 25.36 | 0.12 | 5.44 | 1.77 |
| Total Emissions | 5.12 | 29.59 | 25.45 | 0.12 | 12.67 | 2.49 |
| Santa Barbara County CEQA Threshold[1] | 25 | 25 | -- | -- | -- | -- |
| Significant Impact (Yes/No) | No | **Yes** | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008).

Table 7-26 and Table 7-27 show maximum daily criteria pollutant emissions generated during operation of Alternative D with the optional CSSR element. Table 7-26 includes emissions from all sources – on-site equipment, on-site vehicles, on-site composting windrows and off-site vehicles, and compares the emissions to the daily triggers for offsets in the SBCAPCD New Source Review Rule (55 pounds per day for $NO_x$ or ROC; 80 pounds per day for PM10). Table 7-27 shows emissions from on-site and off-site vehicles only with the optional CSSR element and compares emissions to Santa Barbara County's threshold of 25 pounds per day of $NO_x$ or ROC for motor vehicle trips only.

As shown in Table 7-26, the maximum daily emissions of $NO_x$ and PM10 from all sources are below the thresholds, but ROC emissions exceed the threshold. The ROC emissions are primarily from fugitive emissions from the composting windrows. $NO_x$ and PM10 impacts from Alternative D's operation would be less than significant, but ROC emissions would be significant and greater than the proposed Project. As discussed in Section 7.3.2.1, the conditional Negative Declaration and the Addendum for the Engel & Gray facility did not estimate fugitive ROC emissions from the windrows at the facility.

The same measures that might be used to reduce fugitive ROC emissions from the composting windrows for Alternative D without the optional CSSR element might be used to reduce emissions for Alternative D with the optional CSSR element. However, as with Alternative D without the optional CSSR element, the remaining ROC emissions would still exceed the significance threshold.

**Table 7-26 Maximum Daily Operation Emissions with CSSR – All Sources, Alternative D**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | ROC | $NO_x$ | CO | $SO_x$ | PM10 | PM2.5 |
| **Operations at Engel & Gray Facility** | | | | | | |
| On-Site Equipment and Vehicles and Compost Windrows | 5,102.74 | 7.59 | NA[2] | NA[2] | NA[2] | NA[2] |
| Off-Site Vehicles | 0.32 | 0.90 | NA[2] | NA[2] | NA[2] | NA[2] |
| Total Emissions at Engel & Gray Facility | 5,103.06 | 8.49 | NA[2] | NA[2] | NA[2] | NA[2] |
| **Operations at Tajiguas Landfill** | | | | | | |
| On-Site Equipment and Vehicles | 2.20 | 14.84 | 43.78 | 0.08 | 7.24 | 0.73 |
| Off-Site Vehicles | 5.97 | 29.35 | 32.03 | 0.14 | 6.54 | 2.09 |
| Total Emissions at Landfill | 8.17 | 44.19 | 75.81 | 0.22 | 13.78 | 282 |
| | | | | | | |
| **Total Emissions** | **5,111.23** | **52.68** | **75.81** | **0.22** | **13.78** | **2.82** |
| Santa Barbara County CEQA Threshold[1] | 55 | 55 | -- | -- | 80 | -- |
| Significant Impact (Yes/No) | **Yes** | No | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008). These thresholds are based on SBCAPCD's New Source Review Rule.

[2] NA = Estimate not available

**Table 7-27 Maximum Daily Operation Emissions with CSSR – Vehicle Emissions Only, Alternative D**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | **ROC** | **$NO_x$** | **CO** | **$SO_x$** | **PM10** | **PM2.5** |
| On-Site Vehicles | 0.04 | 0.13 | 0.13 | <0.005 | 10.93 | 1.09 |
| Off-Site Vehicles | 6.29 | 30.25 | 32.03 | 0.14 | 6.54 | 2.09 |
| Total Emissions | 6.33 | 30.38 | 32.16 | 0.14 | 17.47 | 3.18 |
| Santa Barbara County CEQA Threshold[1] | 25 | 25 | -- | -- | -- | -- |
| Significant Impact (Yes/No) | No | **Yes** | No | No | No | No |

[1] Thresholds are from the Environmental Thresholds and Guidelines Manual (County of Santa Barbara, 2008).

As shown in Table 7-27, the maximum daily emissions from vehicles only would exceed the threshold for $NO_x$ emissions established by Santa Barbara County. The motor vehicle $NO_x$ emissions are primarily from the diesel-fueled trucks transporting organics from the Landfill to the Engel & Gray facility. Therefore, the vehicle emissions from operation of Alternative D would result in a significant impact from $NO_x$ emissions.

Motor vehicle $NO_x$ emissions could be reduced by using CNG-fueled trucks to transport organics from the Landfill to the Engel & Gray facility. The use of new CNG-fueled trucks would reduce estimated daily motor vehicle $NO_x$ emissions to 9.41 pounds per day, which would be below the significance threshold and less than significant.

Ambient Air Quality Impacts

As discussed in section 6.1.2, air quality impacts of the proposed Project (MRF, AD and composting facilities at the Tajiguas Landfill) are not expected to exceed any applicable NAAQS or CAAQS even when the regional ambient background concentrations are considered. Given that operation of the entire proposed Project would not exceed applicable standards, operation of only the MRF at the Tajiguas Landfill would also not exceed applicable NAAQS or CAAQS. According to the Addendum, dated July 3, 2008, to the Initial Study and Conditional Negative Declaration (E-94-56), adopted June 21, 1995, that was prepared for the Engel & Gray Composting Facility project, air quality impacts associated with operation of the permitted facility were determined to be less than significant with incorporation of mitigation measures. However, the 2008 Addendum indicated that the air quality impacts were evaluated with the URBEMIS 2007 emissions tool and there was no indication that dispersion modeling was conducted; therefore, it is unknown whether operation of the Engel & Gray facility would exceed applicable NAAQS or CAAQS. However, it is anticipated that operation of Alternative D would not result in exceedances of the NAAQS or CQQAS. Although the dispersion modeling results for the proposed Project indicated that no significant impacts would occur, the property footprint of the Engel & Gray facility is smaller than the property footprint of the proposed Project, which could result in greater impacts than the proposed Project at or near the property boundary.

<u>Cumulative Criteria Pollutant Impacts</u>

The proposed Atlas Copco – Mafi Trench Project is an industrial project that would be located approximately 1 mile southeast of the Engel & Gray facility. The City of Santa Maria (2013) has prepared a Subsequent Environmental Impact Report for the project. The project would be a 260,000 square foot facility on a vacant 20-acre site for manufacturing, testing and engineering hydrocarbon expander-compressors used in natural gas refineries, and turbines and cryogenic pumps used in applications across the Liquefied Natural Gas (LNG) industry. The air quality analysis in the Subsequent EIR concluded that the project would have less than significant criteria pollutant air quality impacts.

As shown in Table 7-24 and Table 7-26, ROC emissions during operation of Alternative D would exceed the significance threshold. As discussed in the County's *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008), if a project's total emissions of the ozone precursors, $NO_x$ or ROC, exceed the long-term threshold, then the project's cumulative impacts will be considered significant. Since ozone precursor ROC emissions during operation of Alternative D exceed the threshold, operation of Alternative D would contribute to significant cumulative impacts from ROC emissions.

### 7.3.4.2 Health Risk assessment

As discussed in Section 6.2.1, operation of the proposed Project would not result in impacts related to cancer or non-cancer health risks from TACs. Under Alternative D, health impacts from operation of the MRF at the Tajiguas Landfill would not be significant. However, health impacts from operation of the Engel & Gray facility are unknown because the Initial Study/Conditional Negative Declaration (1995) and the Addendum (2008) did not analyze health impacts related to TACs. It is anticipated that health risks from operation of the facility would be less than significant, like the proposed Project. However, the property footprint under this alternative is smaller than that of the proposed Project, which may result in significant impacts at or near the property boundary that may increase worker cancer risk in nearby agricultural fields.

### 7.3.4.3 Greenhouse Gases

As discussed in Section 6.3.1, construction and operation **<u>amortized</u>** GHG emissions for the proposed Project would not exceed thresholds, and waste diversion and energy generation would reduce landfill GHG emissions compared to operation of the permitted Landfill. As with the proposed Project, Alternative D would divert organic waste from the Tajiguas Landfill, resulting in the same reduction in landfill GHG emissions as the proposed Project. Unlike the proposed Project, Alternative D would not include energy generation from diverted waste. Therefore, the approximately 2,378 MT $CO_2e$ that would be offset annually (from 2017 to 2036) by energy generation from the proposed Project's AD facility would not be realized under this alternative.

The proposed Project includes processing of organic waste recovered from the MRF in the AD facility adjacent to the MRF. However, under Alternative D, organic waste recovered from MSW at the MRF (to be located at the Tajiguas Landfill) would be transported to the Engel & Gray facility for aerobic composting. Therefore, GHG emissions associated with transportation of organic waste would be higher under Alternative D than the proposed Project. The estimated GHG emissions from Alternative D without and with the optional CSSR element are presented in Table 7-28 and Table 7-29, respectively.

#### 7.3.4.4 Odors

Impact Analysis

As discussed in Section 6.4.3, odor impacts from the proposed Project would be less than significant. Under Alternative D odor emissions would occur from the MRF at the Tajiguas Landfill and from the composting facility at the Engel & Gray facility. The Tajiguas Landfill and the Engel & Gray facility are separated by more than 35 miles. Based on the odor dispersion for the proposed Project, potential odors generated by proposed Project facilities will completely diminish within 2 to 5 miles from the source. Therefore, potential odor impacts from operations at the Tajiguas Landfill and at the Engel & Gray facility under Alternative D were analyzed separately.

The majority of hours exceeding the odor guideline (5 $OU/m^3$) for the proposed Project originate from the composting windrows. The remaining hours of exceedances from the MRF odor sources are less than 32 hours per year, or less than one percent of the hours in a year. As such, it is expected that impacts related to odors generated from the MRF at the Tajiguas Landfill under Alternative D would be lower than odor impacts from the proposed Project.

The Engel & Gray facility is surrounded by agricultural uses on the north, south and west; the Santa Maria Wastewater Treatment Facility is located immediately to the east of the Engel & Gray facility. For the open air aerobic composting windrows at the Engel & Gray facility, the overall bulk odorous emissions from composting are likely higher than the composting emissions from the proposed Project due to the following:

- Open air aerobic compositing will use separated organics which have a higher odor potential than digestate from the AD facility, which would be used for the proposed Project;

- The aerobic composting windrows at the Engel & Gray will require more space and have more surface area for odor emissions than the digestate that would be used for the proposed Project;
- The odorous off gases from the proposed Project's anaerobic digestion process would be collected and combusted, which destroys the odor at a high efficiency; and

The anaerobic digestion process of the proposed Project is housed in a building, and fugitive odor emissions in the building are treated by a biofilter.

**Table 7-28 Greenhouse Gas Annual Emissions Summary, Alternative D**

| Source | Emissions (MT/year)[1] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[2] |
| ***On-site*** | | | | |
| **Engel & Gray Facility** | | | | |
| On-site Equipment | NA[3] | NA[3] | NA[3] | NA[3] |
| **Total** | **NA[3]** | **NA[3]** | **NA[3]** | **NA[3]** |
| **Tajiguas Landfill** | | | | |
| MRF Facility Equipment | 1,229 | 0.07 | 0.03 | 1,241 |
| Motor Vehicle Exhaust | 15.7 | 0.02 | <0.005 | 15.9 |
| **Total** | **1,245** | **0.09** | **0.03** | **1,257** |
| **On-site Total** | **1,245** | **0.09** | **0.03** | **1,257** |
| ***Off-site*** | | | | |
| **Engel & Gray Facility** | | | | |
| Motor Vehicle Exhaust | NA[3] | NA[3] | NA[3] | NA[3] |
| **Total** | **NA[3]** | **NA[3]** | **NA[3]** | **NA[3]** |
| **Tajiguas Landfill** | | | | |
| Motor Vehicle Exhaust | 2,148 | 2.10 | 0.22 | 2,266 |
| **Total** | **2,148** | **2.10** | **0.22** | **2,266** |
| **Off-site Total** | **2,148** | **2.10** | **0.22** | **2,266** |
| | | | | |
| **On-site and Off-site Total** | **3,393** | **2.2** | **0.25** | **3,523** |

[1] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT
[2] $CO_2e$ = $CO_2$-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$
[3] NA = Estimate is not available

**Table 7-29 Greenhouse Gas Annual Emissions Summary with CSSR, Alternative D**

| Source | Emissions (MT/year)[1] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[2] |
| ***On-site*** | | | | |
| **Engel & Gray Facility** | | | | |
| On-site Equipment | NA[3] | NA[3] | NA[3] | NA[3] |
| **Total** | **NA[3]** | **NA[3]** | **NA[3]** | **NA[3]** |
| **Tajiguas Landfill** | | | | |
| MRF Facility Equipment | 1,229 | 0.07 | 0.03 | 1,241 |
| Motor Vehicle Exhaust | 28.1 | 0.02 | <0.005 | 5.6 |
| **Total** | **1,257** | **0.09** | **0.03** | **1,247** |
| **On-site Total** | **1,257** | **0.09** | **0.03** | **1,247** |
| ***Off-site*** | | | | |
| **Engel & Gray Facility** | | | | |
| Motor Vehicle Exhaust | NA[3] | NA[3] | NA[3] | NA[3] |
| **Total** | **NA[3]** | **NA[3]** | **NA[3]** | **NA[3]** |
| **Tajiguas Landfill** | | | | |
| Motor Vehicle Exhaust | 2,563 | 2.76 | 0.28 | 2,716 |
| **Total** | **2,563** | **2.76** | **0.28** | **2,716** |
| **Off-site Total** | **2,563** | **2.76** | **0.28** | **2,716** |
| | | | | |
| **On-site and Off-site Total** | **3,820** | **2.8** | **0.31** | **3,963** |

[1] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT
[2] $CO_2e$ = $CO_2$-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$
[3] NA = Estimate is not available

The Engel & Gray facility currently processes approximately 50,000 tons/year of organic materials and employs process and nuisance controls to reduce odorous emissions. The facility is permitted to process up to 200,000 tons of organic waste per year. Odor impacts for the facility were determined to be less than significant with mitigation in the Initial Study/ Conditional Negative Declaration (1995) and Addendum (2008) that were prepared for the facility. Alternative D will ship up to an additional 73,600 tons/year of organic material to the Engel & Gray facility for composting, which would be within the facility's permitted capacity of 200,000 tons/year but more than the facility currently processes. The existing facility is located next to the City of Santa Maria's wastewater treatment plant, in an agricultural area with few sensitive receptors, and is already implementing odor nuisance mitigation; the additional organic material processed at the Engel & Gray facility under Alternative D may increase odors over existing levels but would not be expected to significantly increase odor impacts. Although composting odors from the aerobic composting of the organics recovered from the MSW at the Engel & Gray facility would likely be higher than composting odors from the anaerobic digestion of the MSW organic waste and aerobic composting of the digestate at Tajiguas Landfill under the proposed Project, as with the proposed Project, odor impacts would be less than significant under Alternative D.

Cumulative Odor Impacts

The air quality analysis in the Subsequent EIR for the proposed Atlas Copco – Mafi Trench Project (City of Santa Maria, 2013) concluded that the project would not handle odorous substances and would have less than significant odor impacts. Since operation of Alternative D would not have significant odor impacts, and the proposed Atlas Copco – Mafi Trench Project, which is located approximately 1 mile from the Engel & Gray facility, would also not cause significant odor impacts, Alternative D would not contribute to significant cumulative odor impacts.

### 7.3.5 Alternative E: Tajiguas Landfill Expansion

Under Alternative E, disposal of MSW at the existing, permitted Tajiguas Landfill would continue until the disposal capacity is reached in approximately 2026. Therefore, air quality impacts from this alternative would be similar to impacts that currently occur from operation of the Tajiguas Landfill until approximately 2026. After the disposal capacity is reached in approximately 2026, the Landfill would be expanded to extend its life by at least 10 years from the currently projected closure in approximately 2026 to approximately 2036.

#### 7.3.5.1 Criteria Pollutants

Emission Estimates

Under Alternative E, none of the operation emissions from the proposed Project would occur.

Expansion of the landfill after its capacity is reached in 2026 would require approximately 300,000 cubic yards of excavation to create the additional capacity and to facilitate the installation of the composite liner. The EIR prepared for the Tajiguas Landfill Expansion Project (01-EIR-05, page 2-41) estimated that 5,368,000 cubic yards of excavation would be required for the Landfill expansion that was previously approved. The EIR that was prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project (08EIR-00000-00007, page 3-4) does not specifically indicate the amount of excavation required for the currently approved, ongoing Landfill expansion. However, it indicated that total earthmoving quantities would be approximately 1,328,000 cubic yards less than required for the previously approved Tajiguas Landfill Expansion Project. Thus, the 300,000 cubic yards of excavation required for the Landfill expansion under Alternative E would be less than required under the Tajiguas Landfill Expansion Project or the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project.

The EIR prepared for the Tajiguas Landfill Expansion Project (01-EIR-05, Section 3.11.3.3, pages 3.11-19 to 3.11-28) and 08EIR-00000-00007 (Section 4.3, pages 4.3-6 and 4.3-7) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project concluded that ozone precursor emissions from operation of the Tajiguas Landfill would exceed significance thresholds and cause significant unavoidable impacts. Although the amount of excavation required under Alternative E would be less than the amount required for the currently approved Landfill expansion and operations, the amount of active equipment and associated emissions on a typical day of operations is not expected to substantially change. Therefore, ozone precursor emissions from operation of the Tajiguas Landfill are expected to continue to exceed significance thresholds and cause significant unavoidable impacts under Alternative E when the Landfill capacity is expanded.

Implementation of the proposed Project is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated emissions and lessen the impacts from ozone precursor emissions. These reductions would not occur under Alternative E, either before the current disposal capacity is reached or after the Landfill expansion would begin in 2026. Thus, emissions under Alternative E may be higher than for the proposed Project.

<u>Ambient Air Quality Impacts</u>

As discussed in section 6.1.2, air quality impacts of the proposed Project are not expected to exceed any applicable NAAQS or CAAQS even when the regional ambient background concentrations are considered. The operation of current sources at the Tajiguas Landfill would continue. 01-EIR-05 (Section 3.11.3.3, pages 3.11-19 to 3.11-28) prepared for the Tajiguas Landfill Expansion Project and 08EIR-00000-00007 (Section 4.3, pages 4.3-6 and 4.3-7) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project concluded that operation of the Tajiguas Landfill would cause exceedances of ambient air quality standards for 1-hour $NO_2$ and 24-hour PM10 and cause significant unavoidable impacts. These exceedances of ambient air quality standards would cause significant unavoidable impacts under Alternative E when the Landfill capacity is expanded.

Implementation of the proposed Project is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated $NO_x$ and PM10 emissions. These reductions would not occur under Alternative E.

Cumulative Criteria Pollutant Impacts

As discussed in the previous sections, ozone precursor emissions from operation of the Tajiguas Landfill would continue to exceed significance thresholds and cause significant unavoidable impacts under Alternative E when the Landfill capacity is expanded. As discussed in the County's *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008), if a project's total emissions of the ozone precursors, $NO_x$ or ROC, exceed the long-term threshold, then the project's cumulative impacts will be considered significant. Since ozone precursor emissions during operation of Alternative E exceed the threshold, operation of Alternative E would contribute considerably to significant cumulative impacts from ozone precursor emissions. Additionally, operation of the Tajiguas Landfill would continue to cause exceedances of ambient air quality standards for 1-hour $NO_2$ and 24-hour PM10 under Alternative E when the Landfill capacity is expanded.

#### 7.3.5.2 Health Risks

As discussed in section 6.2.1, health risks from operation of the proposed Project are not expected to exceed any applicable significance thresholds. Under Alternative E, the operation of current sources at the Tajiguas Landfill would continue. 01-EIR-05 (Section 3.11.3.3, pages 3.11-19 to 3.11-28) prepared for the Tajiguas Landfill Expansion Project and 08EIR-00000-00007 (Section 4.3, page 4.3-7) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project concluded that operation of the Tajiguas Landfill would cause exceedances of the significance threshold for carcinogenic health risks. Implementation of the proposed Project is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated DPM emissions and health risks. These reductions would not occur under Alternative E. Therefore, Alternative E would cause significant unavoidable health risks when the Landfill capacity is expanded.

#### 7.3.5.3 Greenhouse Gases

As discussed in Section 6.3, **amortized** GHG emissions generated by construction and operation of the proposed Project would not exceed significance thresholds, and the proposed Project would result in an overall reduction in GHG emissions due to waste diversion and energy production. Under Alternative E, none of the construction or operation GHG emissions from the proposed Project would occur. Likewise, under Alternative E, none of the waste diversion or energy production would occur, and therefore, no reductions in GHG emissions would be realized.

An analysis of GHGs was prepared as part of the cumulative air quality impact analysis in 08EIR-00000-00007 prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project. The GHG analysis concluded that because the discretionary approvals required for the Tajiguas Landfill Reconfiguration Project did not involve any changes to the landfill's operational parameters (i.e., daily maximum waste, total waste disposal capacity, permitted disposal area, or permitted traffic) and, therefore did not affect the emissions of greenhouse gases and global climate change associated with the permitted landfill, an impact classification was not assigned to the estimated emissions.

Under Alternative E, expansion of the Landfill to accept waste until 2036 would result in an increase of GHG emissions generated at the Tajiguas Landfill compared to the Landfill analyzed in the previous EIR that is permitted to accept waste until 2026. However, a similar quantity of GHG emissions would be generated if the Tajiguas Landfill closes in 2026 and the waste is transported to a different landfill. Therefore, the GHG emissions generated by Alternative E would be similar to the estimated GHG emissions presented in the baseline analysis in Section 3.1.4.1, which assumes the Tajiguas Landfill would operate through 2036. Because Alternative E would increase Landfill GHG emissions and the proposed Project would decrease Landfill GHG emissions, impacts related to GHGs would be greater under Alternative E than the proposed Project.

#### 7.3.5.4 Odors

Impact Analysis

The EIR prepared for the Tajiguas Landfill Expansion Project (01-EIR-05, Section 3.6) concluded that odors generated from the Landfill are considered a significant but mitigable nuisance impact. The current facility and related landfilling activities have not generated any complaints that have been reported to the County. Operation of the landfill through 2036 is not expected to increase odors. Occasional complaints from nearby receptors may occur, such as the future residential receptor identified as part of the proposed Project. Therefore, as with the proposed Project, odor-related impacts under Alternative E would be less than significant with mitigation.

Cumulative Odor Impacts

As discussed in the previous section, odor-related impacts under Alternative E would be less than significant. As discussed in Section 6.4.3, potential cumulative projects in the vicinity of the Tajiguas Landfill are not anticipated to case significant odor-related impacts. Therefore, operation of Alternative E would not contribute to significant cumulative odor impacts.

### 7.3.6 Alternative F: Waste Export to the Simi Valley Landfill and Recycling Center

#### 7.3.6.1 Criteria Pollutants

Emission Estimates

Emissions generated by the proposed Project's MRF, AD and composting facilities at the Tajiguas Landfill would not occur under Alternative F. Instead, under Alternative F, air emissions at the Tajiguas Landfill would remain the same as those which were analyzed in the Final EIRs for the Tajiguas Landfill Expansion Project (01-EIR-05) and the Tajiguas Landfill

Reconfiguration and Baron Ranch Restoration Project (08EIR-00000-00007) until the Landfill reaches its capacity in 2026. Alternative F would not result in new significant impacts at the Tajiguas Landfill and would not significantly exacerbate the existing impacts at the Tajiguas Landfill. However, 01-EIR-05 (Section 3.11.3.3, pages 3.11-19 to 3.11-28) prepared for the Tajiguas Landfill Expansion Project and 08EIR-00000-00007 (Section 4.3, pages 4.3-6 and 4.3-7) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project concluded that ozone precursor emissions from operation of the Tajiguas Landfill would exceed significance thresholds and cause significant unavoidable impacts. Implementation of the proposed Project is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated emissions and lessen the impacts from ozone precursor emissions. These reductions would not occur under Alternative F.

As noted in the Final EIR (SCH No. 2007121148, County of Ventura, December 2010) prepared for the SVLRC, emissions from proposed SVLRC project construction and operation would exceed the VCAPCD daily $NO_X$ and ROC emission thresholds and result in a significant air quality impact. It is assumed that the MSW transported to the SVLRC under Alternative F could be accommodated within the capacity of the SVLRC following its expansion. Therefore, transporting MSW to the SVLRC for disposal would not generate additional operation emissions at the SVLRC but would contribute to the significant emissions analyzed and disclosed in the SVLRC EIR.

Motor vehicle emissions from consolidating and transporting waste from the Tajiguas Landfill wasteshed were not specifically analyzed in the SVLRC EIR and are calculated in Table 7-30. Table 7-30 shows maximum daily criteria pollutant emissions from motor vehicles associated with consolidating MSW at the SCRTS and the MarBorg Industries MRF/transfer station and exporting it to the SVLRC under Alternative F and compares emissions to Santa Barbara County's threshold of 25 pounds per day of $NO_x$ or ROC for motor vehicle trips only.

As shown in Table 7-30, the maximum daily emissions from vehicles would not exceed the thresholds established by Santa Barbara County. Therefore, the vehicle emissions from operation of Alternative F would not result in a significant impact, but these emissions would be in addition to the emissions identified in the SVLRC EIR.

**Table 7-30 Maximum Operation Vehicle Emissions, Alternative F**

| Source | Maximum Daily Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | ROC | $NO_x$ | CO | $SO_x$ | PM10 | PM2.5 |
| Off-Site Vehicles | 2.70 | 9.28 | 15.44 | <0.005 | 6.92 | 2.50 |
| Total Emissions | 2.70 | 9.28 | 15.44 | <0.005 | 6.92 | 2.50 |
| Santa Barbara County CEQA Threshold[1] | 25 | 25 | -- | -- | -- | -- |
| Significant Impact (Yes/No) | No | No | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008).

Ambient Air Quality Impacts

As discussed in Section 6.1.2, emissions generated by the proposed Project would not cause the NAAQS or CAAQS to be exceeded, and impacts would be less than significant.

Emissions generated by the proposed Project's MRF, AD and composting facilities at the Tajiguas Landfill would not occur under Alternative F. Instead, under Alternative F, air emissions at the Tajiguas Landfill would remain the same as those which were analyzed in the Final EIR for the Tajiguas Landfill Expansion Project (01-EIR-05) until the Landfill reaches its capacity in 2026. Alternative F would not result in new significant ambient air quality impacts at the Tajiguas Landfill. However, 01-EIR-05 (Section 3.11.3.3, pages 3.11-19 to 3.11-28) prepared for the Tajiguas Landfill Expansion Project and 08EIR-00000-00007 (Section 4.3, pages 4.3-6 and 4.3-7) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project concluded that operation of the Tajiguas Landfill would cause exceedances of ambient air quality standards for 1-hour $NO_2$ and 24-hour PM10 and cause significant unavoidable impacts. Implementation of the proposed Project is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated $NO_x$ and PM10 emissions. These reductions would not occur under Alternative F.

After the Landfill reaches its capacity, MSW would be transported to the SVLRC. Air quality impacts would be expected to increase in the vicinity of the SCRTS, the MarBorg Industries facility and the SVLRC over current conditions as additional collection trucks and equipment would increase the on-site emissions at these facilities. The added volume would not be accommodated within the existing permits; however, the traffic volumes would be less than for the MarBorg and SCRTS MRF Alternatives (Alternatives B and C). The CEQA environmental analyses that were conducted for the existing SCRTS and the MarBorg Industries facilities did not include air quality modeling. Therefore, the potential for exceedances of ambient air quality standards at the SCRTS and MarBorg Industries facilities under Alternative F is unknown. However, it is unlikely that exceedances of air quality standards would occur given the low criteria pollutant emissions from the motor vehicles and the small fraction of those emissions that would occur at a single location. The Final EIR prepared for the SVLRC identified that SVLRC construction and operation would result in off-site ambient air pollutant concentrations that would contribute to or exacerbate exceedances of the following standards: (1) 1-hour CAAQS and NAAQS for $NO_2$; (2) 24-hour CAAQS and NAAQS for PM10; (3) annual CAAQS for PM10; (4) 24-hour NAAQS for PM2.5; and (5) annual CAAQS for PM2.5. MSW from the Tajiguas wasteshed disposed of at the SVLRC under Alternative F would contribute to those identified impacts.

<u>Cumulative Criteria Pollutant Impacts</u>

As discussed in the previous sections, criteria pollutant emissions from motor vehicles under Alternative F would not exceed significance thresholds, and motor vehicle emissions from operation of Alternative F would not cause exceedances of ambient air quality standards. As discussed in the County's *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008), for projects that do not have significant ozone precursor emissions or localized pollutant impacts, emissions have been taken into account in the AQAP growth projections and therefore, cumulative impacts may be considered to be insignificant. Since ozone precursor ROC and $NO_x$ emissions from motor vehicles during operation of Alternative F do not exceed the thresholds, and operation of Alternative F would not cause ambient air quality standards to be exceeded, operation of motor vehicles under Alternative F would not contribute considerably to significant cumulative criteria pollutant impacts.

#### 7.3.6.2 Health Risks

As discussed in section 6.2.1, health risks from operation of the proposed Project are not expected to exceed any applicable significance thresholds. Under Alternative F, the operation of current sources at the Tajiguas Landfill would continue until the Landfill reaches its capacity in 2026. 01-EIR-05 (Section 3.11.3.3, pages 3.11-19 to 3.11-28) prepared for the Tajiguas Landfill Expansion Project and 08EIR-00000-00007 (Section 4.3, page 4.3-7) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project concluded that operation of the Tajiguas Landfill would cause exceedances of the significance threshold for carcinogenic health risks. Implementation of the proposed Project is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated DPM emissions and health risks. These reductions would not occur under Alternative F.

Alternative F may increase impacts to public health in the vicinity of the SCRTS and MarBorg Industries facilities and the SVLRC after the Tajiguas Landfill reaches its capacity, as additional diesel-fueled collection trucks would increase the on-site emissions at these facilities. An HRA was prepared as a part of the Final EIR for the SVLRC and the analysis identified that SVLRC construction and operations would not expose the public to significant levels of TACs. It is noted, however, that SVLRC is located in Ventura County, and for this EIR, a facility-wide HRA was not required and only the net increase in TAC emissions was analyzed for the landfill expansion under Ventura County APCD rules. Thus, associated health risks to the public were identified as less than significant. Compared to the Tajiguas Landfill, there are more residences in close proximity to the MarBorg Industries and SCRTS facilities that could be exposed to on-site DPM emissions. However, increased DPM emissions from the collection trucks in the vicinity of the MarBorg Industries and SCRTS facilities and the SVLRC would be small because the trucks would not spend significant time at the facilities and emission factors for the trucks in 2026, when the waste export would begin, would be substantially lower than emission factors from the current truck fleet. Additionally, emissions from trucks transporting MSW to the SVLRC from the SCRTS and the MarBorg Industries facilities would be spread over distances of 72 miles and 66 miles, respectively, which would not be anticipated to cause significant exposures to DPM emissions at any individual receptor. Therefore, Alternative F is not anticipated to cause significant adverse health risks.

### 7.3.6.3 Greenhouse Gases

As discussed in Section 6.3.1, **amortized** GHG emissions generated by construction and operation of the proposed Project would not exceed annual thresholds, and the proposed Project would result in an overall reduction in GHG emissions due to waste diversion and energy production. Under Alternative F, none of the construction or operation GHG emissions from the proposed Project would occur. Likewise, under Alternative F, none of the waste diversion or energy production would occur, and therefore, no reductions in Landfill GHG emissions would be realized.

Under Alternative F, the Tajiguas Landfill would close in 2026, and the waste would be exported to the SVLRC until 2036. The baseline analysis for the permitted Tajiguas Landfill emissions that is presented in Section 3.1.4.1 shows the emissions of GHGs that would occur if the Tajiguas Landfill accepts waste at the projected rate through 2036. This alternative would result in approximately the same landfill GHG emissions as this baseline because landfill GHG emissions would be approximately the same whether the waste is landfilled at the Tajiguas Landfill or at the SVLRC. In addition to landfill GHG emissions, GHG emissions would be generated by trucks hauling the waste to the SVLRC. The GHG emissions associated with transportation of waste to the SVLRC are summarized in Table 7-31 below.

Alternative F would result in more landfill GHG emissions and more transportation GHG emissions than the proposed Project. The SVLRC Final EIR identified that GHG emissions from proposed operations would result in a significant impact. Impacts related to GHG emissions for Alternative F would be considered less than significant, whereas, impacts related to GHG emissions for the proposed Project would be beneficial due to the overall reduction in GHG emissions that would be realized by the proposed Project. Therefore, GHG impacts under Alternative F are greater than GHG impacts of the proposed Project.

**Table 7-31 Export Vehicle Greenhouse Gas Annual Emissions Summary, Alternative F**

| Source | Emissions (MT/year)[1] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[2] |
| Motor Vehicle Exhaust | 2,026 | 0.02 | 0.07 | 2,048 |
| **Total** | **2,026** | **0.02** | **0.07** | **2,048** |

[1] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[2] $CO_2e$ = $CO_2$-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

### 7.3.6.4 Odors

Impact Analysis

As discussed in Section 6.4.1, odor impacts from the proposed Project would be less than significant. Under Alternative F, none of the odors generated by the MRF or the AD and composting facilities would occur.

Beyond 2026, with the closure of the Tajiguas Landfill, no significant odor sources will remain at the Landfill. The landfill gas collection system will ensure that any odors from off-gas collection are thermally destroyed. As with the proposed Project, odor impacts at the Tajiguas Landfill would be less than significant.

The Final EIR for Expansion of the SVLRC was completed in 2010 and found that odorous impacts during the operation of the facility were less than significant with mitigation under the revised capacity and expansion. Continued use of odor control systems and an Odor Control Plan are required as a mitigation measure. It is assumed that the MSW transported to the SVLRC under Alternative F would not result in significant odor impacts because the MSW could be accommodated within the capacity of the SVLRC. The additional transfer of MSW at the SCRTS and MarBorg facilities may increase odors at these sites.

Cumulative Odor Impacts

The cumulative projects in the vicinity of the MarBorg Industries and the SCRTS facilities are residential, commercial and institutional. Odors may be generated by equipment exhaust during construction of these projects, but the impacts would be temporary and are not anticipated to be significant. Additionally, the Final EIR for Expansion of the SVLRC concluded that operation of the SVLRC would not cause cumulatively considerable odor impacts. Therefore, cumulative odor impacts are not anticipated to be significant, and Alternative F's contribution to cumulative odor impacts would not be considerable.

### 7.3.7 Alternative G: Waste Export to the Santa Maria Integrated Waste Management Facility

#### 7.3.7.1 Criteria Pollutants

Emission Estimates

Emissions generated by the proposed Project's MRF, AD and composting facilities at the Tajiguas Landfill would not occur under Alternative G. Instead, under Alternative G, air emissions at the Tajiguas Landfill would remain the same as those which were analyzed in the Final EIRs for the Tajiguas Landfill Expansion Project (01-EIR-05) and the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project (08EIR-00000-00007) until the Landfill reaches its capacity in 2026. Alternative G would not result in new significant impacts at the Tajiguas Landfill and would not significantly exacerbate the existing impacts at the Tajiguas Landfill. However, 01-EIR-05 (Section 3.11.3.3, pages 3.11-19 to 3.11-28) prepared for the Tajiguas Landfill Expansion Project and 08EIR-00000-00007 (Section 4.3, pages 4.3-6 and 4.3-7) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project concluded that ozone precursor emissions from operation of the Tajiguas Landfill would exceed significance thresholds and cause significant unavoidable impacts. Implementation of the proposed Project is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated emissions and lessen the impacts from ozone precursor emissions. These reductions would not occur under Alternative G.

As noted in the EIR (SCH #2006091069 City of Santa Maria, April 2010) prepared for the Santa Maria IWMF, air contaminant emissions associated with the Santa Maria IWMF operations would result from on-site equipment exhaust, fugitive dust, disposal vehicles and other transportation emissions, and landfill gas generation and flaring. When compared to the SBCAPCD's significance thresholds, the Santa Maria IWMF would exceed the 25 pounds per day significance thresholds for ROC and $NO_X$ from vehicle trips by 26.3 pounds per day and 461.8 pounds per day respectively. The Santa Maria IWMF would also exceed the 240 pounds per day significance threshold for $NO_X$ from all operational sources by 275.8 pounds per day, as well as the 80 pounds per day significance threshold for PM10 from all operational sources by 1,768.5 pounds per day. Therefore, operational emissions associated with the Santa Maria IWMF were identified in the EIR as significant and unavoidable. It is assumed that the MSW transported to the Santa Maria IWMF could be accommodated within the capacity of the Santa Maria IWMF. Therefore, transporting MSW to the Santa Maria IWMF for disposal would not generate additional operation emissions at the Santa Maria IWMF but would contribute to the significant emissions analyzed and disclosed in the Santa Maria IWMF EIR.

Motor vehicle emissions from consolidating and transporting waste from the Tajiguas Landfill wasteshed were not specifically analyzed in the Santa Maria IWMF and are calculated in Table 7-32. Table 7-32 shows maximum daily criteria pollutant emissions from motor vehicles associated with consolidating MSW at the SCRTS and the MarBorg Industries MRF/transfer station and exporting it to the Santa Maria IWMF under Alternative G and compares emissions to Santa Barbara County's threshold of 25 pounds per day of $NO_x$ or ROC for motor vehicle trips only.

As shown in Table 7-32, the maximum daily emissions from vehicles would not exceed the thresholds established by Santa Barbara County. Therefore, the vehicle emissions from operation of Alternative G would not result in a significant impact, but these emissions would be in addition to the emissions identified in the Santa Maria IWMF EIR.

**Table 7-32 Maximum Operation Vehicle Emissions, Alternative G**

| **Source** | **Maximum Daily Emissions (pounds/day)** | | | | | |
|---|---|---|---|---|---|---|
| | **ROC** | **$NO_x$** | **CO** | **$SO_x$** | **PM10** | **PM2.5** |
| Off-Site Vehicles | 2.10 | 3.07 | 12.20 | <0.005 | 5.63 | 2.04 |
| Total Emissions | 2.10 | 3.07 | 12.20 | <0.005 | 5.63 | 2.04 |
| Santa Barbara County CEQA Threshold[1] | 25 | 25 | -- | -- | -- | -- |
| Significant Impact (Yes/No) | No | No | No | No | No | No |

[1] Thresholds are from the *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008).

Ambient Air Quality Impacts

As discussed in Section 6.1.2, emissions generated by the proposed Project would not cause the NAAQS or CAAQS to be exceeded, and impacts would be less than significant.

Emissions generated by the proposed Project's MRF, AD and composting facilities at the Tajiguas Landfill would not occur under Alternative G. Instead, under Alternative G, air emissions at the Tajiguas Landfill would remain the same as those which were analyzed in the Final EIR for the Tajiguas Landfill Expansion Project (01-EIR-05) until the Landfill reaches its capacity in 2026. Alternative G would not result in new significant ambient air quality impacts at the Tajiguas Landfill. However, 01-EIR-05 (Section 3.11.3.3, pages 3.11-19 to 3.11-28) prepared for the Tajiguas Landfill Expansion Project and 08EIR-00000-00007 (Section 4.3, pages 4.3-6 and 4.3-7) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project concluded that operation of the Tajiguas Landfill would cause exceedances of ambient air quality standards for 1-hour $NO_2$ and 24-hour PM10 and cause significant unavoidable impacts. Implementation of the proposed Project is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated $NO_x$ and PM10 emissions. These reductions would not occur under Alternative G.

After the Landfill reaches its capacity and MSW would be transported to the Santa Maria IWMF, air quality impacts would be expected to increase in the vicinity of the SCRTS, the MarBorg Industries facility and the Santa Maria IWMF[15] over current conditions as additional collection trucks and equipment would increase the on-site emissions at these facilities. The added volume would not be accommodated within the existing permits; however, the traffic volumes would be less than for the MarBorg and SCRTS MRF alternatives (Alternatives B and C). The CEQA environmental analyses that were conducted for the SCRTS and the MarBorg Industries facilities did not include air quality modeling. Therefore, the potential for exceedances of ambient air quality standards at the SCRTS and MarBorg Industries facilities under Alternative G is unknown. However, it is unlikely that exceedances of air quality standards would occur given the low criteria pollutant emissions from the motor vehicles and the small fraction of those emissions that would occur at a single location.

Cumulative Criteria Pollutant Impacts

As discussed in the previous sections, criteria pollutant emissions from motor vehicles under Alternative G would not exceed significance thresholds, and operation of motor vehicles under Alternative G would not cause exceedances of ambient air quality standards. As discussed in the County's *Environmental Thresholds and Guidelines Manual* (County of Santa Barbara, 2008), for projects that do not have significant ozone precursor emissions or localized pollutant impacts, emissions have been taken into account in the AQAP growth projections and therefore, cumulative impacts may be considered to be insignificant. Since ozone precursor ROC and $NO_x$ emissions from motor vehicles during operation of Alternative G do not exceed the thresholds, and operation of motor vehicles under Alternative G would not cause ambient air quality standards to be exceeded, operation of motor vehicles under Alternative G would not contribute considerably to significant cumulative criteria pollutant impacts.

[15] No modeling of impacts with respect to the NAAQS and CAAQS was done as a part of the Santa Maria IWMF CEQA air quality analysis and the potential for exceedances at the landfill site are not known.

### 7.3.7.2 Health Risk Assessment

As discussed in Section 6.2.1, health risks from operation of the proposed Project are not expected to exceed any applicable significance thresholds. Under Alternative G, the operation of current sources at the Tajiguas Landfill would continue until the Landfill reaches its capacity in 2026. 01-EIR-05 (Section 3.11.3.3, pages 3.11-19 to 3.11-28) prepared for the Tajiguas Landfill Expansion Project and 08EIR-00000-00007 (Section 4.3, page 4.3-7) prepared for the Tajiguas Landfill Reconfiguration and Baron Ranch Restoration Project concluded that operation of the Tajiguas Landfill would cause exceedances of the significance threshold for carcinogenic health risks. However, risk models, assumptions, and SBCAPCD reporting requirements have been revised since the preparation of that EIR and HRA.

An HRA was conducted for this EIR which included the impacts from the existing Tajiguas Landfill sources (see Section 6.2). Cancer and acute non-cancer impacts results indicate that there would be risk levels over the significance thresholds in limited areas near the fenceline (see Figures 6-1 and 6-2). Since these areas are not reasonably accessible to the public and since long term exposure would not be possible in these areas, these results were not considered to show a significant health risk impact. Furthermore, implementation of the proposed Project is anticipated to result in the recovery and beneficial reuse of 60 percent or more (by weight) of the waste stream by diverting such amount from disposal at the Landfill. This reduction in disposal at the Landfill would reduce activities at the Landfill working face, including operation of off-road equipment, such as scrapers, which would reduce the associated DPM emissions and health risks. These reductions would not occur under Alternative G.

Alternative G may increase impacts to public health in the vicinity of the SCRTS and MarBorg facilities and the Santa Maria IWMF after the Tajiguas Landfill reaches its capacity, as additional diesel-fueled collection trucks would increase the on-site emissions at these facilities. No significant health risks were identified in association with the HRA prepared for the Santa Maria IWMF EIR. Compared to the Tajiguas Landfill, there are more residences in close proximity to the MarBorg Industries and SCRTS facilities that could be exposed to on-site DPM emissions. However, increased DPM emissions from the collection trucks in the vicinity of the MarBorg Industries and SCRTS facilities and the Santa Maria IWMF would be small because the trucks would not spend significant time at the facilities and emission factors for the trucks in 2026, when the waste export would begin, would be substantially lower than emission factors from the current truck fleet. Additionally, emissions from trucks transporting MSW to the Santa Maria IWMF from the SCRTS and the MarBorg Industries facilities would be spread over distances of 59 miles and 65 miles, respectively, which would not be anticipated to cause significant exposures to DPM emissions at any individual receptor. Therefore, Alternative G is not anticipated to cause significant adverse health risks.

### 7.3.7.3 Greenhouse Gases

As discussed in Section 6.3.1, **amortized** GHG emissions generated by construction and operation of the proposed Project would not exceed annual thresholds; and the proposed Project would result in an overall reduction in GHG emissions due to waste diversion and energy production. Under Alternative G, none of the construction or operation GHG emissions from the proposed Project would occur. Likewise, under Alternative G, none of the waste diversion or energy production would occur, and therefore, no reductions in Landfill GHG emissions would be realized.

Under Alternative G, the Tajiguas Landfill would close in 2026, and the waste would be exported to the Santa Maria IWMF until 2036. The baseline analysis for the permitted Tajiguas Landfill emissions that is presented in Section 3.1.4.1 shows the emissions of GHGs that would occur if the Tajiguas Landfill accepts waste at the projected rate through 2036. Alternative G would result in approximately the same landfill GHG emissions as this baseline because landfill GHG emissions would be approximately the same whether the waste is landfilled at the Tajiguas Landfill or at the Santa Maria IWMF. GHG emissions at the Santa Maria IWMF were calculated to be 44,173.9 metric tons $CO_2e$ and identified as a significant and unavoidable impact in the EIR. Emissions from LFG would constitute 82.4 percent of new emissions from the Santa Maria IWMF project. Under Alternative G, MSW from the Tajiguas Landfill wasteshed disposed of at the landfill would contribute to the significant GHG emissions at the Santa Maria IWMF. In addition to landfill GHG emissions, GHG emissions would be generated by trucks hauling the waste to the Santa Maria IWMF. The GHG emissions associated with transportation of waste to the Santa Maria IWMF are summarized in Table 7-33 below.

**Table 7-33 Export Vehicle Greenhouse Gas Annual Emissions Summary, Alternative G**

| Source | Emissions (MT/year)[1] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[2] |
| Motor Vehicle Exhaust | 1,556 | 0.02 | 0.06 | 1,573 |
| **Total** | **1,556** | **0.02** | **0.06** | **1,573** |

[1] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[2] $CO_2e$ = $CO_2$-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

This alternative would result in more landfill GHG emissions and more transportation GHG emissions than the proposed Project. Impacts related to GHG emissions from waste export vehicles for Alternative G would be less than significant. GHG emissions from continued landfilling of the MSW would contribute to the significant impacts identified in the Santa Maria IWMF EIR. Impacts related to GHG emissions for the proposed Project would be beneficial due to the overall reduction in GHG emissions that would be realized by the proposed Project. Therefore, GHG impacts under Alternative G are greater than GHG impacts of the Project

### 7.3.7.4 Odors

Impact Analysis

As discussed in Section 6.4.1, odor impacts from the proposed Project would be less than significant. Under Alternative G, none of the odors generated by the MRF or the AD and composting facilities would occur.

Beyond 2026, with the closure of the Tajiguas Landfill, no significant odor sources will remain. The landfill gas collection system will ensure that any odors from off-gas collection are thermally destroyed. As with the proposed Project, odor impacts at the Tajiguas Landfill would be less than significant.

The Final EIR for the Santa Maria IWMF found that odor impacts during the operation of the facility would be significant but mitigable. An odor abatement plan and monitoring program were required as mitigation. It is assumed that the MSW transported to the Santa Maria IWMF under Alternative G would not result in any additional odor impacts beyond those disclosed in the EIR because the MSW would be accommodated within the capacity of the Santa Maria IWMF. The additional transfer of MSW at the SCRTS and MarBorg facilities may increase odors at these sites.

Cumulative Odor Impacts

The cumulative projects in the vicinity of the MarBorg Industries and the SCRTS facilities are residential, commercial and institutional. Odors may be generated by equipment exhaust during construction of these projects, but the impacts would be temporary and are not anticipated to be significant. Additionally, because the Final EIR for the Santa Maria IWMF concluded that operation of the Santa Maria IWMF would not cause significant odor impacts, the MSW disposed at the Santa Maria IWMF is not anticipated to cause cumulatively significant odor impacts. Therefore, cumulative odor impacts are not anticipated to be significant, and Alternative G's contribution to cumulative odor impacts would not be considerable.

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# Attachment A

# Assumptions and Input Information

# TAJIGUAS RESOURCE RECOVERY PROJECT
## CONSTRUCTION EQUIPMENT AND ON-SITE VEHICLE USE
**@ 10/6/2015**

| EQUIPMENT DESCRIPTION | FUEL TYPE | ENGINE HP | HRS PER DAY OPERATION | ON-SITE MILES PER DAY, EACH | WORST CASE SCENARIO FOR ANY GIVEN DAY DURING A MONTH - 8 HOUR PER DAY OPERATION | | | | | | | | | | | | | | | | | | | TOTAL JOB HOURS USING 22 WORKING DAYS PER MONTH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 | |
| Company Pick-up Trucks - F250 | GAS | 385 | 2 | 3 | 3 | 3 | 5 | 5 | 5 | 7 | 7 | 7 | 7 | 10 | 10 | 10 | 10 | 10 | 10 | 5 | 5 | 3 | 3 | 5,500 |
| Company Flatbed Trucks - Ford F550 | DIESEL | 400 | 4 | 5 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 4,576 |
| Air Compressor - 185 | DIESEL | 61 | 8 | 0 | | | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 5,280 |
| 100 Ton Hydraulic Crane | DIESEL | 168 | 8 | 1 | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | 2,112 |
| Putzmeister Concrete Pump - M 28-4 | DIESEL | 350 | 8 | 5 | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | 1,408 |
| CAT Reach Lift - TH83 | DIESEL | 105 | 8 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 6,160 |
| Genie Knuckleboom - Z60/34 | DIESEL | 51 | 8 | 0 | | | | | | | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 6,688 |
| Delivery Truck and Trailers - (on-site usage only including concrete deliveries) | DIESEL | 380 | 2 | 16 | 1 | 2 | 2 | 6 | 6 | 10 | 10 | 10 | 8 | 8 | 8 | 6 | 6 | 8 | 12 | 12 | 8 | 2 | 1 | 5,544 |
| Fuel/Lube Truck | DIESEL | 220 | 4 | 2 | | 0.5 | 0.5 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.25 | 0.25 | 0.25 | 0.05 | 0.05 | 211 |
| CAT 623G Scraper | DIESEL | 365 | 8 | 15 | | 6 | 6 | | | | | | | | | | | | | | | | | 2,112 |
| CAT D8R Dozer | DIESEL | 305 | 8 | 3 | | 2 | 2 | | | | | | | | | | | | | | | | | 704 |
| CAT 140H Motor Grader | DIESEL | 185 | 8 | 20 | 1 | 2 | 2 | 1 | 1 | 1 | | | | | | | | | 1 | 1 | 1 | | | 1,936 |
| CAT Soil Compactor - 825H | DIESEL | 354 | 8 | 20 | | 1 | 1 | | | | | | | | | | | | | | | | | 352 |
| 6 X 6 Water Truck 4000 gal. | DIESEL | 250 | 8 | 50 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | 1 | 1 | 1 | 1 | 1 | 2,816 |
| CAT Single Drum Roller - CS-563D | DIESEL | 153 | 8 | 3 | | | | | | | | | | | | | | | 1 | 1 | 1 | | | 528 |
| CAT Paving Machine - AP-1055D | DIESEL | 224 | 8 | 1 | | | | | | | | | | | | | | | | 1 | 1 | | | 352 |
| CAT Asphalt Roller, Steel Drum - CB-634C | DIESEL | 145 | 8 | 3 | | | | | | | | | | | | | | | | 1 | 1 | | | 352 |
| CAT Wheel Loader - 966G | DIESEL | 235 | 8 | 2 | | | | 1 | 1 | 1 | | | | | | | | | | | | | | 528 |
| CAT Backhoe - 416C | DIESEL | 80 | 8 | 1 | | | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4,400 |
| CAT Excavator - 345BL | DIESEL | 321 | 8 | 1 | | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | 880 |
| CAT Compactor - CP-323C | DIESEL | 80 | 8 | 1 | | | | 1 | 1 | 1 | | | | | | | | | | | | | | 528 |
| John Deere Skiploader - 210LE | DIESEL | 59 | 8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3,344 |
| **EQUIPMENT MAN POWER** | | | | | 10 | 23.5 | 26.5 | 21.05 | 25.05 | 33.05 | 32.05 | 32.05 | 30.05 | 32.05 | 36.05 | 34.05 | 33.05 | 34.05 | 40.25 | 36.25 | 27.25 | 15.05 | 14.05 | 56,311 |
| MAN POWER FOR NON EQUIPMENT TASKS | | | 8 | | 6 | 16 | 24 | 32 | 48 | 54 | 64 | 64 | 64 | 64 | 64 | 64 | 68 | 68 | 68 | 68 | 64 | 52 | 40 | 174,592 |
| **TOTALS** | | | | | **16** | **39.5** | **50.5** | **53.05** | **73.05** | **87.05** | **96.05** | **96.05** | **94.05** | **96.05** | **100.05** | **98.05** | **101.05** | **102.05** | **108.25** | **104.25** | **91.25** | **67.05** | **54.05** | **230,903** |
| | | | | | | | | | | | | | | | | | | | | | | | | 230,903 |
| | | | | | | | | | | | | | | | | | | | | | | | | **WK DY/MO** |
| | | | | | | | | | | | | | | | | | | | | | | | | **22** |

| MUSTANG POWER<br>TAJIGUAS RESOURCE RECOVERY PROJECT<br>ON-SITE CUT AND FILL QUANTITIES | | | |
|---|---|---|---|
| EQUIPMENT DESCRIPTION | WORKING DAYS | CY PER DAY | TOTALS |
| Cut per Cubic Yard - JULY | 13 | 1,480 | 19,240 |
| Cut per Cubic Yard - AUGUST | 21 | 2,816 | 59,136 |
| Cut per Cubic Yard - SEPTEMBER | 16 | 1,802 | 28,824 |
| TOTAL CUT | | | **107,200** |
| Fill per Cubic Yard - JULY - THEORETICAL QUANTITY, SEE NOTE BELOW | 13 | 1,121 | 14,574 |
| Fill per Cubic Yard - AUGUST - THEORETICAL QUANTITY, SEE NOTE BELOW | 21 | 2,133 | 44,793 |
| Fill per Cubic Yard - SEPTEMBER - THEORETICAL QUANTITY, SEE NOTE BELOW | 16 | 1,365 | 21,833 |
| TOTAL FILL | | | **81,200** |
| TOTAL CUT VS FILL | | | **26,000** |

**WITH SUBSIDENCE, IT IS EXPECTED THAT THIS SITE WILL BALANCE AND NO EXPORT OF SURPLUS MATERIAL IS EXPECTED TO OCCUR**

**Heisler, Steve**

| | |
|---|---|
| **From:** | John Dewey <john@deweygroup.com> |
| **Sent:** | Friday, February 08, 2013 2:50 PM |
| **To:** | Wazlaw, Sean |
| **Cc:** | johnkular@bak.rr.com; Joddi Leipner (jleipner@cosbpw.net); Heisler, Steve; Mike Diani |
| **Subject:** | RE: TRRP - paving and arch coatings - data needs |

Sean,

Just let Mike Diani know if you need any additional info on this.

Thanks

jd

---

**From:** Mike Diani [mailto:miked@diani.com]
**Sent:** Friday, February 08, 2013 2:01 PM
**To:** Wazlaw, Sean
**Cc:** johnkular@bak.rr.com; John Dewey
**Subject:** RE: TRRP - paving and arch coatings - data needs

Sean,

I am still working Item #2 and should have you an answer next week. Answer to #1 is as follows

1. For asphaltic paving, the daily area paved each month and the total area to be paved. Not sure what you mean by the daily area paved each month, but we will be paving in 2 areas. Area 1 is the paving around the new facilities, and area 2 is the compost area. The paving at the facilities is approximately 272,000 SF and 3" thick, this will take 10 days to lay down all the asphalt and will be a continuous operation. The paving at the compost area is approximately 332,000 SF and has 2 lifts at 3" thick each for a total thickness of 6" of asphalt with a paving mat between the 2 lifts. This paving will take 15 days per lift for a total of 30 days in an continuous operation as well. If this does not answer your question, please feel free to contact me.

2. For painting, the daily quantity of coatings to be applied each month and their VOC contents. We are working on the type of coating to be used and will have this information next week. This work will actually not be very extensive as the ADF Facility is all concrete with no coating and the building will be pre-engineered structures that come prefinished. We will have some area that will require coatings, and this is what I am trying to put together now. Again your question is not clear to me, but I will answer the same as I did above unless you can guide me in another direction.

Thanks, and please do not hesitate to contact with any questions you may have.

Michael J. Diani
President
Diani Building Corp.
Phone: (805) 925-9533
Fax: (805) 928-2150
e-mail: mike@diani.com

**Heisler, Steve**

| | |
|---|---|
| **From:** | Mike Diani <miked@diani.com> |
| **Sent:** | Wednesday, February 13, 2013 4:46 PM |
| **To:** | Heisler, Steve |
| **Cc:** | John Dewey; Wazlaw, Sean; johnkular@bak.rr.com; Joddi Leipner (jleipner@cosbpw.net) |
| **Subject:** | RE: TRRP - paving and arch coatings - data needs |

Steve,

The grading and Paving Operations are scheduled to start late in the month of August 2016 which will be primarily grading, and the paving will start early in the month of September and last through October of 2016.

The answer to Item #2, Painting, the daily quantity of coatings to be applied each month and their VOC contents is as follows: Primers, Sealers and Undercoats are expected to have a VOC content of no more than 200 grams per liter (1.68 pounds per gallon). Flat Paints and Coatings will have a VOC content of no more than 50 grams per liter (0.42 pounds per gallon), and Non-Flat Paints and Coatings will have a VOC content of no more than 150 grams per liter (1.26 pounds per gallon). We are calculating that we will paint approximately 84,000 SF of surface with an average application rate of 250 SF per gallon times 2 coats (1 primer/undercoat and 1 finish coat, 50% Flat and 50% Non-Flat) for a total of 672 gallons of paint at an average VOC content of 1.26 pounds per gallon. The application rate is estimated at 7 gallons per day per painter with an average of 2 painters is 14 gallons per day for a total of 48 full days of painting and an average VOC content of 17.64 pounds per day of painting.

Painting will occur periodically throughout the entire construction duration with the most concentrated effort during the months of September, October and November of 2016 being 2/3rds of the entire scope of work.

Please let me know if you need any further explanation or information.

Thanks,

Michael J. Diani
President
Diani Building Corp.
Phone: (805) 925-9533
Fax: (805) 928-2150
e-mail: mike@diani.com

## 0.01 Technical Data on 100% Landfill Gas (B82)(at module)

| Data at: | | | | Full load | Part Load | |
|---|---|---|---|---|---|---|
| Fuel gas LHV | | BTU/scft | | 587 | | |
| | | | | 100% | 75% | 50% |
| | | | | | | |
| Energy input | | MBTU/hr | [2] | 9,878 | 7,660 | 5,439 |
| Gas volume | | scfhr | *) | 16,828 | 13,049 | 9,266 |
| Mechanical output | | bhp | [1] | 1,573 | 1,180 | 787 |
| Electrical output | | kW el. | [4] | 1,137 | 850 | 562 |
| Recoverable thermal output | | | | | | |
| ~ Intercooler 1st stage | | MBTU/hr | | 706 | 157 | 34 |
| ~ Lube oil | | MBTU/hr | | 461 | 416 | 300 |
| ~ Jacket water | | MBTU/hr | | 1,078 | 1,003 | 771 |
| ~ Exhaust gas cooled to 356 °F | | MBTU/hr | | 2,075 | 1,819 | 1,423 |
| Total recoverable thermal output | | MBTU/hr | [5] | 4,319 | 3,395 | 2,528 |
| | | | | | | |
| | | | | | | |
| Heat to be dissipated | | | | | | |
| ~ Intercooler 2nd stage | | MBTU/hr | | 222 | 181 | 102 |
| ~ Lube oil | | MBTU/hr | | ~ | ~ | ~ |
| ~ Surface heat | ca. | MBTU/hr | [7] | 347 | ~ | ~ |
| | | | | | | |
| | | | | | | |
| Spec. fuel consumption of engine | | BTU/bhp.hr | [2] | 6,280 | 6,491 | 6,909 |
| Lube oil consumption | ca. | gal/hr | [3] | 0.11 | ~ | ~ |
| Electrical efficiency | | % | | 39.3% | 37.9% | 35.2% |
| Thermal efficiency | | % | | 43.7% | 44.3% | 46.5% |
| Total efficiency | | % | [6] | 83.0% | 82.2% | 81.7% |
| | | | | | | |
| Hot water circuit: | | | | | | |
| Forward temperature | | °F | | 194.0 | 170.2 | 167.1 |
| Return temperature | | °F | | 158.0 | 158.0 | 158.0 |
| Hot water flow rate | | GPM | | 240.0 | 240.0 | 240.0 |

*) approximate value for pipework dimensioning
[_] Explanations: see 0.10 - Technical parameters

All heat data is based on standard conditions according to attachment 0.10. Deviations from the standard conditions can result in a change of values within the heat balance, and must be taken into consideration in the layout of the cooling circuit/equipment (intercooler; emergency cooling; ...). In the specifications in addition to the general tolerance of +/- 8% on the thermal output a further reserve of 10% is recommended for the dimensioning of the cooling requirements.

# TAJIGUAS RESOURCE RECOVERY PROJECT
## CHP ENGINE EMISSIONS - GE JENNBACHER JGS 416 B82 (2 UNITS)
## @ 10/6/2015

- Specification Sheet -

***SCR/Oxidation Catalyst System - For NOx/CO/VOC Reduction***

| | | | |
|---|---|---|---|
| **Customer:** | WES | **Notes:** | |
| **Attention:** | Steve Hall | **Ref. No:** | B30211-1 |
| **Job Ref:** | | **Date:** | 10/08/15 |

| | | | | | |
|---|---|---|---|---|---|
| **Engine Mfg:** | Jenbacher | | | **Model No:** | JGS416B82 |
| **EKW:** | 1,137 | **Cycle:** | 4 | **RPM:** | 1500 |
| **Fuel Type :** | Clean Biogas | **Load:** | 100% | **Hours/Year:** | 8,300 |

| | | | | | |
|---|---|---|---|---|---|
| **SCR Model** | **DeNOx-J416B82/1573** | **Nbr Units:** | 1 | **SCR Controls:** | **Open Loop** |

| Item Description | English | Units | Metric | Units |
|---|---|---|---|---|
| | | | | |
| **Engine Output** | **1,573** | BHP | **1,173** | BKW |
| **Exhaust Gas Mass Flow** | **15,007** | Lbs/Hour | **6,807** | Kg/Hour |
| **Exhaust Gas Temperature** | **867.0** | °F | **463.9** | °C |
| **Exhaust Flow - Standard Units** | **208,097** | SCFH | **5,575** | SCMH |
| **Pre-Catalyst NOx Emissions** | **0.60** | G/BHP/Hr | **0.80** | G/BKW/Hr |
| **Pre-Catalyst NOx Emissions** | **45** | PPMV@15% O2 | **45** | PPMV@15% O2 |
| **Pre-Catalyst NOx Emissions** | **1.8** | Lbs/MWe/Hr | **0.8** | Kg/MWe/Hr |
| **Post-Catalyst NOx Emissions** | **0.120** | G/BHP/Hr | **0.161** | G/BKW/Hr |
| **Post-Catalyst NOx Emissions** | **9** | PPMV@15% O2 | **9** | PPMV@15% O2 |
| **Post-Catalyst NOx Emissions** | **0.37** | Lbs/MWe/Hr | **0.17** | Kg/MWe/Hr |
| **Percentage NOx Reduction** | **80.0** | % | **80.0** | % |
| **Pre-Catalyst CO Emissions** | **3.00** | G/BHP/Hr | **4.02** | G/BKW/Hr |
| **Pre-Catalyst CO Emissions** | **360** | PPMV@15% O2 | **360** | PPMV@15% O2 |
| **Pre-Catalyst CO Emissions** | **9.1** | Lbs/MWe/Hr | **4.2** | Kg/MWe/Hr |
| **Post-Catalyst CO Emissions** | **0.300** | G/BHP/Hr | **0.402** | G/BKW/Hr |
| **Post-Catalyst CO Emissions** | **36** | PPMV@15% O2 | **36** | PPMV@15% O2 |
| **Post-Catalyst CO Emissions** | **0.91** | Lbs/MWe/Hr | **0.42** | Kg/MWe/Hr |
| **Percentage CO Reduction** | **90.0** | % | **90.0** | % |
| **Pre-Catalyst VOC Emissions** | **0.43** | G/BHP/Hr | **0.58** | G/BKW/Hr |
| **Pre-Catalyst VOC Emissions** | **92** | PPMV@15% O2 | **92** | PPMV@15% O2 |
| **Pre-Catalyst VOC Emissions** | **1.3** | Lbs/MWe/Hr | **0.6** | Kg/MWe/Hr |
| **Post-Catalyst VOC Emissions** | **0.120** | G/BHP/Hr | **0.161** | G/BKW/Hr |
| **Post-Catalyst VOC Emissions** | **26** | PPMV@15% O2 | **26** | PPMV@15% O2 |
| **Post-Catalyst VOC Emissions** | **0.37** | Lbs/MWe/Hr | **0.17** | Kg/MWe/Hr |
| **Percentage VOC Reduction** | **72.1** | % | **72.1** | % |
| **Pressure Drop Across Catalyst/Mixer** | **6.0** | In. H20 | **15.0** | mbar |
| **Maximum SCR System Ammonia Slip** | **5** | PPMV | **5** | PPMV |
| **40%/60% Urea/H2O Consumption Rate** | **0.4** | Gal/Hour | **1.5** | Liter/Hr |
| **SCR Catalyst Volume** | **31.50** | Cu. Ft | **0.892** | Cu/Meter |
| **SCR Catalyst Configuration** | **7x6x3x12** | | **7x6x3x300** | |
| **SCR Catalyst Space Velocity** | **6,606** | $SCFH/FT^3$ | **6,251** | $SCMH/M^3$ |
| **Oxidation Catalyst Volume** | **3.50** | Cu. Ft | **0.099** | Cu/Meter |
| **Oxidation Catalyst Configuration** | **7x6x1x4** | | **7x6x1x100** | |
| **Oxidation Catalyst Space Velocity** | **59,456** | $SCFH/FT^3$ | **56,255** | $SCMH/M^3$ |

**John Dewey**

**From:** AMasten@penndda.com
**Sent:** Thursday, May 08, 2014 2:27 PM
**To:** John Dewey
**Cc:** AMasten@penndda.com; NKoop@weesys.com; RSargent@pennpowersystems.com; Trevor Leiphardt
**Subject:** RE: CHP engine SCR Start-up

SCR Catalyst guaranteed for 14,000 operating hours or 2 yrs, whichever comes first.
Oxidation Catalyst guaranteed for 11,000 operating hours or 18 months, whichever comes first

**Adam Masten**
**Vice President of Engineering**
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From: John Dewey <john@deweygroup.com>
To: "AMasten@penndda.com" <AMasten@penndda.com>,
Cc: "NKoop@weesys.com" <NKoop@weesys.com>, "RSargent@pennpowersystems.com" <RSargent@pennpowersystems.com>, Trevor Leiphardt <trevor@deweygroup.com>
Date: 05/08/2014 12:59 PM
Subject: RE: CHP engine SCR Start-up

---

What is the effective life of the SCR element? After how many hours is it likely to be replaced?

Thanks

**From:** AMasten@penndda.com [mailto:AMasten@penndda.com]
**Sent:** Tuesday, May 06, 2014 5:37 AM
**To:** John Dewey
**Cc:** AMasten@penndda.com; NKoop@weesys.com; RSargent@pennpowersystems.com; Trevor Leiphardt
**Subject:** RE: CHP engine SCR Start-up

John,

The SCR has a burn in period as it contains special metals that are delivered with a protective coating applied. As the protective coating is burnt off and the metals activated, the SCR system begins functioning as the filtering system. The 50-100 hour burn in period is to ensure all the coating has been burnt off and the metals fully activated so that it is working at 100% effectiveness.

## DESIGN CRITERIA

**Flare Gas Stream –**

**Design Case**

| | |
|---|---|
| Type: | Digester Gas |
| Composition: | 60% $CH_4$ (maximum) |
| | 40% $CO_2$, air, inerts |
| Flow Rate: | 450 SCFM (maximum) |
| Waste Heat Release: | 14.7 MM BTU/hr (maximum) |

**Case 2**

| | |
|---|---|
| Type: | Purge Gas |
| Composition: | 40% $CH_4$ (maximum) diminishing to 1% $CH_4$ (minimum) balance $CO_2$ |
| Flow Rate: | 435 SCFM (maximum) |

NOTE: Hydrogen Sulfide concentrations greater than 1,000 ppm will require special materials and will increase costs.

**Mechanical**

| | |
|---|---|
| Design Wind Speed: | 110 mph |
| Ambient Temperature: | 32 °F to 120 °F |
| Electrical Area Classification: | non-hazardous |
| Elevation: | 0 feet above MSL |

**Process**

| | |
|---|---|
| Smokeless Capacity: | 100% |
| Operating Temperature: | 1400 °F to 1800 °F (2000 °F shutdown) |
| Retention Time: | 0.7 seconds at 1800 °F (minimum) |
| Required Flame Arrester Inlet Pressure: | 10" $H_2O$ (maximum) |
| Ambient Pressure: | 14.7 psia |

NOTE: *Low methane concentrations may require auxiliary fuel to initiate combustion and maintain temperature.*

**Utilities**

| | |
|---|---|
| Pilot Gas (intermittent): | 22 SCFH of propane at 7-10 psig (or) |
| | 50 SCFH of natural gas at 10-15 psig |
| Compressed Air: | 100 PSIG (regulated) |
| Electricity: | 120 V control system components |
| Auxiliary Fuel: | 55 SCFM (maximum) of natural gas as needed to maintain combustion temperature of 435 scfm of engine exhaust. |

**Expected Flue Gas**

| Operating Temperature | 1600°F | 1800°F |
|---|---|---|
| $CO_2$ Volume % | 7.0 | 8.1 |
| $H_2O$ Volume % | 8.2 | 9.2 |
| $N_2$ Volume % | 72.6 | 71.8 |
| $O_2$ Volume % | 12.2 | 10.9 |

**Expected Flare Emission Range –Digester (Design Flow)[1]**

| Operating Temperature | 1600°F | 1800°F |
|---|---|---|
| Overall Destruction Efficiency[2] | 98% | 99% |
| NOx, lb / MMBTU[3] | 0.06 | 0.08 |
| CO, lb / MMBTU[4] | 0.20 | 0.15 |
| SOx, lb / MMBTU[5] | 0.22 | 0.22 |

(1) Expected emission rates at lower operating temperatures are available upon request.
(2) Typical sulphur containing compounds are expected to have greater than 98% oxidation efficiency.
(3) Assumes up to 15 ppm of $NH_3$ present in gas. Excludes all other NOx from fixed nitrogen.
(4) Excludes CO contribution present in the gas.
(5) Assumes 100% conversion of $H_2S$ (200 ppm maximum) present in the gas.

NOTE: *Expected emissions are based on field tests of operating units and the higher heating value (HHV) of the gas. Destruction efficiency, NOx, and CO emissions shown are valid for combustion of specified gas only. Expected emissions are not guaranteed unless expressly stated elsewhere in this proposal.*

# TAJIGUAS RESOURCE RECOVERY PROJECT

## ON & OFF-ROAD EQUIPMENT

## @ 10/6/2015

| Operations Equipment Type | Make/Model | Number | Fuel Consumption Type | Eng HP | GPH | HPD | GPD | Ave Hours of Operation/Day |
|---|---|---|---|---|---|---|---|---|
| **AD Equipment** | | | | | | | | |
| | CAT 938M | 1 | Diesel | 169 | 2.7 | 8 | 22 | 8:00 pm-4:00 pm |
| | Komptech Hurrikan S | 1 | Electric | 47kw | | 8 | | 8:00 am-4:00 pm |
| | Post AD Screen Equipment-Titech | 1 | Electric | | | | | |
| | Compost-Screen Machine 612T | 1 | Diesel | 84 | 5 | 8 | 40 | 8:00 am-4:00 pm |
| | Windrow Turner-Vermeer CT 1010 | 1 | Diesel | 215 | 12 | 8 | 96 | 8:00 am-4:00 pm |
| | Chipper/Grinder-Morbark 3800 | 1 | Electric | | | 1.5 | - | 10:00 am-4:00 pm |
| Export to No. County | Tractors-Freightliner (Cummins ISX12 G-400) | 2 | CNG | 400 | | | | |
| Export to No. County | Trailers - Western | 2 | N/A | | | | | |
| Digestate to CFA | Tractors-Freightliner (Cummins ISL G-320) | 1 | CNG | 500 | | | | |
| Digestate to CFA | Trailers - Globe (45 Yd End Dump) | 1 | N/A | | 0 | 0 | - | |
| | Totals | | | | | | | |
| **MRF Equipment** | | | | | | | | |
| | CAT 980M | 2 | Diesel | 386 | #REF! | 16 | #REF! | 7:00 am-11:00 pm |
| | CAT 938K | 1 | Diesel | 169 | 2.7 | 16 | 43 | 7:00 am-11:00 pm |
| | Caterpillar M322D | 1 | Diesel | 173 | 2.7 | 16 | 43 | 7:00 am-11:00 pm |
| | CAT 2P-6000 Forklift | 3 | Diesel | 61 | 1.5 | 16 | 72 | 7:00 am-11:00 pm |
| Export to Port of LA | Tractors-Freightliner (IXS12 G-400 4 Base + 2 SS-Optional) | 6 | LNG | 400 | | | | |
| Export to Port of LA | Trailers - Western (45 Yd End Dump) | 6 | N/A | | 0 | 0 | - | |
| Residual to Landfill | Tractors-Freightliner (Cummins ISL G-320) | 1 | CNG | 500 | | | 3 | |
| Residual to Landfill | Trailers - Globe (45 Yd End Dump) | 2 | N/A | | 0 | 0 | - | |
| | Utility Truck & Trailer (Ford F 350 XL) | 1 | Diesel | 400 | | | 3 | |
| | Pick-up Trucks (Ford F250 XL-4wd) | 2 | Diesel | 400 | | | 13 | |
| | Mechanics Tools | 1 | N/A | | 0 | 0 | - | |
| | Scrubber-Sweeper (Tennant M30) | 1 | Diesel | 41 | | | | 12:00 am-12:00 am |
| | Sweeper (Tennant 800) | 1 | Diesel | 63 | 4 | 24 | 96 | 12:00 am-12:00 am |
| | Totals | | | | | | #REF! | Gals/day |
| | | | | | | | 12 | days storage |
| | | | | | | | #REF! | Gallons |
| Standby Generator | Caterpillar 3512B 1,400 kW-1 | 1 | Diesel | 1877 | 102 | 24 | 2,448 | |
| | | | | | | | 3 | days |
| ***All On & Off-Road Equipment is anticipated to meet &/or exceed EPA Tier 4 Final*** | | | | | | | 7,344 | |
| ***Emission Standards as equipment is anticipated to be purchase in 2016.*** | | | | | | | #REF! | Total Fuel Storage Reqt. |

# TAJIGUAS RESOURCE RECOVERY PROJECT

| Mobile Equipment | Mobile Equipment Specifications - URL for Specifications and/or Equipment Brochure |
|---|---|
| Flare | http://www.johnzink.com/wp-content/uploads/flar_ztof.pdf |
| Generator | https://deweygroup.box.com/s/qoei1qiolbi4ibdojzkmufjdiiff4aoh |
| CAT 980M | http://s7d2.scene7.com/is/content/Caterpillar/C10204017 |
| CAT 938K | http://s7d2.scene7.com/is/content/Caterpillar/C737355 |
| CAT 938M | http://s7d2.scene7.com/is/content/Caterpillar/C737355 |
| CAT 2p-6000 Forklifts | http://www.ritchiespecs.com/specification?type=&category=Forklift&make=Caterpillar&model=P6000&modelid=104493 |
| CAT M322D | http://s7d2.scene7.com/is/content/Caterpillar/C682373 |
| Compost-Screen Machine 612T | http://www.screenmachine.com/612t-trommel-screen.php |
| Windrow Turner-Vermeer CT 1010 | http://www2.vermeer.com/vermeer/LA/en/N/equipment/compost_turners/ct1010tx |
| Sweeper (Tennant 800) | https://deweygroup.box.com/s/87ieawbrr2327y4nchqa |
| Tractors-Freightliner (Cummins ISX12 G-400) | http://www.cumminswestport.com/content/506/Cummins%20Westport%20ISX12%20G%20Brochure%20-%204971420_0313.pdf |
| Tractors-Freightliner (Cummins ISL G-320) | http://www.cumminswestport.com/content/430/4971373_0413.pdf |
| Ford F-350 XL Truck | http://www.ford.com/trucks/superduty/trim/f350xl/ |
| Ford F-250 XL-4wd Truck | http://www.ford.com/trucks/superduty/trim/f250xl/ |
| Scrubber-Sweeper (Tennant M30) | http://assets.tennantco.com/globalassets/webassets/scrubber-sweeper%20riders/m30%20brochure_1.016.001.am.en.pdf |

# TAJIGUAS RESOURCE RECOVERY PROJECT

**Material Quantities**

| Material | Annual Quantity (tons) | Annual Operating Days |
|---|---|---|
| Exported Compost | 25,760 | 311 |
| Exported Recyclables | 90,000 | 311 |
| Exported Recyclables (with CSSR) | 126,000 | 311 |
| Digestate to Composting | 60,000 | 208 |
| Compost Windrows | 15,363 | 52 |
| MSW into MRF | 250,000 | 311 |
| MSW into MRF (with CSSR) | 290,000 | 311 |
| MSW to AD Facility | 73,600 | 311 |
| Wood to Chipper/Grinder | 21,226 | 311 |

# TAJIGUAS RESOURCE RECOVERY PROJECT
## COMPOST PAD AREA CALCS - CORNELL MODEL
## @ 5/15/2013

| Inputs: | | Outputs: | | | | |
|---|---|---|---|---|---|---|
| Output AD | 66,900 | Tonnes/yr | 73,590 | Tons/year | | |
| Input Composting | 83,625 | Tonnes/yr | 80/20 digestate/structural material | | | |
| Compost density | 0.65 | T/m3 | | | | |
| Conversion factors: | 1.10 | tons/Tonne | 35.320 | cf/m3 | 2,205 | lbs/Tonne |
| Input Composting | 92,180 | tons/yr. | | | | |
| Compost density | 40.6 | lbs/ft3 | | | | |

**Windrow Turning Activity**

| | | |
|---|---|---|
| 11,522 | Tons (Total Mass Windrows) | |
| 2,373 | Tons/Hr (Vermeer CT 1010 Capacity) | 3,250 cyds/hour |
| 4.9 | Hrs Turning Time/week (Entire Composting Area) | |

**Dry weather leachate production**

Step 1

| | | |
|---|---|---|
| 92,180 | tons/yr | compost |
| 7,682 | tons/mo. | compost |
| 60% | initial moisture content by weight | |
| 0.5% | moisture loss as leachate | |
| 38.41 | tons/mo. | leachate |
| 2561 | lbs/day | " |
| 41.03 | ft3/day | " |
| 0.0005 | cfs | " |
| 0.21 | gpm | " |
| 307 | gpd | " |

**Cured Compost Storage**

| | | |
|---|---|---|
| 2 | month accumulation | Step 3 |
| 160 | length | |
| 155 | width | |
| 20 | height | |
| 622,000 | Volume | should exceed cell F16 |
| 24,800 | Area (ft$^2$) | |
| **0.57** | Area (Acres) | |

**Compost volume and area**

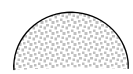
Step 2

| | | | Finished Compost | |
|---|---|---|---|---|
| 7,682 | tons/mo. | 40% | 3,073 | tons/mo |
| 40.6 | lbs/ft3 | | 36,872 | TPY |
| 378,666 | ft3 | | 11,838 | T/Acre |
| 1.5 | months of compost finishing time | | | |
| 567,999 | revised compost volume | | | |

Row height and width based on 20' Windrow Turner (Zbest green waste)

| | | | |
|---|---|---|---|
| Row length (ft) | 200 | Row height (ft) | 9.0 |
| Distance between rows (ft) | 8 | Row width (ft) | 55.0 |
| Access distance (ft) | 20 | Row groups | 2 |
| (at end of rows) | | | |

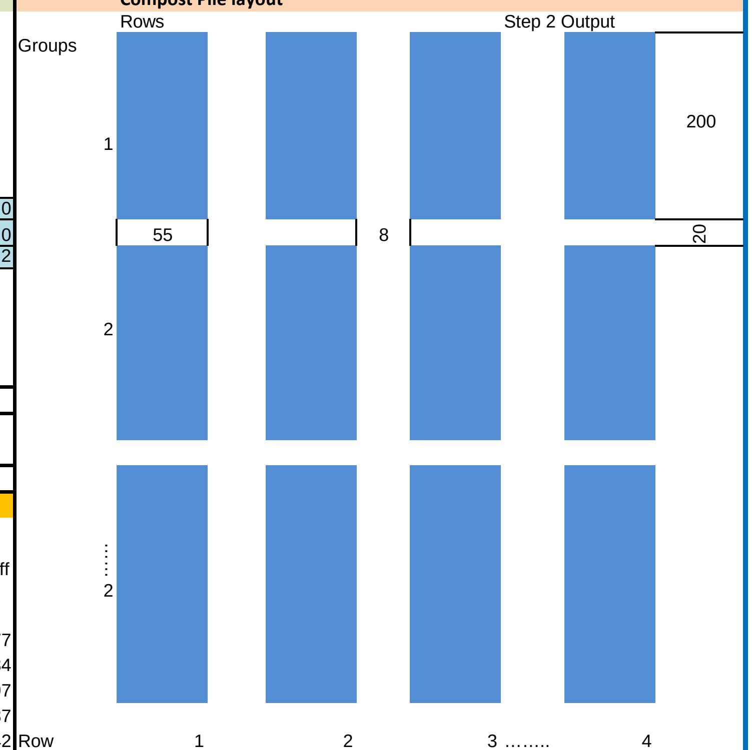
| | | |
|---|---|---|
| Total volume (ft$^3$) | 567,999 | |
| X-section Area (ft$^2$) | 330 | 2/3 bh |
| Windrow length (ft) | 200 | |
| Calculated # of rows | 4.3 | |
| Actual # of rows | 4 | |
| Area (ft$^2$) | **110,880** | |
| Area (acres) | **2.55** | |



**Dimensions of Raw Storage Pad:**

| | | |
|---|---|---|
| Width | **252** | (ft) |
| Length | **440** | (ft) |
| | **3.11** | **Total Acres** |

**Compost Pile layout**




**Leachate Runoff**

Step 4

Assume 24 hour storm duration, 60% of rainfall falls in 1 hour

| **Updated for actual CFA layout** | | | Event | Rainfall depth | Surface Runoff | Rainfall on piles | Retained Volume | Compost runoff | Total runoff | Avg runoff rate |
|---|---|---|---|---|---|---|---|---|---|---|
| Gross Area | | 294,901 | | | | | | | | |
| bare surface | 54% | 159,221 | Month or Year | in. | ft3 | ft3 | ft3 | ft3 | ft3 | ft3/s |
| compost covered surface | 46% | 135,680 | APR, MAY | 0.80 | 10,615 | 9,045 | 9,045 | - | 10,615 | 1.77 |
| 45% initial moisture content by weight | | | FEB | 6.00 | 79,611 | 67,840 | 64,411 | 3,429 | 83,039 | 13.84 |
| 63% moisture content at saturation | | | JAN | 5.30 | 70,323 | 59,925 | 64,411 | (4,486) | 65,837 | 10.97 |
| 2,074 tons retained moisture | | | OCT | 2.20 | 29,191 | 24,875 | 24,875 | - | 29,191 | 4.87 |
| 64,411 ft3 max. retained moisture | | | NOV | 2.00 | 26,537 | 22,613 | 22,613 | - | 26,537 | 4.42 |
| 1.48 ac-ft max. retained moisture | | | DEC | 2.10 | 27,864 | 23,744 | 23,744 | - | 27,864 | 4.64 |
| | | | 2, MAR | 3.50 | 46,440 | 39,573 | 39,573 | - | 46,440 | 7.74 |
| | | | 5 | 4.61 | 61,167 | 52,124 | 64,411 | (12,288) | 48,880 | 8.15 |
| | | | 10 | 5.55 | 73,640 | 62,752 | 64,411 | (1,659) | 71,980 | 12.00 |
| | | | 25 | 6.71 | 89,031 | 75,868 | 64,411 | 11,456 | 100,488 | 16.75 |
| | | 205,939 | 50 | 7.56 | 100,309 | 85,478 | 64,411 | 21,067 | 121,376 | 20.23 |
| | | | 100 | 8.38 | 111,189 | 94,750 | 64,411 | 30,338 | 141,528 | 23.59 |

# TAJIGUAS RESOURCE RECOVERY PROJECT
## AD & MRF ELECTRICITY CONSUMPTION & NET PRODUCTION
### @ 10/6/2015

| | ITEM | Vendor | Model | Number | VOLTAGE | ELECTRICAL LOAD | Kw | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| I. | Sewage treatment equipment | Vendor | Model | Number | | | | | | | |
| | A. MRF w/w treatment | Orenco | AX-Max | 1 | 120V 1 ph | 5A | 0.60 | | | | |
| | B. ADF w/w treatment | Orenco | AX-20 | 1 | 120V 1 ph | 5A | 0.60 | | | | |
| | C. UV treatment unit (1) | Hallett | 30 | 1 | 120V 1 ph | .3A | 0.04 | | | | |
| | D. Control system | Orenco | | 1 | 120V 1 ph | 5A | 0.60 | | | | |
| II. | Water & Irrigation system | | | | | | | | | | |
| | A. Well Pump | | | 1 | 208V 3 ph | 5 HP | 3.67 | | | | |
| | B. Pump to Recycle tank | Gould | | 1 | 208V 3 ph | 2 HP | 1.49 | | | | |
| | C. Control system | Rain Bird | | 1 | 120V 1 ph | 5A | 0.60 | | | | |
| | D. Weather station | Rain Bird | | 1 | 120V 1 ph | 2A | 0.24 | * can be solar powered | | | |
| | E. Fire Supply | | | 1 | 240V 3 ph | 20 Hp | 14.90 | Intermittent Load Reqt. | | | |
| III. | Compost System | | | | | | | | | | |
| | A. Storm Pumps | Power Prime | DV100 | 2 | 240V 3 ph | 20 Hp | 29.80 | Intermittent Load Reqt. | | | |
| | B. Control systems | Rain Bird | | 1 | 120V 1 ph | 5A | 0.60 | | | | |
| IV. | MRF Equipment | | | | | | | | | | |
| | A. MSW Line Motors | Various | | 110 | | | 550 | | | | |
| | B. Baler | Van Dyk | | 1 | | | 125 | | | | |
| V. | SS Equipment | | | | | | | | | | |
| | A. SS Line Motors | Various | | 40 | | | 200 | | | | |
| VI. | MRF Bldg | | | | | | | | | | |
| | A. Biofilter Fans | | | | | | 56 | | | | |
| | B. Misc. Lighting & Other | | | | | | 230 | | | | |
| VII. | AD Facility | | | | | | | | | | |
| | A. Process Electricity (CHP Engine parasitic load) | | | | | | 40 | | | | |
| | B. Biofilter Fans, compressors & misc equipment (plant parasitic reqt.) | | | | | | 92 | | | | |
| | C. Misc. Lighting & Other | | | | | | 99 | | | | |
| VIII. | Misc. | | | | | | | | | | |
| | A. Parking Lot Lighting | | | | | | 27 | | | | |
| | **Total Facility Consumption** | | | | | Total | **1,473** | kw Max Load Potential | 1,211 | kw - MRF | |
| | | | | | | | 60% | kw Average Daily Operating Load | | | |
| | | | | | | | 884 | **kwh Net daily consumption** | | | |
| | | | | | 8,760 | Hrs/year | 6,595,355 | kwh Annual Consumption | | | |
| | | | | | | **Rated Generation (Mw)** | **6,595** | **Mwh Annual consumption** | | | |
| | | | | | **0.13** | **MW AD Parasitic Load** | **1,174** | **AD Electrical consumption (Mwh)** | 262 | kw | 18% |
| | **POWER GENERATION** | | | | **0.58** | **MW MRF Operations** | **5,062** | **MRF electrical Consumption (Mwh)** | 1,130 | kw | 77% |
| I. | AD Facility | | | | **0.04** | **MW Other Site Reqts** | **359** | **Other Site needs (Mwh)** | 80 | kw | 5% |
| | A. CHP Engines | 2 | 1137 kw | | **0.75** | **MW Total Consumption** | | | 1,473 | kw | |
| | | | | | | | 2,274 | Kw max Generation Potential; | | | |
| II. | Solar Array | | | | **1.60** | **MW Gross (AD)** | **14,032** | **Mwh Estimated Annual Generation (Gross)** | | | |
| | B. PV Panels | | | | | | | | | | |
| | | | | | | | 481 | kw Estimated Average Potential | | | |
| | | | | | **0.10** | **MW Gross (Solar)** | **873** | **Mwh Estimated Annual Production (Solar)** | | | |
| | | | | | **1.70** | **Total Project Production** | **14,905** | **Total Annual Mwh Generation (Gross)** | | | |
| | | | | | **0.95** | **Mw Net Export to Grid** | **8,310** | **Net Export to the Grid (Mwh) annually** | | | |

# Attachment B

# Construction Emissions Calculations

**Table 1**
**Construction Criteria Pollutant Emission Summary**

| Pollutant | Maximum Daily (lb/day) | Maximum 12-Month Total (ton/12 months) |
|---|---|---|
| CO | 100.63 | 8.38 |
| ROC | 40.80 | 1.70 |
| NOx | 199.40 | 11.35 |
| SOx | 0.03 | 0.00 |
| PM10 | 123.28 | 11.77 |
| PM2.5 | 21.06 | 1.69 |

**Table 2**
**Construction Greenhouse Gas Emission Summary**

| Pollutant | Total Emissions (MT)[a] |
|---|---|
| $CO_2$ | 2,152.02 |
| $CH_4$ | 0.58 |
| $N_2O$ | 0.07 |
| $CO_2e$[b] | 2,187.74 |

[a] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT
[b] $CO_2e$ = CO2-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

**Table 3-A**
**CO Monthly Emissions Summary**

| | Emissions (lb/month)[a] | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 160.85 | 1,840.31 | 1,901.49 | 440.22 | 698.47 | 863.42 | 658.13 | 658.13 | 658.13 | 658.13 | 784.22 | 784.22 | 723.03 | 600.11 | 779.68 | 944.32 | 733.94 | 347.70 | 347.70 |
| Motor Vehicle Exhaust | 8.18 | 13.00 | 15.01 | 16.00 | 16.00 | 22.54 | 22.78 | 22.78 | 20.52 | 20.00 | 20.24 | 17.97 | 17.97 | 20.24 | 28.07 | 23.02 | 18.26 | 9.45 | 8.32 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 94.15 | 234.67 | 297.46 | 322.36 | 436.51 | 524.90 | 576.27 | 576.27 | 560.61 | 571.32 | 594.15 | 578.49 | 595.61 | 605.56 | 649.01 | 626.18 | 543.49 | 393.78 | 317.46 |
| **Total** | **263.18** | **2,087.98** | **2,213.97** | **778.57** | **1,150.97** | **1,410.87** | **1,257.18** | **1,257.18** | **1,239.26** | **1,249.45** | **1,398.60** | **1,380.68** | **1,336.62** | **1,225.91** | **1,456.76** | **1,593.52** | **1,295.69** | **750.93** | **673.47** |
| **Running 12-Month Total (tons)** | **7.84** | **8.38** | **7.95** | **7.57** | **7.98** | **8.05** | **7.72** | **7.43** | **6.80** | **6.18** | **5.56** | **4.86** | **4.17** | **3.50** | **2.89** | **2.16** | **1.36** | **0.71** | **0.34** |

[a] Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 3-B**
**ROC Monthly Emissions Summary**

| | Emissions (lb/month)[a] | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 37.59 | 499.48 | 509.61 | 110.14 | 161.67 | 200.65 | 131.72 | 131.72 | 131.72 | 131.72 | 156.93 | 156.93 | 146.80 | 116.23 | 158.92 | 202.57 | 161.22 | 66.48 | 66.48 |
| Motor Vehicle Exhaust | 1.52 | 2.59 | 2.82 | 3.03 | 3.03 | 4.26 | 4.33 | 4.33 | 3.83 | 3.39 | 3.46 | 2.96 | 2.96 | 3.46 | 5.17 | 4.59 | 3.53 | 1.80 | 1.55 |
| Asphaltic Paving | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.07 | 6.40 | 0.00 | 0.00 |
| Architectural Coating | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 35.28 | 35.28 | 35.28 | 35.28 | 35.28 | 35.28 | 35.28 | 35.28 | 194.04 | 194.04 | 194.04 | 0.00 | 0.00 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 8.69 | 21.58 | 27.13 | 30.35 | 40.44 | 49.37 | 53.91 | 53.91 | 51.97 | 52.82 | 54.83 | 52.89 | 54.41 | 55.84 | 60.89 | 58.88 | 50.45 | 35.55 | 28.52 |
| **Total** | **47.81** | **523.65** | **539.56** | **143.52** | **205.14** | **254.27** | **225.24** | **225.24** | **222.80** | **223.21** | **250.50** | **248.06** | **239.45** | **210.81** | **419.02** | **471.14** | **415.64** | **103.83** | **96.55** |
| **Running 12-Month Total (tons)** | **1.55** | **1.65** | **1.49** | **1.43** | **1.60** | **1.70** | **1.63** | **1.56** | **1.45** | **1.34** | **1.23** | **1.10** | **0.98** | **0.86** | **0.75** | **0.54** | **0.31** | **0.10** | **0.05** |

[a] Monthly emissions calculated from daily emissions assuming 22 working days/month, except for architectural coating and asphaltic paving ROC, which are calculated from estimated days coating and paving per month

**Table 3-C**
**NOx Monthly Emissions Summary**

| | Emissions (lb/month)[a] | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 310.08 | 4,172.79 | 4,240.79 | 852.53 | 1,194.57 | 1,620.81 | 1,060.64 | 1,060.64 | 1,060.64 | 1,060.64 | 1,237.53 | 1,237.53 | 1,169.52 | 802.25 | 1,159.27 | 1,547.92 | 1,253.61 | 448.98 | 448.98 |
| Motor Vehicle Exhaust | 37.61 | 73.48 | 73.85 | 75.22 | 75.22 | 104.50 | 105.65 | 105.65 | 91.19 | 64.20 | 65.34 | 50.88 | 50.88 | 65.34 | 120.65 | 119.74 | 89.68 | 45.94 | 38.71 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 27.99 | 65.96 | 72.10 | 122.48 | 133.64 | 195.67 | 200.69 | 200.69 | 172.47 | 168.08 | 170.31 | 142.08 | 143.76 | 171.42 | 234.50 | 232.26 | 170.79 | 76.08 | 55.27 |
| **Total** | **375.68** | **4,312.23** | **4,386.74** | **1,050.23** | **1,403.43** | **1,920.98** | **1,366.98** | **1,366.98** | **1,324.29** | **1,292.91** | **1,473.17** | **1,430.49** | **1,364.17** | **1,039.02** | **1,514.42** | **1,899.92** | **1,514.08** | **570.99** | **542.95** |
| **Running 12-Month Total (tons)** | **10.85** | **11.35** | **9.71** | **8.27** | **8.70** | **8.75** | **8.08** | **7.67** | **6.98** | **6.32** | **5.67** | **4.94** | **4.22** | **3.54** | **3.02** | **2.26** | **1.31** | **0.56** | **0.27** |

[a] Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 3-D**
**SOx Monthly Emissions Summary**

| | Emissions (lb/month)[a] | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 0.51 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.16 | 0.16 | 0.16 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.16 | 0.16 | 0.16 |
| Motor Vehicle Exhaust | 0.06 | 0.12 | 0.12 | 0.13 | 0.13 | 0.19 | 0.19 | 0.19 | 0.17 | 0.13 | 0.13 | 0.11 | 0.11 | 0.13 | 0.22 | 0.22 | 0.16 | 0.08 | 0.07 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total** | **0.68** | **0.12** | **0.12** | **0.13** | **0.13** | **0.19** | **0.35** | **0.35** | **0.32** | **0.29** | **0.45** | **0.42** | **0.42** | **0.45** | **0.54** | **0.53** | **0.32** | **0.24** | **0.22** |
| **Running 12-Month Total (tons)** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

[a] Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 3-E**
**PM10 Monthly Emissions Summary**

| | Emissions (lb/month)[a] | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 14.51 | 161.20 | 166.35 | 40.82 | 66.36 | 81.91 | 62.71 | 62.71 | 62.71 | 62.71 | 76.18 | 76.18 | 71.03 | 59.98 | 75.26 | 90.28 | 70.16 | 35.37 | 35.37 |
| Motor Vehicle Exhaust | 0.96 | 1.78 | 1.80 | 1.90 | 1.90 | 2.64 | 2.71 | 2.71 | 2.35 | 1.76 | 1.84 | 1.48 | 1.48 | 1.84 | 3.09 | 3.06 | 2.26 | 1.17 | 0.99 |
| Motor Vehicle Fugitive Emissions | 282.14 | 469.75 | 499.47 | 1,182.14 | 1,182.14 | 1,894.52 | 1,927.96 | 1,927.96 | 1,586.63 | 1,631.21 | 1,664.66 | 1,323.32 | 1,323.32 | 1,664.66 | 2,313.87 | 2,239.58 | 1,523.47 | 469.75 | 299.09 |
| Earthwork Fugitive Emissions | 271.82 | 1,826.42 | 1,820.45 | 264.70 | 264.70 | 264.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 264.70 | 264.70 | 264.70 | 0.00 | 0.00 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 1.40 | 3.39 | 4.04 | 5.44 | 6.61 | 8.79 | 9.31 | 9.31 | 8.52 | 8.52 | 8.75 | 7.96 | 8.14 | 8.87 | 10.69 | 10.46 | 8.35 | 4.91 | 3.81 |
| Motor Vehicle Fugitive Emissions | 6.31 | 15.62 | 19.55 | 22.23 | 29.38 | 36.14 | 39.36 | 39.36 | 37.77 | 38.34 | 39.77 | 38.18 | 39.26 | 40.49 | 44.52 | 43.09 | 36.70 | 25.49 | 20.40 |
| **Total** | **577.14** | **2,478.17** | **2,511.65** | **1,517.23** | **1,551.10** | **2,288.69** | **2,042.05** | **2,042.05** | **1,697.98** | **1,742.53** | **1,791.19** | **1,447.12** | **1,443.22** | **1,775.83** | **2,712.15** | **2,651.17** | **1,905.64** | **536.70** | **359.66** |
| **Running 12-Month Total (tons)** | **10.84** | **11.28** | **10.93** | **11.03** | **11.59** | **11.77** | **10.89** | **10.05** | **9.03** | **8.18** | **7.31** | **6.42** | **5.69** | **4.97** | **4.08** | **2.73** | **1.40** | **0.45** | **0.18** |

[a] Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 3-F**
**PM2.5 Monthly Emissions Summary**

| | Emissions (lb/month)[a] | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 14.51 | 161.20 | 166.35 | 40.82 | 66.36 | 81.91 | 62.71 | 62.71 | 62.71 | 62.71 | 76.18 | 76.18 | 71.03 | 59.98 | 75.26 | 90.28 | 70.16 | 35.37 | 35.37 |
| Motor Vehicle Exhaust | 0.67 | 1.24 | 1.25 | 1.31 | 1.31 | 1.81 | 1.86 | 1.86 | 1.61 | 1.19 | 1.24 | 0.99 | 0.99 | 1.24 | 2.11 | 2.10 | 1.55 | 0.81 | 0.69 |
| Motor Vehicle Fugitive Emissions | 28.21 | 46.98 | 49.95 | 118.21 | 118.21 | 189.45 | 192.80 | 192.80 | 158.66 | 163.12 | 166.47 | 132.33 | 132.33 | 166.47 | 231.39 | 223.96 | 152.35 | 46.98 | 29.91 |
| Earthwork Fugitive Emissions | 29.66 | 239.73 | 238.83 | 28.58 | 28.58 | 28.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 28.58 | 28.58 | 28.58 | 0.00 | 0.00 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 0.73 | 1.76 | 2.04 | 2.96 | 3.48 | 4.76 | 5.00 | 5.00 | 4.48 | 4.45 | 4.55 | 4.04 | 4.12 | 4.60 | 5.77 | 5.67 | 4.40 | 2.40 | 1.83 |
| Motor Vehicle Fugitive Emissions | 1.55 | 3.83 | 4.80 | 5.46 | 7.21 | 8.87 | 9.66 | 9.66 | 9.27 | 9.41 | 9.76 | 9.37 | 9.64 | 9.94 | 10.93 | 10.58 | 9.01 | 6.26 | 5.01 |
| **Total** | **75.33** | **454.74** | **463.21** | **197.33** | **225.16** | **315.38** | **272.02** | **272.02** | **236.73** | **240.87** | **258.20** | **222.92** | **218.11** | **242.23** | **354.05** | **361.17** | **266.06** | **91.81** | **72.80** |
| **Running 12-Month Total (tons)** | **1.62** | **1.69** | **1.58** | **1.53** | **1.61** | **1.63** | **1.52** | **1.42** | **1.28** | **1.16** | **1.04** | **0.91** | **0.80** | **0.69** | **0.57** | **0.40** | **0.22** | **0.08** | **0.04** |

[a] Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 3-G**
**$CO_2$ Monthly Emissions Summary**

| | Emissions (lb/month)[a] | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 44,478.67 | 584,661.69 | 593,757.65 | 131,244.15 | 170,979.70 | 238,375.79 | 143,830.79 | 143,830.79 | 143,830.79 | 143,830.79 | 163,914.65 | 163,914.65 | 154,818.70 | 94,117.23 | 143,398.57 | 189,899.30 | 155,687.49 | 53,210.79 | 53,210.79 |
| Motor Vehicle Exhaust | 6,547.86 | 12,277.00 | 12,558.83 | 13,693.30 | 13,693.30 | 19,330.93 | 19,613.35 | 19,613.35 | 16,935.45 | 13,136.86 | 13,419.28 | 10,741.38 | 10,741.38 | 13,419.28 | 22,713.99 | 22,009.42 | 16,371.20 | 8,055.66 | 6,716.71 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 9,749.70 | 23,541.11 | 27,937.60 | 38,334.51 | 46,328.13 | 61,965.80 | 65,562.93 | 65,562.93 | 59,742.50 | 59,697.60 | 61,296.32 | 55,475.90 | 56,674.94 | 62,095.69 | 75,380.17 | 73,781.44 | 58,543.46 | 33,887.92 | 26,181.53 |
| **Total** | **60,776.22** | **620,479.80** | **634,254.08** | **183,271.96** | **231,001.14** | **319,672.52** | **229,007.07** | **229,007.07** | **220,508.74** | **216,665.25** | **238,630.25** | **230,131.92** | **222,235.01** | **169,632.19** | **241,492.73** | **285,690.17** | **230,602.15** | **95,154.37** | **86,109.03** |
| **Construction Total** | **4,744,321.67** | | | | | | | | | | | | | | | | | | |

[a] Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 3-H**
**$CH_4$ Monthly Emissions Summary**

| | Emissions (lb/month)[a] | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 3.39 | 45.07 | 45.98 | 9.94 | 14.59 | 18.10 | 11.89 | 11.89 | 11.89 | 11.89 | 14.16 | 14.16 | 13.25 | 10.49 | 14.34 | 18.28 | 14.55 | 6.00 | 6.00 |
| Motor Vehicle Exhaust | 1.71 | 2.93 | 3.18 | 3.41 | 3.41 | 4.80 | 4.88 | 4.88 | 4.31 | 3.79 | 3.87 | 3.30 | 3.30 | 3.87 | 5.82 | 5.19 | 3.98 | 2.03 | 1.75 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 9.46 | 23.47 | 29.48 | 33.06 | 44.00 | 53.78 | 58.70 | 58.70 | 56.54 | 57.45 | 59.64 | 57.48 | 59.12 | 60.73 | 66.32 | 64.13 | 54.90 | 38.59 | 30.96 |
| **Total** | **14.56** | **71.46** | **78.64** | **46.42** | **62.00** | **76.68** | **75.46** | **75.46** | **72.73** | **73.13** | **77.67** | **74.94** | **75.67** | **75.09** | **86.47** | **87.60** | **73.43** | **46.62** | **38.70** |
| **Construction Total** | **1,282.70** | | | | | | | | | | | | | | | | | | |

[a] Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 3-I**
**$N_2O$ Monthly Emissions Summary**

| | Emissions (lb/month)[a] | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 1.16 | 15.22 | 15.46 | 3.42 | 4.46 | 6.21 | 3.75 | 3.75 | 3.75 | 3.75 | 4.28 | 4.28 | 4.04 | 2.47 | 3.75 | 4.96 | 4.07 | 1.39 | 1.39 |
| Motor Vehicle Exhaust | 0.09 | 0.15 | 0.16 | 0.17 | 0.17 | 0.24 | 0.25 | 0.25 | 0.22 | 0.20 | 0.20 | 0.18 | 0.18 | 0.20 | 0.30 | 0.26 | 0.20 | 0.10 | 0.09 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 0.63 | 1.58 | 1.99 | 2.20 | 2.95 | 3.58 | 3.91 | 3.91 | 3.79 | 3.86 | 4.01 | 3.88 | 3.99 | 4.08 | 4.42 | 4.27 | 3.68 | 2.62 | 2.11 |
| **Total** | **1.88** | **16.94** | **17.61** | **5.79** | **7.58** | **10.03** | **7.91** | **7.91** | **7.76** | **7.81** | **8.49** | **8.33** | **8.21** | **6.75** | **8.46** | **9.48** | **7.94** | **4.12** | **3.59** |
| **Construction Total** | **156.59** | | | | | | | | | | | | | | | | | | |

[a] Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 4-A**
**CO Daily Emissions Summary by Month**

| | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 7.31 | 83.65 | 86.43 | 20.01 | 31.75 | 39.25 | 29.91 | 29.91 | 29.91 | 29.91 | 35.65 | 35.65 | 32.87 | 27.28 | 35.44 | 42.92 | 33.36 | 15.80 | 15.80 |
| Motor Vehicle Exhaust | 0.37 | 0.59 | 0.68 | 0.73 | 0.73 | 1.02 | 1.04 | 1.04 | 0.93 | 0.91 | 0.92 | 0.82 | 0.82 | 0.92 | 1.28 | 1.05 | 0.83 | 0.43 | 0.38 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 4.28 | 10.67 | 13.52 | 14.65 | 19.84 | 23.86 | 26.19 | 26.19 | 25.48 | 25.97 | 27.01 | 26.29 | 27.07 | 27.53 | 29.50 | 28.46 | 24.70 | 17.90 | 14.43 |
| **Total** | **11.96** | **94.91** | **100.63** | **35.39** | **52.32** | **64.13** | **57.14** | **57.14** | **56.33** | **56.79** | **63.57** | **62.76** | **60.76** | **55.72** | **66.22** | **72.43** | **58.90** | **34.13** | **30.61** |

**Table 4-B**
**ROC Daily Emissions Summary by Month**

| | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 1.71 | 22.70 | 23.16 | 5.01 | 7.35 | 9.12 | 5.99 | 5.99 | 5.99 | 5.99 | 7.13 | 7.13 | 6.67 | 5.28 | 7.22 | 9.21 | 7.33 | 3.02 | 3.02 |
| Motor Vehicle Exhaust | 0.07 | 0.12 | 0.13 | 0.14 | 0.14 | 0.19 | 0.20 | 0.20 | 0.17 | 0.15 | 0.16 | 0.13 | 0.13 | 0.16 | 0.24 | 0.21 | 0.16 | 0.08 | 0.07 |
| Asphaltic Paving | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.07 | 6.40 | 0.00 | 0.00 |
| Architectural Coating | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 0.00 | 0.00 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 0.40 | 0.98 | 1.23 | 1.38 | 1.84 | 2.24 | 2.45 | 2.45 | 2.36 | 2.40 | 2.49 | 2.40 | 2.47 | 2.54 | 2.77 | 2.68 | 2.29 | 1.62 | 1.30 |
| **Total** | **2.17** | **23.80** | **24.53** | **6.52** | **9.32** | **11.56** | **26.27** | **26.27** | **26.16** | **26.18** | **27.42** | **27.31** | **26.92** | **25.62** | **27.87** | **40.80** | **33.82** | **4.72** | **4.39** |

**Table 4-C**
**NOx Daily Emissions Summary by Month**

| | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 14.09 | 189.67 | 192.76 | 38.75 | 54.30 | 73.67 | 48.21 | 48.21 | 48.21 | 48.21 | 56.25 | 56.25 | 53.16 | 36.47 | 52.69 | 70.36 | 56.98 | 20.41 | 20.41 |
| Motor Vehicle Exhaust | 1.71 | 3.34 | 3.36 | 3.42 | 3.42 | 4.75 | 4.80 | 4.80 | 4.14 | 2.92 | 2.97 | 2.31 | 2.31 | 2.97 | 5.48 | 5.44 | 4.08 | 2.09 | 1.76 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 1.27 | 3.00 | 3.28 | 5.57 | 6.07 | 8.89 | 9.12 | 9.12 | 7.84 | 7.64 | 7.74 | 6.46 | 6.53 | 7.79 | 10.66 | 10.56 | 7.76 | 3.46 | 2.51 |
| **Total** | **17.08** | **196.01** | **199.40** | **47.74** | **63.79** | **87.32** | **62.14** | **62.14** | **60.20** | **58.77** | **66.96** | **65.02** | **62.01** | **47.23** | **68.84** | **86.36** | **68.82** | **25.95** | **24.68** |

**Table 4-D**
**SOx Daily Emissions Summary by Month**

| | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Motor Vehicle Exhaust | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total** | **0.03** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.02** | **0.02** | **0.01** | **0.01** | **0.02** | **0.02** | **0.02** | **0.02** | **0.02** | **0.02** | **0.01** | **0.01** | **0.01** |

**Table 4-E**
**PM10 Daily Emissions Summary by Month**

| | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Source** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 0.66 | 7.33 | 7.56 | 1.86 | 3.02 | 3.72 | 2.85 | 2.85 | 2.85 | 2.85 | 3.46 | 3.46 | 3.23 | 2.73 | 3.42 | 4.10 | 3.19 | 1.61 | 1.61 |
| Motor Vehicle Exhaust | 0.04 | 0.08 | 0.08 | 0.09 | 0.09 | 0.12 | 0.12 | 0.12 | 0.11 | 0.08 | 0.08 | 0.07 | 0.07 | 0.08 | 0.14 | 0.14 | 0.10 | 0.05 | 0.04 |
| Motor Vehicle Fugitive Emissions | 12.82 | 21.35 | 22.70 | 53.73 | 53.73 | 86.11 | 87.63 | 87.63 | 72.12 | 74.15 | 75.67 | 60.15 | 60.15 | 75.67 | 105.18 | 101.80 | 69.25 | 21.35 | 13.59 |
| Earthwork Fugitive Emissions | 12.36 | 83.02 | 82.75 | 12.03 | 12.03 | 12.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 12.03 | 12.03 | 12.03 | 0.00 | 0.00 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 0.06 | 0.15 | 0.18 | 0.25 | 0.30 | 0.40 | 0.42 | 0.42 | 0.39 | 0.39 | 0.40 | 0.36 | 0.37 | 0.40 | 0.49 | 0.48 | 0.38 | 0.22 | 0.17 |
| Motor Vehicle Fugitive Emissions | 0.29 | 0.71 | 0.89 | 1.01 | 1.34 | 1.64 | 1.79 | 1.79 | 1.72 | 1.74 | 1.81 | 1.74 | 1.78 | 1.84 | 2.02 | 1.96 | 1.67 | 1.16 | 0.93 |
| **Total** | **26.23** | **112.64** | **114.17** | **68.96** | **70.50** | **104.03** | **92.82** | **92.82** | **77.18** | **79.21** | **81.42** | **65.78** | **65.60** | **80.72** | **123.28** | **120.51** | **86.62** | **24.40** | **16.35** |

**Table 4-F**
**PM2.5 Daily Emissions Summary by Month**

| Source | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 0.66 | 7.33 | 7.56 | 1.86 | 3.02 | 3.72 | 2.85 | 2.85 | 2.85 | 2.85 | 3.46 | 3.46 | 3.23 | 2.73 | 3.42 | 4.10 | 3.19 | 1.61 | 1.61 |
| Motor Vehicle Exhaust | 0.03 | 0.06 | 0.06 | 0.06 | 0.06 | 0.08 | 0.08 | 0.08 | 0.07 | 0.05 | 0.06 | 0.05 | 0.05 | 0.06 | 0.10 | 0.10 | 0.07 | 0.04 | 0.03 |
| Motor Vehicle Fugitive Emissions | 1.28 | 2.14 | 2.27 | 5.37 | 5.37 | 8.61 | 8.76 | 8.76 | 7.21 | 7.41 | 7.57 | 6.02 | 6.02 | 7.57 | 10.52 | 10.18 | 6.92 | 2.14 | 1.36 |
| Earthwork Fugitive Emissions | 1.35 | 10.90 | 10.86 | 1.30 | 1.30 | 1.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.30 | 1.30 | 1.30 | 0.00 | 0.00 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 0.03 | 0.08 | 0.09 | 0.13 | 0.16 | 0.22 | 0.23 | 0.23 | 0.20 | 0.20 | 0.21 | 0.18 | 0.19 | 0.21 | 0.26 | 0.26 | 0.20 | 0.11 | 0.08 |
| Motor Vehicle Fugitive Emissions | 0.07 | 0.17 | 0.22 | 0.25 | 0.33 | 0.40 | 0.44 | 0.44 | 0.42 | 0.43 | 0.44 | 0.43 | 0.44 | 0.45 | 0.50 | 0.48 | 0.41 | 0.28 | 0.23 |
| **Total** | **3.42** | **20.67** | **21.06** | **8.97** | **10.23** | **14.34** | **12.36** | **12.36** | **10.76** | **10.95** | **11.74** | **10.13** | **9.91** | **11.01** | **16.09** | **16.42** | **12.09** | **4.17** | **3.31** |

**Table 4-G**
**$CO_2$ Daily Emissions Summary by Month**

| Source | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 2,021.76 | 26,575.53 | 26,988.98 | 5,965.64 | 7,771.80 | 10,835.26 | 6,537.76 | 6,537.76 | 6,537.76 | 6,537.76 | 7,450.67 | 7,450.67 | 7,037.21 | 4,278.06 | 6,518.12 | 8,631.79 | 7,076.70 | 2,418.67 | 2,418.67 |
| Motor Vehicle Exhaust | 297.63 | 558.05 | 570.86 | 622.42 | 622.42 | 878.68 | 891.52 | 891.52 | 769.79 | 597.13 | 609.97 | 488.24 | 488.24 | 609.97 | 1032.45 | 1000.43 | 744.15 | 366.17 | 305.31 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 443.17 | 1070.05 | 1269.89 | 1742.48 | 2105.82 | 2816.63 | 2980.13 | 2980.13 | 2715.57 | 2713.53 | 2786.20 | 2521.63 | 2576.13 | 2822.53 | 3426.37 | 3353.70 | 2661.07 | 1540.36 | 1190.07 |
| **Total** | **2,762.56** | **28,203.63** | **28,829.73** | **8,330.54** | **10,500.05** | **14,530.57** | **10,409.41** | **10,409.41** | **10,023.12** | **9,848.42** | **10,846.83** | **10,460.54** | **10,101.59** | **7,710.55** | **10,976.94** | **12,985.92** | **10,481.92** | **4,325.20** | **3,914.05** |

**Table 4-H**
**$CH_4$ Daily Emissions Summary by Month**

| Source | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 0.15 | 2.05 | 2.09 | 0.45 | 0.66 | 0.82 | 0.54 | 0.54 | 0.54 | 0.54 | 0.64 | 0.64 | 0.60 | 0.48 | 0.65 | 0.83 | 0.66 | 0.27 | 0.27 |
| Motor Vehicle Exhaust | 0.08 | 0.13 | 0.14 | 0.16 | 0.16 | 0.22 | 0.22 | 0.22 | 0.20 | 0.17 | 0.18 | 0.15 | 0.15 | 0.18 | 0.26 | 0.24 | 0.18 | 0.09 | 0.08 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 0.43 | 1.07 | 1.34 | 1.50 | 2.00 | 2.44 | 2.67 | 2.67 | 2.57 | 2.61 | 2.71 | 2.61 | 2.69 | 2.76 | 3.01 | 2.92 | 2.50 | 1.75 | 1.41 |
| **Total** | **0.66** | **3.25** | **3.57** | **2.11** | **2.82** | **3.49** | **3.43** | **3.43** | **3.31** | **3.32** | **3.53** | **3.41** | **3.44** | **3.41** | **3.93** | **3.98** | **3.34** | **2.12** | **1.76** |

**Table 4-I**
**$N_2O$ Daily Emissions Summary by Month**

| Source | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 0.05 | 0.69 | 0.70 | 0.16 | 0.20 | 0.28 | 0.17 | 0.17 | 0.17 | 0.17 | 0.19 | 0.19 | 0.18 | 0.11 | 0.17 | 0.23 | 0.18 | 0.06 | 0.06 |
| Motor Vehicle Exhaust | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 0.03 | 0.07 | 0.09 | 0.10 | 0.13 | 0.16 | 0.18 | 0.18 | 0.17 | 0.18 | 0.18 | 0.18 | 0.18 | 0.19 | 0.20 | 0.19 | 0.17 | 0.12 | 0.10 |
| **Total** | **0.09** | **0.77** | **0.80** | **0.26** | **0.34** | **0.46** | **0.36** | **0.36** | **0.35** | **0.35** | **0.39** | **0.38** | **0.37** | **0.31** | **0.38** | **0.43** | **0.36** | **0.19** | **0.16** |

**Table 5-A**
**Equipment Use**

| Equipment | Horsepower | Daily Use (hr/day) | Number | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Air Compressor - 185 | 61 | 8 | | | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 100 Ton Hydraulic Crane | 168 | 8 | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| Putzmeister Concrete Pump - M 28-4 | 350 | 8 | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | |
| CAT Reach Lift - TH83 | 105 | 8 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 |
| Genie Knuckleboom - Z60/34 | 51 | 8 | | | | | | | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 2 |
| CAT 623G Scraper | 365 | 8 | | 6 | 6 | | | | | | | | | | | | | | | | |
| CAT D8R Dozer | 305 | 8 | | 2 | 2 | | | | | | | | | | | | | | | | |
| CAT 140H Motor Grader | 185 | 8 | 1 | 2 | 2 | 1 | 1 | 1 | | | | | | | | | 1 | 1 | 1 | | |
| CAT Soil Compactor - 825H | 354 | 8 | | 1 | 1 | | | | | | | | | | | | | | | | |
| CAT Single Drum Roller - CS-563D | 153 | 8 | | | | | | | | | | | | | | | 1 | 1 | 1 | | |
| CAT Paving Machine - AP-1055D | 224 | 8 | | | | | | | | | | | | | | | | 1 | 1 | | |
| CAT Asphalt Roller, Steel Drum - CB-634C | 145 | 8 | | | | | | | | | | | | | | | | 1 | 1 | | |
| CAT Wheel Loader - 966G | 235 | 8 | | | | 1 | 1 | 1 | | | | | | | | | | | | | |
| CAT Backhoe - 416C | 80 | 8 | | | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CAT Excavator - 345BL | 321 | 8 | | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | |
| CAT Compactor - CP-323C | 80 | 8 | | | | 1 | 1 | 1 | | | | | | | | | | | | | |
| John Deere Skiploader - 210LE | 59 | 8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

**Table 5-B**
**Equipment CO Emissions**

| Equipment | OFFROAD Model Category | Emission Factor (lb/hr) | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Air Compressor - 185 | Air Compressors | 3.20E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 5.13 | 5.13 | 5.13 | 5.13 | 5.13 | 5.13 | 5.13 | 5.13 | 5.13 | 5.13 | 5.13 | 5.13 | 5.13 | 5.13 | 5.13 |
| 100 Ton Hydraulic Crane | Cranes | 4.79E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 3.83 | 3.83 | 3.83 | 3.83 | 3.83 | 3.83 | 3.83 | 3.83 | 3.83 | 3.83 | 3.83 | 3.83 | 0.00 | 0.00 | 0.00 |
| Putzmeister Concrete Pump - M 28-4 | Pumps | 6.98E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Reach Lift - TH83 | Aerial Lifts | 2.39E-01 | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 | 3.82 | 3.82 | 3.82 | 3.82 | 3.82 | 5.73 | 5.73 | 5.73 | 5.73 | 5.73 | 3.82 | 1.91 | 1.91 | 1.91 |
| Genie Knuckleboom - Z60/34 | Aerial Lifts | 2.39E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.82 | 3.82 | 3.82 | 3.82 | 7.64 | 7.64 | 7.64 | 7.64 | 7.64 | 7.64 | 3.82 | 3.82 | 3.82 |
| CAT 623G Scraper | Scrapers | 1.07E+00 | 0.00 | 51.30 | 51.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT D8R Dozer | Crawler Tractors | 8.35E-01 | 0.00 | 13.36 | 13.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT 140H Motor Grader | Graders | 4.04E-01 | 3.23 | 6.47 | 6.47 | 3.23 | 3.23 | 3.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.23 | 3.23 | 3.23 | 0.00 | 0.00 |
| CAT Soil Compactor - 825H | Rollers | 5.59E-01 | 0.00 | 4.47 | 4.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Single Drum Roller - CS-563D | Rollers | 6.16E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.93 | 4.93 | 4.93 | 0.00 | 0.00 |
| CAT Paving Machine - AP-1055D | Pavers | 5.58E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.47 | 4.47 | 0.00 | 0.00 |
| CAT Asphalt Roller, Steel Drum - CB-634C | Rollers | 6.16E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.93 | 4.93 | 0.00 | 0.00 |
| CAT Wheel Loader - 966G | Rubber Tired Loaders | 3.44E-01 | 0.00 | 0.00 | 0.00 | 2.75 | 2.75 | 2.75 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Backhoe - 416C | Tractors/Loaders/Backhoes | 3.48E-01 | 0.00 | 0.00 | 2.78 | 2.78 | 5.56 | 5.56 | 5.56 | 5.56 | 5.56 | 5.56 | 5.56 | 5.56 | 2.78 | 2.78 | 2.78 | 2.78 | 2.78 | 2.78 | 2.78 |
| CAT Excavator - 345BL | Excavators | 4.96E-01 | 0.00 | 3.97 | 3.97 | 3.97 | 3.97 | 3.97 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Compactor - CP-323C | Rollers | 4.00E-01 | 0.00 | 0.00 | 0.00 | 3.20 | 3.20 | 3.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| John Deere Skiploader - 210LE | Skid Steer Loaders | 2.71E-01 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 | 2.17 |
| **Total Daily Emissions** | | | **7.31** | **83.65** | **86.43** | **20.01** | **31.75** | **39.25** | **29.91** | **29.91** | **29.91** | **29.91** | **35.65** | **35.65** | **32.87** | **27.28** | **35.44** | **42.92** | **33.36** | **15.80** | **15.80** |

**Table 5-C**
**Equipment ROC Emissions**

| Equipment | OFFROAD Model Category | Emission Factor (lb/hr) | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Air Compressor - 185 | Air Compressors | 7.18E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 |
| 100 Ton Hydraulic Crane | Cranes | 9.17E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.00 | 0.00 | 0.00 |
| Putzmeister Concrete Pump - M 28-4 | Pumps | 1.74E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.39 | 1.39 | 1.39 | 1.39 | 1.39 | 1.39 | 1.39 | 1.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Reach Lift - TH83 | Aerial Lifts | 4.77E-02 | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 | 0.76 | 0.76 | 0.76 | 0.76 | 0.76 | 1.15 | 1.15 | 1.15 | 1.15 | 1.15 | 0.76 | 0.38 | 0.38 | 0.38 |
| Genie Knuckleboom - Z60/34 | Aerial Lifts | 4.77E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.76 | 0.76 | 0.76 | 0.76 | 1.53 | 1.53 | 1.53 | 1.53 | 1.53 | 1.53 | 0.76 | 0.76 | 0.76 |
| CAT 623G Scraper | Scrapers | 2.88E-01 | 0.00 | 13.83 | 13.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT D8R Dozer | Crawler Tractors | 2.30E-01 | 0.00 | 3.68 | 3.68 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT 140H Motor Grader | Graders | 1.32E-01 | 1.06 | 2.12 | 2.12 | 1.06 | 1.06 | 1.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.06 | 1.06 | 1.06 | 0.00 | 0.00 |
| CAT Soil Compactor - 825H | Rollers | 1.47E-01 | 0.00 | 1.17 | 1.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Single Drum Roller - CS-563D | Rollers | 1.10E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.88 | 0.88 | 0.88 | 0.00 | 0.00 |
| CAT Paving Machine - AP-1055D | Pavers | 1.86E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.49 | 1.49 | 0.00 | 0.00 |
| CAT Asphalt Roller, Steel Drum - CB-634C | Rollers | 1.10E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.88 | 0.88 | 0.00 | 0.00 |
| CAT Wheel Loader - 966G | Rubber Tired Loaders | 1.12E-01 | 0.00 | 0.00 | 0.00 | 0.89 | 0.89 | 0.89 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Backhoe - 416C | Tractors/Loaders/Backhoes | 5.75E-02 | 0.00 | 0.00 | 0.46 | 0.46 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 |
| CAT Excavator - 345BL | Excavators | 1.58E-01 | 0.00 | 1.26 | 1.26 | 1.26 | 1.26 | 1.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Compactor - CP-323C | Rollers | 8.55E-02 | 0.00 | 0.00 | 0.00 | 0.68 | 0.68 | 0.68 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| John Deere Skiploader - 210LE | Skid Steer Loaders | 3.34E-02 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 |
| **Total Daily Emissions** | | | **1.71** | **22.70** | **23.16** | **5.01** | **7.35** | **9.12** | **5.99** | **5.99** | **5.99** | **5.99** | **7.13** | **7.13** | **6.67** | **5.28** | **7.22** | **9.21** | **7.33** | **3.02** | **3.02** |

**Table 5-D**
**Equipment NOx Emissions**

| Equipment | OFFROAD Model Category | Emission Factor (lb/hr) | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| Air Compressor - 185 | Air Compressors | 4.45E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 7.12 | 7.12 | 7.12 | 7.12 | 7.12 | 7.12 | 7.12 | 7.12 | 7.12 | 7.12 | 7.12 | 7.12 | 7.12 | 7.12 | 7.12 |
| 100 Ton Hydraulic Crane | Cranes | 6.67E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 5.34 | 0.00 | 0.00 | 0.00 |
| Putzmeister Concrete Pump - M 28-4 | Pumps | 2.09E+00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 16.69 | 16.69 | 16.69 | 16.69 | 16.69 | 16.69 | 16.69 | 16.69 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Reach Lift - TH83 | Aerial Lifts | 3.35E-01 | 2.68 | 2.68 | 2.68 | 2.68 | 2.68 | 5.36 | 5.36 | 5.36 | 5.36 | 5.36 | 8.04 | 8.04 | 8.04 | 8.04 | 8.04 | 5.36 | 2.68 | 2.68 | 2.68 |
| Genie Knuckleboom - Z60/34 | Aerial Lifts | 3.35E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.36 | 5.36 | 5.36 | 5.36 | 10.72 | 10.72 | 10.72 | 10.72 | 10.72 | 10.72 | 5.36 | 5.36 | 5.36 |
| CAT 623G Scraper | Scrapers | 2.41E+00 | 0.00 | 115.56 | 115.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT D8R Dozer | Crawler Tractors | 1.90E+00 | 0.00 | 30.34 | 30.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT 140H Motor Grader | Graders | 1.16E+00 | 9.26 | 18.51 | 18.51 | 9.26 | 9.26 | 9.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 9.26 | 9.26 | 9.26 | 0.00 | 0.00 |
| CAT Soil Compactor - 825H | Rollers | 1.39E+00 | 0.00 | 11.15 | 11.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Single Drum Roller - CS-563D | Rollers | 8.71E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.97 | 6.97 | 6.97 | 0.00 | 0.00 |
| CAT Paving Machine - AP-1055D | Pavers | 1.67E+00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 13.37 | 13.37 | 0.00 | 0.00 |
| CAT Asphalt Roller, Steel Drum - CB-634C | Rollers | 8.71E-01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.97 | 6.97 | 0.00 | 0.00 |
| CAT Wheel Loader - 966G | Rubber Tired Loaders | 9.87E-01 | 0.00 | 0.00 | 0.00 | 7.90 | 7.90 | 7.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Backhoe - 416C | Tractors/Loaders/Backhoes | 3.86E-01 | 0.00 | 0.00 | 3.09 | 3.09 | 6.18 | 6.18 | 6.18 | 6.18 | 6.18 | 6.18 | 6.18 | 6.18 | 3.09 | 3.09 | 3.09 | 3.09 | 3.09 | 3.09 | 3.09 |
| CAT Excavator - 345BL | Excavators | 1.16E+00 | 0.00 | 9.28 | 9.28 | 9.28 | 9.28 | 9.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Compactor - CP-323C | Rollers | 5.49E-01 | 0.00 | 0.00 | 0.00 | 4.39 | 4.39 | 4.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| John Deere Skiploader - 210LE | Skid Steer Loaders | 2.70E-01 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 | 2.16 |
| **Total Daily Emissions** | | | **14.09** | **189.67** | **192.76** | **38.75** | **54.30** | **73.67** | **48.21** | **48.21** | **48.21** | **48.21** | **56.25** | **56.25** | **53.16** | **36.47** | **52.69** | **70.36** | **56.98** | **20.41** | **20.41** |

**Table 5-E**
**Equipment SOx Emissions**

| Equipment | OFFROAD Model Category | Emission Factor (lb/hr) | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| Air Compressor - 185 | Air Compressors | 5.50E-04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 100 Ton Hydraulic Crane | Cranes | 9.03E-04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| Putzmeister Concrete Pump - M 28-4 | Pumps | 3.39E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Reach Lift - TH83 | Aerial Lifts | 4.46E-04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| Genie Knuckleboom - Z60/34 | Aerial Lifts | 4.46E-04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| CAT 623G Scraper | Scrapers | 3.15E-03 | 0.00 | 0.15 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT D8R Dozer | Crawler Tractors | 2.54E-03 | 0.00 | 0.04 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT 140H Motor Grader | Graders | 1.93E-03 | 0.02 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 |
| CAT Soil Compactor - 825H | Rollers | 2.15E-03 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Single Drum Roller - CS-563D | Rollers | 1.22E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 |
| CAT Paving Machine - AP-1055D | Pavers | 2.19E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 |
| CAT Asphalt Roller, Steel Drum - CB-634C | Rollers | 1.22E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 |
| CAT Wheel Loader - 966G | Rubber Tired Loaders | 1.67E-03 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Backhoe - 416C | Tractors/Loaders/Backhoes | 6.06E-04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Excavator - 345BL | Excavators | 2.29E-03 | 0.00 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Compactor - CP-323C | Rollers | 6.91E-04 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| John Deere Skiploader - 210LE | Skid Steer Loaders | 5.01E-04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total Daily Emissions** | | | **0.02** | **0.27** | **0.27** | **0.07** | **0.09** | **0.12** | **0.07** | **0.07** | **0.07** | **0.07** | **0.08** | **0.08** | **0.08** | **0.05** | **0.08** | **0.10** | **0.08** | **0.03** | **0.03** |

**Table 5-F**
**Equipment PM10 Emissions**

| Equipment | OFFROAD Model Category | Emission Factor (lb/hr) | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| Air Compressor - 185 | Air Compressors | 3.91E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 |
| 100 Ton Hydraulic Crane | Cranes | 3.77E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.00 | 0.00 | 0.00 |
| Putzmeister Concrete Pump - M 28-4 | Pumps | 6.28E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Reach Lift - TH83 | Aerial Lifts | 2.55E-02 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.61 | 0.61 | 0.61 | 0.61 | 0.61 | 0.41 | 0.20 | 0.20 | 0.20 |
| Genie Knuckleboom - Z60/34 | Aerial Lifts | 2.55E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.41 | 0.41 | 0.41 | 0.41 | 0.82 | 0.82 | 0.82 | 0.82 | 0.82 | 0.82 | 0.41 | 0.41 | 0.41 |
| CAT 623G Scraper | Scrapers | 9.29E-02 | 0.00 | 4.46 | 4.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT D8R Dozer | Crawler Tractors | 7.31E-02 | 0.00 | 1.17 | 1.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT 140H Motor Grader | Graders | 3.99E-02 | 0.32 | 0.64 | 0.64 | 0.32 | 0.32 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.32 | 0.32 | 0.00 | 0.00 |
| CAT Soil Compactor - 825H | Rollers | 4.87E-02 | 0.00 | 0.39 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Single Drum Roller - CS-563D | Rollers | 4.69E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.38 | 0.38 | 0.00 | 0.00 |
| CAT Paving Machine - AP-1055D | Pavers | 6.40E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.51 | 0.51 | 0.00 | 0.00 |
| CAT Asphalt Roller, Steel Drum - CB-634C | Rollers | 4.69E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.38 | 0.00 | 0.00 |
| CAT Wheel Loader - 966G | Rubber Tired Loaders | 3.36E-02 | 0.00 | 0.00 | 0.00 | 0.27 | 0.27 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Backhoe - 416C | Tractors/Loaders/Backhoes | 2.93E-02 | 0.00 | 0.00 | 0.23 | 0.23 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 |
| CAT Excavator - 345BL | Excavators | 4.13E-02 | 0.00 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Compactor - CP-323C | Rollers | 4.53E-02 | 0.00 | 0.00 | 0.00 | 0.36 | 0.36 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| John Deere Skiploader - 210LE | Skid Steer Loaders | 1.70E-02 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| **Total Daily Emissions** | | | **0.66** | **7.33** | **7.56** | **1.86** | **3.02** | **3.72** | **2.85** | **2.85** | **2.85** | **2.85** | **3.46** | **3.46** | **3.23** | **2.73** | **3.42** | **4.10** | **3.19** | **1.61** | **1.61** |

**Table 5-G**
**Equipment PM2.5 Emissions**

| Equipment | OFFROAD Model Category | Emission Factor (lb/hr) | Emissions (lb/day) Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Air Compressor - 185 | Air Compressors | 3.91E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 |
| 100 Ton Hydraulic Crane | Cranes | 3.77E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.00 | 0.00 | 0.00 |
| Putzmeister Concrete Pump - M 28-4 | Pumps | 6.28E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Reach Lift - TH83 | Aerial Lifts | 2.55E-02 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.61 | 0.61 | 0.61 | 0.61 | 0.61 | 0.41 | 0.20 | 0.20 | 0.20 |
| Genie Knuckleboom - Z60/34 | Aerial Lifts | 2.55E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.41 | 0.41 | 0.41 | 0.41 | 0.82 | 0.82 | 0.82 | 0.82 | 0.82 | 0.82 | 0.41 | 0.41 | 0.41 |
| CAT 623G Scraper | Scrapers | 9.29E-02 | 0.00 | 4.46 | 4.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT D8R Dozer | Crawler Tractors | 7.31E-02 | 0.00 | 1.17 | 1.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT 140H Motor Grader | Graders | 3.99E-02 | 0.32 | 0.64 | 0.64 | 0.32 | 0.32 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.32 | 0.32 | 0.32 | 0.00 | 0.00 |
| CAT Soil Compactor - 825H | Rollers | 4.87E-02 | 0.00 | 0.39 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Single Drum Roller - CS-563D | Rollers | 4.69E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.38 | 0.38 | 0.00 | 0.00 |
| CAT Paving Machine - AP-1055D | Pavers | 6.40E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.51 | 0.51 | 0.00 | 0.00 |
| CAT Asphalt Roller, Steel Drum - CB-634C | Rollers | 4.69E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.38 | 0.00 | 0.00 |
| CAT Wheel Loader - 966G | Rubber Tired Loaders | 3.36E-02 | 0.00 | 0.00 | 0.00 | 0.27 | 0.27 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Backhoe - 416C | Tractors/Loaders/Backhoes | 2.93E-02 | 0.00 | 0.00 | 0.23 | 0.23 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 |
| CAT Excavator - 345BL | Excavators | 4.13E-02 | 0.00 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Compactor - CP-323C | Rollers | 4.53E-02 | 0.00 | 0.00 | 0.00 | 0.36 | 0.36 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| John Deere Skiploader - 210LE | Skid Steer Loaders | 1.70E-02 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| **Total Daily Emissions** | | | **0.66** | **7.33** | **7.56** | **1.86** | **3.02** | **3.72** | **2.85** | **2.85** | **2.85** | **2.85** | **3.46** | **3.46** | **3.23** | **2.73** | **3.42** | **4.10** | **3.19** | **1.61** | **1.61** |

**Table 5-H**
**Equipment $CO_2$ Emissions**

| Equipment | OFFROAD Model | Emission Factor | Emissions (lb/day) Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Air Compressor - 185 | Air Compressors | 4.69E+01 | 0.00 | 0.00 | 0.00 | 0.00 | 750.53 | 750.53 | 750.53 | 750.53 | 750.53 | 750.53 | 750.53 | 750.53 | 750.53 | 750.53 | 750.53 | 750.53 | 750.53 | 750.53 | 750.53 |
| 100 Ton Hydraulic Crane | Cranes | 8.03E+01 | 0.00 | 0.00 | 0.00 | 0.00 | 642.18 | 642.18 | 642.18 | 642.18 | 642.18 | 642.18 | 642.18 | 642.18 | 642.18 | 642.18 | 642.18 | 642.18 | 0.00 | 0.00 | 0.00 |
| Putzmeister Concrete Pump - M 28-4 | Pumps | 3.45E+02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2,759.16 | 2,759.16 | 2,759.16 | 2,759.16 | 2,759.16 | 2,759.16 | 2,759.16 | 2,759.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Reach Lift - TH83 | Aerial Lifts | 3.80E+01 | 304.30 | 304.30 | 304.30 | 304.30 | 304.30 | 608.60 | 608.60 | 608.60 | 608.60 | 608.60 | 912.90 | 912.90 | 912.90 | 912.90 | 912.90 | 608.60 | 304.30 | 304.30 | 304.30 |
| Genie Knuckleboom - Z60/34 | Aerial Lifts | 3.80E+01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 608.60 | 608.60 | 608.60 | 608.60 | 1,217.20 | 1,217.20 | 1,217.20 | 1,217.20 | 1,217.20 | 1,217.20 | 608.60 | 608.60 | 608.60 |
| CAT 623G Scraper | Scrapers | 3.21E+02 | 0.00 | 15,414.72 | 15,414.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT D8R Dozer | Crawler Tractors | 2.59E+02 | 0.00 | 4,143.95 | 4,143.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT 140H Motor Grader | Graders | 1.72E+02 | 1,375.67 | 2,751.34 | 2,751.34 | 1,375.67 | 1,375.67 | 1,375.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1,375.67 | 1,375.67 | 1,375.67 | 0.00 | 0.00 |
| CAT Soil Compactor - 825H | Rollers | 2.19E+02 | 0.00 | 1,751.24 | 1,751.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Single Drum Roller - CS-563D | Rollers | 1.08E+02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 864.39 | 864.39 | 864.39 | 0.00 | 0.00 |
| CAT Paving Machine - AP-1055D | Pavers | 1.94E+02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1,553.58 | 1,553.58 | 0.00 | 0.00 |
| CAT Asphalt Roller, Steel Drum - CB-634C | Rollers | 1.08E+02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 864.39 | 864.39 | 0.00 | 0.00 |
| CAT Wheel Loader - 966G | Rubber Tired Loaders | 1.49E+02 | 0.00 | 0.00 | 0.00 | 1,190.74 | 1,190.74 | 1,190.74 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Backhoe - 416C | Tractors/Loaders/Backhoes | 5.17E+01 | 0.00 | 0.00 | 413.45 | 413.45 | 826.91 | 826.91 | 826.91 | 826.91 | 826.91 | 826.91 | 826.91 | 826.91 | 413.45 | 413.45 | 413.45 | 413.45 | 413.45 | 413.45 | 413.45 |
| CAT Excavator - 345BL | Excavators | 2.34E+02 | 0.00 | 1,868.20 | 1,868.20 | 1,868.20 | 1,868.20 | 1,868.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Compactor - CP-323C | Rollers | 5.89E+01 | 0.00 | 0.00 | 0.00 | 471.49 | 471.49 | 471.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| John Deere Skiploader - 210LE | Skid Steer Loaders | 4.27E+01 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 | 341.79 |
| **Total Daily Emissions** | | | **2,021.76** | **26,575.53** | **26,988.98** | **5,965.64** | **7,771.80** | **10,835.26** | **6,537.76** | **6,537.76** | **6,537.76** | **6,537.76** | **7,450.67** | **7,450.67** | **7,037.21** | **4,278.06** | **6,518.12** | **8,631.79** | **7,076.70** | **2,418.67** | **2,418.67** |

**Table 5-I**
**Equipment $CH_4$ Emissions**

| Equipment | OFFROAD Model | Emission Factor | Emissions (lb/day) Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Air Compressor - 185 | Air Compressors | 6.48E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| 100 Ton Hydraulic Crane | Cranes | 8.27E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.00 | 0.00 | 0.00 |
| Putzmeister Concrete Pump - M 28-4 | Pumps | 1.57E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Reach Lift - TH83 | Aerial Lifts | 4.31E-03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.07 | 0.03 | 0.03 | 0.03 |
| Genie Knuckleboom - Z60/34 | Aerial Lifts | 4.31E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.07 | 0.07 | 0.07 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.07 | 0.07 | 0.07 |
| CAT 623G Scraper | Scrapers | 2.60E-02 | 0.00 | 1.25 | 1.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT D8R Dozer | Crawler Tractors | 2.07E-02 | 0.00 | 0.33 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT 140H Motor Grader | Graders | 1.19E-02 | 0.10 | 0.19 | 0.19 | 0.10 | 0.10 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.10 | 0.10 | 0.00 | 0.00 |
| CAT Soil Compactor - 825H | Rollers | 1.32E-02 | 0.00 | 0.11 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Single Drum Roller - CS-563D | Rollers | 9.94E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.08 | 0.08 | 0.00 | 0.00 |
| CAT Paving Machine - AP-1055D | Pavers | 1.67E-02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.13 | 0.00 | 0.00 |
| CAT Asphalt Roller, Steel Drum - CB-634C | Rollers | 9.94E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.08 | 0.00 | 0.00 |
| CAT Wheel Loader - 966G | Rubber Tired Loaders | 1.01E-02 | 0.00 | 0.00 | 0.00 | 0.08 | 0.08 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Backhoe - 416C | Tractors/Loaders/Backhoes | 5.19E-03 | 0.00 | 0.00 | 0.04 | 0.04 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| CAT Excavator - 345BL | Excavators | 1.42E-02 | 0.00 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Compactor - CP-323C | Rollers | 7.71E-03 | 0.00 | 0.00 | 0.00 | 0.06 | 0.06 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| John Deere Skiploader - 210LE | Skid Steer Loaders | 3.01E-03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| **Total Daily Emissions** | | | **0.15** | **2.05** | **2.09** | **0.45** | **0.66** | **0.82** | **0.54** | **0.54** | **0.54** | **0.54** | **0.64** | **0.64** | **0.60** | **0.48** | **0.65** | **0.83** | **0.66** | **0.27** | **0.27** |

**Table 5-J**
**Equipment $N_2O$ Emissions**

| Equipment | OFFROAD Model | Emission Factor | Emissions (lb/day) Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Air Compressor - 185 | Air Compressors | 1.23E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| 100 Ton Hydraulic Crane | Cranes | 2.10E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 |
| Putzmeister Concrete Pump - M 28-4 | Pumps | 8.95E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Reach Lift - TH83 | Aerial Lifts | 9.96E-04 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 |
| Genie Knuckleboom - Z60/34 | Aerial Lifts | 9.96E-04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 |
| CAT 623G Scraper | Scrapers | 8.36E-03 | 0.00 | 0.40 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT D8R Dozer | Crawler Tractors | 6.74E-03 | 0.00 | 0.11 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT 140H Motor Grader | Graders | 4.47E-03 | 0.04 | 0.07 | 0.07 | 0.04 | 0.04 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.04 | 0.04 | 0.00 | 0.00 |
| CAT Soil Compactor - 825H | Rollers | 5.69E-03 | 0.00 | 0.05 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Single Drum Roller - CS-563D | Rollers | 2.83E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 |
| CAT Paving Machine - AP-1055D | Pavers | 5.05E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.04 | 0.00 | 0.00 |
| CAT Asphalt Roller, Steel Drum - CB-634C | Rollers | 2.83E-03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 |
| CAT Wheel Loader - 966G | Rubber Tired Loaders | 3.87E-03 | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Backhoe - 416C | Tractors/Loaders/Backhoes | 1.35E-03 | 0.00 | 0.00 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| CAT Excavator - 345BL | Excavators | 6.06E-03 | 0.00 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CAT Compactor - CP-323C | Rollers | 1.55E-03 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| John Deere Skiploader - 210LE | Skid Steer Loaders | 1.12E-03 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Total Daily Emissions** | | | **0.05** | **0.69** | **0.70** | **0.16** | **0.20** | **0.28** | **0.17** | **0.17** | **0.17** | **0.17** | **0.19** | **0.19** | **0.18** | **0.11** | **0.17** | **0.23** | **0.18** | **0.06** | **0.06** |

**Table 6-A**
**On-Site Motor Vehicle Use**

| Vehicle | Fuel | Miles per Day per Veh. | Number | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Company Pick-up Trucks - F250 | Gasoline | 3 | 3 | 3 | 5 | 5 | 5 | 7 | 7 | 7 | 7 | 10 | 10 | 10 | 10 | 10 | 10 | 5 | 5 | 3 | 3 |
| Company Flatbed Trucks - Ford F550 | Diesel | 5 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 2 |
| Delivery Truck and Trailers | Diesel | 16 | 1 | 2 | 2 | 6 | 6 | 10 | 10 | 10 | 8 | 8 | 8 | 6 | 6 | 8 | 12 | 12 | 8 | 2 | 1 |
| Fuel/Lube Truck | Diesel | 2 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 6 X 6 Water Truck 4000 gal. | Diesel | 50 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | 1 | 1 | 1 | 1 | 1 |

**Table 6-B**
**On-Site Motor Vehicle Emission Factors**

| Vehicle | Category | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Company Pick-up Trucks - F250 | LHD1 | 6.94E+00 | 7.98E-01 | 1.26E+00 | 1.00E-02 | 4.92E-02 | 2.19E-02 | 9.68E+02 | 8.59E-01 | 5.27E-02 |
| Company Flatbed Trucks - Ford F550 | T6 Instate Construction Small | 9.72E-01 | 2.84E-01 | 4.72E+00 | 1.14E-02 | 3.09E-01 | 2.12E-01 | 1.16E+03 | 3.24E-01 | 1.55E-02 |
| Delivery Truck and Trailers | T7 Tractor | 1.46E+00 | 3.21E-01 | 9.32E+00 | 1.69E-02 | 2.32E-01 | 1.59E-01 | 1.73E+03 | 3.65E-01 | 1.75E-02 |
| Fuel/Lube Truck | T7 Single Construction | 1.46E+00 | 3.24E-01 | 1.14E+01 | 1.70E-02 | 2.53E-01 | 1.78E-01 | 1.74E+03 | 3.69E-01 | 1.77E-02 |
| 6 X 6 Water Truck 4000 gal. | T7 Single Construction | 1.46E+00 | 3.24E-01 | 1.14E+01 | 1.70E-02 | 2.53E-01 | 1.78E-01 | 1.74E+03 | 3.69E-01 | 1.77E-02 |

**Table 6-C**
**On-Site Motor Vehicle CO Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Company Pick-up Trucks - F250 | 0.14 | 0.14 | 0.23 | 0.23 | 0.23 | 0.32 | 0.32 | 0.32 | 0.32 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.23 | 0.23 | 0.14 | 0.14 |
| Company Flatbed Trucks - Ford F550 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 |
| Delivery Truck and Trailers | 0.05 | 0.10 | 0.10 | 0.31 | 0.31 | 0.51 | 0.51 | 0.51 | 0.41 | 0.41 | 0.41 | 0.31 | 0.31 | 0.41 | 0.62 | 0.62 | 0.41 | 0.10 | 0.05 |
| Fuel/Lube Truck | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 6 X 6 Water Truck 4000 gal. | 0.16 | 0.32 | 0.32 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 |
| **Total** | **0.37** | **0.59** | **0.68** | **0.73** | **0.73** | **1.02** | **1.04** | **1.04** | **0.93** | **0.91** | **0.92** | **0.82** | **0.82** | **0.92** | **1.28** | **1.05** | **0.83** | **0.43** | **0.38** |

**Table 6-D**
**On-Site Motor Vehicle ROC Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Company Pick-up Trucks - F250 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.03 | 0.03 | 0.02 | 0.02 |
| Company Flatbed Trucks - Ford F550 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Delivery Truck and Trailers | 0.01 | 0.02 | 0.02 | 0.07 | 0.07 | 0.11 | 0.11 | 0.11 | 0.09 | 0.09 | 0.09 | 0.07 | 0.07 | 0.09 | 0.14 | 0.14 | 0.09 | 0.02 | 0.01 |
| Fuel/Lube Truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 X 6 Water Truck 4000 gal. | 0.04 | 0.07 | 0.07 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| **Total** | **0.07** | **0.12** | **0.13** | **0.14** | **0.14** | **0.19** | **0.20** | **0.20** | **0.17** | **0.15** | **0.16** | **0.13** | **0.13** | **0.16** | **0.24** | **0.21** | **0.16** | **0.08** | **0.07** |

**Table 6-E**
**On-Site Motor Vehicle NOx Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Company Pick-up Trucks - F250 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.06 | 0.06 | 0.06 | 0.06 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.04 | 0.04 | 0.03 | 0.03 |
| Company Flatbed Trucks - Ford F550 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.16 | 0.16 | 0.16 | 0.16 | 0.21 | 0.21 | 0.21 | 0.21 | 0.16 | 0.16 | 0.10 | 0.10 | 0.10 |
| Delivery Truck and Trailers | 0.33 | 0.66 | 0.66 | 1.97 | 1.97 | 3.29 | 3.29 | 3.29 | 2.63 | 2.63 | 2.63 | 1.97 | 1.97 | 2.63 | 3.94 | 3.94 | 2.63 | 0.66 | 0.33 |
| Fuel/Lube Truck | 0.00 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| 6 X 6 Water Truck 4000 gal. | 1.25 | 2.50 | 2.50 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| **Total** | **1.71** | **3.34** | **3.36** | **3.42** | **3.42** | **4.75** | **4.80** | **4.80** | **4.14** | **2.92** | **2.97** | **2.31** | **2.31** | **2.97** | **5.48** | **5.44** | **4.08** | **2.09** | **1.76** |

**Table 6-F**
**On-Site Motor Vehicle SOx Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Company Pick-up Trucks - F250 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Company Flatbed Trucks - Ford F550 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Delivery Truck and Trailers | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| Fuel/Lube Truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 X 6 Water Truck 4000 gal. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total** | **0.00** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.00** | **0.00** | **0.01** | **0.01** | **0.01** | **0.01** | **0.00** | **0.00** |

**Table 6-G**
**On-Site Motor Vehicle PM10 Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Company Pick-up Trucks - F250 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Company Flatbed Trucks - Ford F550 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Delivery Truck and Trailers | 0.01 | 0.02 | 0.02 | 0.05 | 0.05 | 0.08 | 0.08 | 0.08 | 0.07 | 0.07 | 0.07 | 0.05 | 0.05 | 0.07 | 0.10 | 0.10 | 0.07 | 0.02 | 0.01 |
| Fuel/Lube Truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 X 6 Water Truck 4000 gal. | 0.03 | 0.06 | 0.06 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| **Total** | **0.04** | **0.08** | **0.08** | **0.09** | **0.09** | **0.12** | **0.12** | **0.12** | **0.11** | **0.08** | **0.08** | **0.07** | **0.07** | **0.08** | **0.14** | **0.14** | **0.10** | **0.05** | **0.04** |

**Table 6-H**
**On-Site Motor Vehicle PM2.5 Emissions**

| | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Vehicle** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| Company Pick-up Trucks - F250 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Company Flatbed Trucks - Ford F550 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| Delivery Truck and Trailers | 0.01 | 0.01 | 0.01 | 0.03 | 0.03 | 0.06 | 0.06 | 0.06 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.04 | 0.07 | 0.07 | 0.04 | 0.01 | 0.01 |
| Fuel/Lube Truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 X 6 Water Truck 4000 gal. | 0.02 | 0.04 | 0.04 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| **Total** | **0.03** | **0.06** | **0.06** | **0.06** | **0.06** | **0.08** | **0.08** | **0.08** | **0.07** | **0.05** | **0.06** | **0.05** | **0.05** | **0.06** | **0.10** | **0.10** | **0.07** | **0.04** | **0.03** |

**Table 6-I**
**On-Site Motor Vehicle $CO_2$ Emissions**

| | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Vehicle** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| Company Pick-up Trucks - F250 | 19.22 | 19.22 | 32.03 | 32.03 | 32.03 | 44.84 | 44.84 | 44.84 | 44.84 | 64.05 | 64.05 | 64.05 | 64.05 | 64.05 | 64.05 | 32.03 | 32.03 | 19.22 | 19.22 |
| Company Flatbed Trucks - Ford F550 | 25.67 | 25.67 | 25.67 | 25.67 | 25.67 | 25.67 | 38.51 | 38.51 | 38.51 | 38.51 | 51.35 | 51.35 | 51.35 | 51.35 | 38.51 | 38.51 | 25.67 | 25.67 | 25.67 |
| Delivery Truck and Trailers | 60.86 | 121.72 | 121.72 | 365.17 | 365.17 | 608.61 | 608.61 | 608.61 | 486.89 | 486.89 | 486.89 | 365.17 | 365.17 | 486.89 | 730.34 | 730.34 | 486.89 | 121.72 | 60.86 |
| Fuel/Lube Truck | 0.00 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 | 7.68 |
| 6 X 6 Water Truck 4000 gal. | 191.88 | 383.76 | 383.76 | 191.88 | 191.88 | 191.88 | 191.88 | 191.88 | 191.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 191.88 | 191.88 | 191.88 | 191.88 | 191.88 |
| **Total** | **297.63** | **558.05** | **570.86** | **622.42** | **622.42** | **878.68** | **891.52** | **891.52** | **769.79** | **597.13** | **609.97** | **488.24** | **488.24** | **609.97** | **1032.45** | **1000.43** | **744.15** | **366.17** | **305.31** |

**Table 6-J**
**On-Site Motor Vehicle $CH_4$ Emissions**

| | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Vehicle** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| Company Pick-up Trucks - F250 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.03 | 0.03 | 0.02 | 0.02 |
| Company Flatbed Trucks - Ford F550 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Delivery Truck and Trailers | 0.01 | 0.03 | 0.03 | 0.08 | 0.08 | 0.13 | 0.13 | 0.13 | 0.10 | 0.10 | 0.10 | 0.08 | 0.08 | 0.10 | 0.15 | 0.15 | 0.10 | 0.03 | 0.01 |
| Fuel/Lube Truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 X 6 Water Truck 4000 gal. | 0.04 | 0.08 | 0.08 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| **Total** | **0.08** | **0.13** | **0.14** | **0.16** | **0.16** | **0.22** | **0.22** | **0.22** | **0.20** | **0.17** | **0.18** | **0.15** | **0.15** | **0.18** | **0.26** | **0.24** | **0.18** | **0.09** | **0.08** |

**Table 6-K**
**On-Site Motor Vehicle $N_2O$ Emissions**

| | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Vehicle** | **Jul-15** | **Aug-15** | **Sep-15** | **Oct-15** | **Nov-15** | **Dec-15** | **Jan-16** | **Feb-16** | **Mar-16** | **Apr-16** | **May-16** | **Jun-16** | **Jul-16** | **Aug-16** | **Sep-16** | **Oct-16** | **Nov-16** | **Dec-16** | **Jan-17** |
| Company Pick-up Trucks - F250 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Company Flatbed Trucks - Ford F550 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Delivery Truck and Trailers | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| Fuel/Lube Truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 X 6 Water Truck 4000 gal. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total** | **0.00** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.01** | **0.00** | **0.00** |

**Table 7-A**
**Off-Site Motor Vehicle Use**

| Vehicle | Fuel | Miles per Day per Veh.[a] | Number | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Worker Commute | Gasoline | 24.6 | 16 | 40 | 51 | 54 | 74 | 88 | 97 | 97 | 95 | 97 | 101 | 99 | 102 | 103 | 109 | 105 | 92 | 68 | 55 |
| Delivery Truck and Trailers | Diesel | 30 | 1 | 2 | 2 | 6 | 6 | 10 | 10 | 10 | 8 | 8 | 8 | 6 | 6 | 8 | 12 | 12 | 8 | 2 | 1 |
| Fuel/Lube Truck | Diesel | 10 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 6 X 6 Water Truck 4000 gal. | Diesel | 10 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | 1 | 1 | 1 | 1 | 1 |

[a] Worker commute is default value from California Emission Estimator Model (CalEEMod, version 2011.1.1) for Santa Barbara County. Mileages for other vehicles are assumptions.

**Table 7-B**
**Off-Site Motor Vehicle Emission Factors**

| Vehicle | Category | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Worker Commute | LDT1 | 4.78E+00 | 4.23E-01 | 4.68E-01 | 3.84E-03 | 4.92E-02 | 2.17E-02 | 3.35E+02 | 4.58E-01 | 3.15E-02 |
| Delivery Truck and Trailers | T7 tractor | 1.46E+00 | 3.21E-01 | 9.32E+00 | 1.69E-02 | 2.32E-01 | 1.59E-01 | 1.73E+03 | 3.65E-01 | 1.75E-02 |
| Fuel/Lube Truck | T7 single construction | 1.46E+00 | 3.24E-01 | 1.14E+01 | 1.70E-02 | 2.53E-01 | 1.78E-01 | 1.74E+03 | 3.69E-01 | 1.77E-02 |
| 6 X 6 Water Truck 4000 gal. | T7 single construction | 1.46E+00 | 3.24E-01 | 1.14E+01 | 1.70E-02 | 2.53E-01 | 1.78E-01 | 1.74E+03 | 3.69E-01 | 1.77E-02 |

**Table 7-C**
**Off-Site Motor Vehicle CO Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Worker Commute | 4.15 | 10.38 | 13.23 | 14.01 | 19.20 | 22.83 | 25.17 | 25.17 | 24.65 | 25.17 | 26.20 | 25.68 | 26.46 | 26.72 | 28.28 | 27.24 | 23.87 | 17.64 | 14.27 |
| Delivery Truck and Trailers | 0.10 | 0.19 | 0.19 | 0.58 | 0.58 | 0.96 | 0.96 | 0.96 | 0.77 | 0.77 | 0.77 | 0.58 | 0.58 | 0.77 | 1.16 | 1.16 | 0.77 | 0.19 | 0.10 |
| Fuel/Lube Truck | 0.00 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| 6 X 6 Water Truck 4000 gal. | 0.03 | 0.06 | 0.06 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| **Total** | **4.28** | **10.67** | **13.52** | **14.65** | **19.84** | **23.86** | **26.19** | **26.19** | **25.48** | **25.97** | **27.01** | **26.29** | **27.07** | **27.53** | **29.50** | **28.46** | **24.70** | **17.90** | **14.43** |

**Table 7-D**
**Off-Site Motor Vehicle ROC Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Worker Commute | 0.37 | 0.92 | 1.17 | 1.24 | 1.70 | 2.02 | 2.22 | 2.22 | 2.18 | 2.22 | 2.32 | 2.27 | 2.34 | 2.36 | 2.50 | 2.41 | 2.11 | 1.56 | 1.26 |
| Delivery Truck and Trailers | 0.02 | 0.04 | 0.04 | 0.13 | 0.13 | 0.21 | 0.21 | 0.21 | 0.17 | 0.17 | 0.17 | 0.13 | 0.13 | 0.17 | 0.25 | 0.25 | 0.17 | 0.04 | 0.02 |
| Fuel/Lube Truck | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 6 X 6 Water Truck 4000 gal. | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Total** | **0.40** | **0.98** | **1.23** | **1.38** | **1.84** | **2.24** | **2.45** | **2.45** | **2.36** | **2.40** | **2.49** | **2.40** | **2.47** | **2.54** | **2.77** | **2.68** | **2.29** | **1.62** | **1.30** |

**Table 7-E**
**Off-Site Motor Vehicle NOx Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Worker Commute | 0.41 | 1.01 | 1.29 | 1.37 | 1.88 | 2.23 | 2.46 | 2.46 | 2.41 | 2.46 | 2.56 | 2.51 | 2.59 | 2.61 | 2.77 | 2.66 | 2.33 | 1.73 | 1.40 |
| Delivery Truck and Trailers | 0.62 | 1.23 | 1.23 | 3.70 | 3.70 | 6.16 | 6.16 | 6.16 | 4.93 | 4.93 | 4.93 | 3.70 | 3.70 | 4.93 | 7.39 | 7.39 | 4.93 | 1.23 | 0.62 |
| Fuel/Lube Truck | 0.00 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| 6 X 6 Water Truck 4000 gal. | 0.25 | 0.50 | 0.50 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| **Total** | **1.27** | **3.00** | **3.28** | **5.57** | **6.07** | **8.89** | **9.12** | **9.12** | **7.84** | **7.64** | **7.74** | **6.46** | **6.53** | **7.79** | **10.66** | **10.56** | **7.76** | **3.46** | **2.51** |

**Table 7-F**
**Off-Site Motor Vehicle SOx Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Worker Commute | 0.00 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 |
| Delivery Truck and Trailers | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 |
| Fuel/Lube Truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 X 6 Water Truck 4000 gal. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total** | **0.00** | **0.01** | **0.01** | **0.02** | **0.02** | **0.03** | **0.03** | **0.03** | **0.03** | **0.03** | **0.03** | **0.03** | **0.03** | **0.03** | **0.04** | **0.04** | **0.03** | **0.02** | **0.01** |

**Table 7-G**
**Off-Site Motor Vehicle PM10 Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Worker Commute | 0.04 | 0.11 | 0.14 | 0.14 | 0.20 | 0.23 | 0.26 | 0.26 | 0.25 | 0.26 | 0.27 | 0.26 | 0.27 | 0.27 | 0.29 | 0.28 | 0.25 | 0.18 | 0.15 |
| Delivery Truck and Trailers | 0.02 | 0.03 | 0.03 | 0.09 | 0.09 | 0.15 | 0.15 | 0.15 | 0.12 | 0.12 | 0.12 | 0.09 | 0.09 | 0.12 | 0.18 | 0.18 | 0.12 | 0.03 | 0.02 |
| Fuel/Lube Truck | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 6 X 6 Water Truck 4000 gal. | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Total** | **0.06** | **0.15** | **0.18** | **0.25** | **0.30** | **0.40** | **0.42** | **0.42** | **0.39** | **0.39** | **0.40** | **0.36** | **0.37** | **0.40** | **0.49** | **0.48** | **0.38** | **0.22** | **0.17** |

**Table 7-H**
**Off-Site Motor Vehicle PM2.5 Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Worker Commute | 0.02 | 0.05 | 0.06 | 0.06 | 0.09 | 0.10 | 0.11 | 0.11 | 0.11 | 0.11 | 0.12 | 0.12 | 0.12 | 0.12 | 0.13 | 0.12 | 0.11 | 0.08 | 0.06 |
| Delivery Truck and Trailers | 0.01 | 0.02 | 0.02 | 0.06 | 0.06 | 0.11 | 0.11 | 0.11 | 0.08 | 0.08 | 0.08 | 0.06 | 0.06 | 0.08 | 0.13 | 0.13 | 0.08 | 0.02 | 0.01 |
| Fuel/Lube Truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 X 6 Water Truck 4000 gal. | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total** | **0.03** | **0.08** | **0.09** | **0.13** | **0.16** | **0.22** | **0.23** | **0.23** | **0.20** | **0.20** | **0.21** | **0.18** | **0.19** | **0.21** | **0.26** | **0.26** | **0.20** | **0.11** | **0.08** |

**Table 7-I**
**Off-Site Motor Vehicle $CO_2$ Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Worker Commute | 290.68 | 726.69 | 926.53 | 981.04 | 1,344.38 | 1,598.72 | 1,762.23 | 1,762.23 | 1,725.90 | 1,762.23 | 1,834.90 | 1,798.57 | 1,853.07 | 1,871.23 | 1,980.24 | 1,907.57 | 1,671.39 | 1,235.38 | 999.20 |
| Delivery Truck and Trailers | 114.12 | 228.23 | 228.23 | 684.69 | 684.69 | 1,141.15 | 1,141.15 | 1,141.15 | 912.92 | 912.92 | 912.92 | 684.69 | 684.69 | 912.92 | 1,369.38 | 1,369.38 | 912.92 | 228.23 | 114.12 |
| Fuel/Lube Truck | 0.00 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 |
| 6 X 6 Water Truck 4000 gal. | 38.38 | 76.75 | 76.75 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 38.38 | 38.38 | 38.38 | 38.38 | 38.38 |
| **Total** | **443.17** | **1,070.05** | **1,269.89** | **1,742.48** | **2,105.82** | **2,816.63** | **2,980.13** | **2,980.13** | **2,715.57** | **2,713.53** | **2,786.20** | **2,521.63** | **2,576.13** | **2,822.53** | **3,426.37** | **3,353.70** | **2,661.07** | **1,540.36** | **1,190.07** |

**Table 7-J**
**Off-Site Motor Vehicle $CH_4$ Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Worker Commute | 0.40 | 0.99 | 1.27 | 1.34 | 1.84 | 2.19 | 2.41 | 2.41 | 2.36 | 2.41 | 2.51 | 2.46 | 2.53 | 2.56 | 2.71 | 2.61 | 2.29 | 1.69 | 1.37 |
| Delivery Truck and Trailers | 0.02 | 0.05 | 0.05 | 0.14 | 0.14 | 0.24 | 0.24 | 0.24 | 0.19 | 0.19 | 0.19 | 0.14 | 0.14 | 0.19 | 0.29 | 0.29 | 0.19 | 0.05 | 0.02 |
| Fuel/Lube Truck | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 6 X 6 Water Truck 4000 gal. | 0.01 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Total** | **0.43** | **1.07** | **1.34** | **1.50** | **2.00** | **2.44** | **2.67** | **2.67** | **2.57** | **2.61** | **2.71** | **2.61** | **2.69** | **2.76** | **3.01** | **2.92** | **2.50** | **1.75** | **1.41** |

**Table 7-K**
**Off-Site Motor Vehicle $N_2O$ Emissions**

| Vehicle | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Worker Commute | 0.03 | 0.07 | 0.09 | 0.09 | 0.13 | 0.15 | 0.17 | 0.17 | 0.16 | 0.17 | 0.17 | 0.17 | 0.17 | 0.18 | 0.19 | 0.18 | 0.16 | 0.12 | 0.09 |
| Delivery Truck and Trailers | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 |
| Fuel/Lube Truck | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 X 6 Water Truck 4000 gal. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total** | **0.03** | **0.07** | **0.09** | **0.10** | **0.13** | **0.16** | **0.18** | **0.18** | **0.17** | **0.18** | **0.18** | **0.18** | **0.18** | **0.19** | **0.20** | **0.19** | **0.17** | **0.12** | **0.10** |

**Table 8-A**
**On-Site Motor Vehicle Use**

| Vehicle | Miles per Day | Number Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Company Pick-up Trucks - F250 | 3 | 3 | 3 | 5 | 5 | 5 | 7 | 7 | 7 | 7 | 10 | 10 | 10 | 10 | 10 | 10 | 5 | 5 | 3 | 3 |
| Company Flatbed Trucks - Ford F550 | 5 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 2 |
| Delivery Truck and Trailers | 16 | 1 | 2 | 2 | 6 | 6 | 10 | 10 | 10 | 8 | 8 | 8 | 6 | 6 | 8 | 12 | 12 | 8 | 2 | 1 |
| Fuel/Lube Truck | 2 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 6 X 6 Water Truck 4000 gal. | 50 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | 1 | 1 | 1 | 1 | 1 |

**Table 8-B**
**On-Site Motor Vehicle Mileage**

| Vehicle | Total Miles per Day Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Company Pick-up Trucks - F250 | 9 | 9 | 15 | 15 | 15 | 21 | 21 | 21 | 21 | 30 | 30 | 30 | 30 | 30 | 30 | 15 | 15 | 9 | 9 |
| Company Flatbed Trucks - Ford F550 | 10 | 10 | 10 | 10 | 10 | 10 | 15 | 15 | 15 | 15 | 20 | 20 | 20 | 20 | 15 | 15 | 10 | 10 | 10 |
| Delivery Truck and Trailers | 16 | 32 | 32 | 96 | 96 | 160 | 160 | 160 | 128 | 128 | 128 | 96 | 96 | 128 | 192 | 192 | 128 | 32 | 16 |
| Fuel/Lube Truck | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 6 X 6 Water Truck 4000 gal. | 50 | 100 | 100 | 50 | 50 | 50 | 50 | 50 | 50 | 0 | 0 | 0 | 0 | 0 | 50 | 50 | 50 | 50 | 50 |

**Table 8-C**
**Emission Factors for On-Site Motor Vehicles on Unpaved Surfaces**

| Vehicle | Weight (tons)[a] | Control Efficiency (%)[b] | Emission Factors (lb/mi)[c] PM10 | PM2.5 |
|---|---|---|---|---|
| Company Pick-up Trucks - F250 | 5 | 79 | 2.25E-01 | 2.25E-02 |
| Company Flatbed Trucks - Ford F550 | 9.75 | 79 | 3.04E-01 | 3.04E-02 |
| Delivery Truck and Trailers | 27.5 | 79 | 4.85E-01 | 4.85E-02 |
| Fuel/Lube Truck | 16.5 | 79 | 3.85E-01 | 3.85E-02 |
| 6 X 6 Water Truck 4000 gal. | 34 | 100 | 0.00E+00 | 0.00E+00 |

[a] Weights are based on vehicle specifications, except for delivery trucks, which are assumed to be average of 40 tons loaded and 15 tons empty

[b] Based on watering 3 times per day at 0.18 gal/sq. yd. and 15 mph speed limit, from Appendix E.7, page 3, of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5.
Water Truck control efficiency is 100% because water is sprayed directly in front of truck

[c] Emission factor [lb/mi] = k x (silt content [%] / 12)$^{0.9}$ (weight [tons] / 3)$^{0.45}$ x (1 - control efficiency [%] / 100)
from AP-42, Section 13.2.2 (Unpaved Roads), Equation 1a (11/06)

k = 1.5 for PM10
0.15 for PM2.5

silt content = 6.4 % from AP-42, Section 13.2.2 (Unpaved Roads), Table 13.2.2-1 for landfills (11/06)

**Table 8-D**
**On-Site Motor Vehicle Fugitive PM10 Emissions from Travel on Unpaved Surfaces**

| Vehicle | Emissions (lb/day) Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Company Pick-up Trucks - F250 | 2.03 | 2.03 | 3.38 | 3.38 | 3.38 | 4.73 | 4.73 | 4.73 | 4.73 | 6.75 | 6.75 | 6.75 | 6.75 | 6.75 | 6.75 | 3.38 | 3.38 | 2.03 | 2.03 |
| Company Flatbed Trucks - Ford F550 | 3.04 | 3.04 | 3.04 | 3.04 | 3.04 | 3.04 | 4.56 | 4.56 | 4.56 | 4.56 | 6.08 | 6.08 | 6.08 | 6.08 | 4.56 | 4.56 | 3.04 | 3.04 | 3.04 |
| Delivery Truck and Trailers | 7.76 | 15.52 | 15.52 | 46.55 | 46.55 | 77.58 | 77.58 | 77.58 | 62.06 | 62.06 | 62.06 | 46.55 | 46.55 | 62.06 | 93.09 | 93.09 | 62.06 | 15.52 | 7.76 |
| Fuel/Lube Truck | 0.00 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 |
| 6 X 6 Water Truck 4000 gal. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total** | **12.82** | **21.35** | **22.70** | **53.73** | **53.73** | **86.11** | **87.63** | **87.63** | **72.12** | **74.15** | **75.67** | **60.15** | **60.15** | **75.67** | **105.18** | **101.80** | **69.25** | **21.35** | **13.59** |

**Table 8-E**
**On-Site Motor Vehicle Fugitive PM2.5 Emissions from Travel on Unpaved Surfaces**

| Vehicle | Emissions (lb/day) Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Company Pick-up Trucks - F250 | 0.20 | 0.20 | 0.34 | 0.34 | 0.34 | 0.47 | 0.47 | 0.47 | 0.47 | 0.68 | 0.68 | 0.68 | 0.68 | 0.68 | 0.68 | 0.34 | 0.34 | 0.20 | 0.20 |
| Company Flatbed Trucks - Ford F550 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.46 | 0.46 | 0.46 | 0.46 | 0.61 | 0.61 | 0.61 | 0.61 | 0.46 | 0.46 | 0.30 | 0.30 | 0.30 |
| Delivery Truck and Trailers | 0.78 | 1.55 | 1.55 | 4.65 | 4.65 | 7.76 | 7.76 | 7.76 | 6.21 | 6.21 | 6.21 | 4.65 | 4.65 | 6.21 | 9.31 | 9.31 | 6.21 | 1.55 | 0.78 |
| Fuel/Lube Truck | 0.00 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 |
| 6 X 6 Water Truck 4000 gal. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total** | **1.28** | **2.14** | **2.27** | **5.37** | **5.37** | **8.61** | **8.76** | **8.76** | **7.21** | **7.41** | **7.57** | **6.02** | **6.02** | **7.57** | **10.52** | **10.18** | **6.92** | **2.14** | **1.36** |

**Table 9-A**
**Off-Site Motor Vehicle Use**

| Vehicle | Miles per Day per Veh. | Number | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Worker Commute | 24.6 | 16 | 40 | 51 | 54 | 74 | 88 | 97 | 97 | 95 | 97 | 101 | 99 | 102 | 103 | 109 | 105 | 92 | 68 | 55 |
| Delivery Truck and Trailers | 30 | 1 | 2 | 2 | 6 | 6 | 10 | 10 | 10 | 8 | 8 | 8 | 6 | 6 | 8 | 12 | 12 | 8 | 2 | 1 |
| Fuel/Lube Truck | 10 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 6 X 6 Water Truck 4000 gal. | 10 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | 1 | 1 | 1 | 1 | 1 |

**Table 9-B**
**Off-Site Motor Vehicle Mileage**

| Vehicle | Total Miles per Day | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Worker Commute | 394 | 984 | 1,255 | 1,328 | 1,820 | 2,165 | 2,386 | 2,386 | 2,337 | 2,386 | 2,485 | 2,435 | 2,509 | 2,534 | 2,681 | 2,583 | 2,263 | 1,673 | 1,353 |
| Delivery Truck and Trailers | 30 | 60 | 60 | 180 | 180 | 300 | 300 | 300 | 240 | 240 | 240 | 180 | 180 | 240 | 360 | 360 | 240 | 60 | 30 |
| Fuel/Lube Truck | 0 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 6 X 6 Water Truck 4000 gal. | 10 | 20 | 20 | 10 | 10 | 10 | 10 | 10 | 10 | 0 | 0 | 0 | 0 | 0 | 10 | 10 | 10 | 10 | 10 |
| **Total** | **434** | **1,074** | **1,345** | **1,528** | **2,020** | **2,485** | **2,706** | **2,706** | **2,597** | **2,636** | **2,735** | **2,625** | **2,699** | **2,784** | **3,061** | **2,963** | **2,523** | **1,753** | **1,403** |

**Table 9-C**
**Emission Factors for Vehicles on Off-Site Paved Roads**

| Parameter | Value | Comments |
|---|---|---|
| Road silt loading ($g/m^2$) | 0.1 | CalEEMod default |
| Onroad vehicles average weight (tons) | 2.4 | CalEEMod Default for Santa Barbara County |
| PM10 emission factor (lb/mile) | 6.61E-04 | 0.0022 x (silt loading [$g/m^2$])$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |
| PM2.5 emission factor (lb/mile) | 1.62E-04 | 0.00054 x (silt loading [$g/m^2$])$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |

**Table 9-D**
**Off-Site Vehicle Daily Fugitive PM10 Emissions**

| Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| 0.29 | 0.71 | 0.89 | 1.01 | 1.34 | 1.64 | 1.79 | 1.79 | 1.72 | 1.74 | 1.81 | 1.74 | 1.78 | 1.84 | 2.02 | 1.96 | 1.67 | 1.16 | 0.93 |

**Table 9-E**
**Off-Site Vehicle Daily Fugitive PM2.5 Emissions**

| Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| 0.07 | 0.17 | 0.22 | 0.25 | 0.33 | 0.40 | 0.44 | 0.44 | 0.42 | 0.43 | 0.44 | 0.43 | 0.44 | 0.45 | 0.50 | 0.48 | 0.41 | 0.28 | 0.23 |

**Table 10**
**Fugitive PM Emissions from Grading and Scraping**

**Table 10-A**
**Grader and Scraper Daily Use**

| Equipment | Daily Use (mi/day) | Number | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| CAT 623G Scraper | 15 | | 6 | 6 | | | | | | | | | | | | | | | | |
| CAT 140H Motor Grader | 20 | 1 | 2 | 2 | 1 | 1 | 1 | | | | | | | | | 1 | 1 | 1 | | |

**Table 10-B**
**Grader and Daily Scraper Mileage**

| Equipment | Miles per Day | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| CAT 623G Scraper | 0 | 90 | 90 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CAT 140H Motor Grader | 20 | 40 | 40 | 20 | 20 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 20 | 20 | 0 | 0 |
| **Total** | **20** | **130** | **130** | **20** | **20** | **20** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **20** | **20** | **20** | **0** | **0** |

**Table 10-C**
**Grading and Scraping Emission Factors**

| Parameter | Value | Comments |
|---|---|---|
| Grading speed (mph) | 7.1 | Default from AP-42, Section 11.9, Western Surface Coal Mining (July 1998) |
| PM0 emission factor (lb/mile) | 1.54 | 0.60 x 0.051 x (speed [mph])$^{2}$ from AP-42, 11.9 |
| PM2.5 emission factor (lb/mile) | 0.17 | 0.031 x 0.040 x (speed [mph])$^{2.5}$ from AP-42, 11.9 |
| Control efficiency for watering every 3 hours (percent) | 61 | Western Regional Air Partnership (WRAP) Fugitive Dust Handbook, Table 3-7 |
| Controlled PM0 emission factor (lb/mile) | 0.60 | |
| Controlled PM2.5 emission factor (lb/mile) | 0.06 | |

**Table 10-D**
**Grading and Scraping Daily PM10 Emissions**

| Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| 12.03 | 78.21 | 78.21 | 12.03 | 12.03 | 12.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 12.03 | 12.03 | 12.03 | 0.00 | 0.00 |

**Table 10-E**
**Grading and Scraping Daily PM2.5 Emissions**

| Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| 1.30 | 8.44 | 8.44 | 1.30 | 1.30 | 1.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.30 | 1.30 | 1.30 | 0.00 | 0.00 |

**Table 11**
**Fugitive PM Emissions from Bulldozing**

**Table 11-A**
**Bulldozer Daily Use**

| Equipment | Daily Use (hr/day) | Number | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| CAT D8R Dozer | 8 | | 2 | 2 | | | | | | | | | | | | | | | | |

**Table 11-B**
**Bulldozer Daily Operating Hours**

| Equipment | Daily Use (hr/day) | Total Bulldozing Time (hr/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| CAT D8R Dozer | 8 | 0 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 11-C**
**Bulldozing Emission Factors**

| Parameter | Value | Comments |
|---|---|---|
| Silt content (percent) | 6.4 | From AP-42, Section 13.2.2 (Unpaved Roads), Table 13.2.2-1 for landfill roads (11/06) |
| Moisture (percent) | 7.9 | Default from AP-42, Section 11.9, for overburden |
| PM0 emission factor (lb/hour) | 0.67 | 0.75 x 1.0 x (silt content [%])$^{1.5}$ / (moisture content [%])$^{1.4}$ from AP-42, 11.9 |
| PM2.5 emission factor (lb/hour) | 0.38 | 0.105 x 5.7 x (silt content [%])$^{1.2}$ / (moisture content [%])$^{1.3}$ from AP-42, 11.9 |
| Control efficiency for watering every 3 hours (percent) | 61 | Western Regional Air Partnership (WRAP) Fugitive Dust Handbook, Table 3-7 |
| Controlled PM0 emission factor (lb/hour) | 0.26 | |
| Controlled PM2.5 emission factor (lb/hour) | 0.15 | |

**Table 11-D**
**Bulldozing Daily PM10 Emissions**

| Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| 0.00 | 4.20 | 4.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Table 11-E**
**Bulldozing Daily PM2.5 Emissions**

| Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| 0.00 | 2.36 | 2.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Table 12**
**Fugitive PM Emissions from Soil Dropping**

**Table 12-A**
**Daily Cut and Fill Quantities**

| | Quantity (cubic yards/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| Cut | 1,480 | 2,816 | 1,402 | | | | | | | | | | | | | | | | |
| Fill | 1,121 | 2,133 | 1,365 | | | | | | | | | | | | | | | | |
| **Total** | **2,601** | **4,949** | **2,767** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

**Table 12-B**
**Soil Dropping Emission Factors**

| Parameter | Value | Comments |
|---|---|---|
| Mean wind speed (miles/hr) | 5.47 | From Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, |
| Moisture (percent) | 12 | Default from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06) for landfill cover |
| PM0 emission factor (lb/ton) | 1.02E-04 | 0.035 x 0.0032 x (mean wind speed [mph] / 5)$^{1.3}$ / (moisture content [%] / 2)$^{1.4}$ from AP-42, 13.2.4 |
| PM2.5 emission factor (lb/ton) | 1.55E-05 | 0.053 x 0.0032 x (mean wind speed [mph] / 5)$^{1.3}$ / (moisture content [%] / 2)$^{1.4}$ from AP-42, 13.2.4 |
| Soil Density (tons/cubic yard) | 1.215 | Table 2.46, Handbook of Solid Waste Management |
| PM0 emission factor (lb/cubic yard) | 1.24E-04 | |
| PM2.5 emission factor (lb/cubic yard) | 1.89E-05 | |

**Table 12-C**
**Soil Dropping Daily PM10 Emissions**

| Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| 0.32 | 0.62 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Table 12-D**
**Soil Dropping Daily PM2.5 Emissions**

| Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| 0.05 | 0.09 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Table 13**
**Architectural Coating ROC Emissions**

| Item | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
| Daily Coating Quantity (gal) | | | | | | | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | | |
| Daily ROC Emissions (lb/day)[a] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 17.64 | 0.00 | 0.00 |
| Days Coating/Month | | | | | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 11 | 11 | 11 | | |
| Monthly ROC Emissions (lb/month)[b] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 35.28 | 35.28 | 35.28 | 35.28 | 35.28 | 35.28 | 35.28 | 35.28 | 194.04 | 194.04 | 194.04 | 0.00 | 0.00 |

Coating ROC content = 1.26 lb/gal, construction contractor estimate

[a] Daily ROC emissions [lb/day] = Daily coating quantity [gal/day] x Coating ROC content [lb/gal]

[b] Monthly ROC emissions [lb/month] = Daily ROC emissions [lb/day] x Days coating/month

**Table 14**
**Asphaltic Paving ROC Emissions**

| Item | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Emissions (lb/day) | | | | | | | | | | | | | | | | | | |
| Daily Area Paved (sq. ft./day) | | | | | | | | | | | | | | | | 19,133 | 11,067 | | |
| Daily ROC Emissions (lb/day)[a] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.55 | 0.32 | 0.00 | 0.00 |
| Days Paving/Month | | | | | | | | | | | | | | | | 20 | 20 | | |
| Monthly ROC Emissions (lb/month)[b] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.07 | 6.40 | 0.00 | 0.00 |

ROC Off-gassing emission factor = 2.62 lb/acre, CalEEMod default

[a] Daily ROC emissions [lb/day] = Daily area ppaved [sq. ft.] / 43,560 [sq.ft./acre] x Emissions factor [lb/acre]

[b] Monthly ROC emissions [lb/month] = Daily ROC emissions [lb/day] x Days coating/month

**Table 15**

**Santa Barbara OFFROAD2007 Emission Factors for 2015[a]**

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A/C Tug Narrow Body | 0 | 250 | 6.07E-01 | 2.04E-01 | 1.90E+00 | 2.01E-03 | 7.69E-02 | 7.69E-02 | 1.79E+02 | 1.84E-02 | 4.65E-03 | 8.12E+00 |
| A/C Tug Wide Body | 0 | 500 | 1.58E+00 | 3.54E-01 | 3.24E+00 | 3.26E-03 | 1.30E-01 | 1.30E-01 | 3.33E+02 | 3.20E-02 | 8.69E-03 | 1.52E+01 |
| A/C unit | 0 | 120 | 4.64E-01 | 8.44E-02 | 6.36E-01 | 8.91E-04 | 4.51E-02 | 4.51E-02 | 7.59E+01 | 7.61E-03 | 1.99E-03 | 3.47E+00 |
| A/C unit | 121 | 250 | 3.12E-01 | 7.98E-02 | 1.00E+00 | 1.76E-03 | 2.87E-02 | 2.87E-02 | 1.56E+02 | 7.20E-03 | 4.06E-03 | 7.08E+00 |
| A/C unit | 251 | 500 | 4.77E-01 | 1.09E-01 | 1.36E+00 | 2.32E-03 | 4.08E-02 | 4.08E-02 | 2.37E+02 | 9.83E-03 | 6.14E-03 | 1.07E+01 |
| Aerial Lifts | 0 | 15 | 5.28E-02 | 1.01E-02 | 6.31E-02 | 1.35E-04 | 2.54E-03 | 2.54E-03 | 8.64E+00 | 9.08E-04 | 2.26E-04 | 3.95E-01 |
| Aerial Lifts | 16 | 25 | 4.87E-02 | 1.56E-02 | 9.05E-02 | 1.39E-04 | 4.63E-03 | 4.63E-03 | 1.10E+01 | 1.41E-03 | 2.86E-04 | 4.99E-01 |
| Aerial Lifts | 26 | 50 | 1.67E-01 | 5.00E-02 | 1.72E-01 | 2.53E-04 | 1.34E-02 | 1.34E-02 | 1.96E+01 | 4.51E-03 | 5.18E-04 | 9.03E-01 |
| Aerial Lifts | 51 | 120 | 2.39E-01 | 4.77E-02 | 3.35E-01 | 4.46E-04 | 2.55E-02 | 2.55E-02 | 3.80E+01 | 4.31E-03 | 9.96E-04 | 1.74E+00 |
| Aerial Lifts | 121 | 500 | 4.29E-01 | 1.05E-01 | 1.28E+00 | 2.09E-03 | 3.82E-02 | 3.82E-02 | 2.13E+02 | 9.50E-03 | 5.52E-03 | 9.63E+00 |
| Aerial Lifts | 501 | 750 | 7.75E-01 | 1.97E-01 | 2.40E+00 | 3.87E-03 | 7.06E-02 | 7.06E-02 | 3.84E+02 | 1.77E-02 | 9.97E-03 | 1.74E+01 |
| Agricultural Mowers | 0 | 120 | 2.17E-01 | 4.04E-02 | 2.98E-01 | 4.11E-04 | 2.15E-02 | 2.15E-02 | 3.50E+01 | 3.64E-03 | 9.17E-04 | 1.60E+00 |
| Agricultural Tractors | 0 | 15 | 6.43E-02 | 1.23E-02 | 7.67E-02 | 1.64E-04 | 3.00E-03 | 3.00E-03 | 1.05E+01 | 1.11E-03 | 2.76E-04 | 4.81E-01 |
| Agricultural Tractors | 16 | 25 | 8.31E-02 | 2.43E-02 | 1.54E-01 | 2.56E-04 | 5.91E-03 | 5.91E-03 | 2.02E+01 | 2.20E-03 | 5.27E-04 | 9.19E-01 |
| Agricultural Tractors | 26 | 50 | 3.05E-01 | 9.01E-02 | 3.01E-01 | 4.42E-04 | 2.36E-02 | 2.36E-02 | 3.42E+01 | 8.13E-03 | 9.05E-04 | 1.58E+00 |
| Agricultural Tractors | 51 | 120 | 4.63E-01 | 9.00E-02 | 6.34E-01 | 8.54E-04 | 4.83E-02 | 4.83E-02 | 7.28E+01 | 8.12E-03 | 1.91E-03 | 3.33E+00 |
| Agricultural Tractors | 121 | 175 | 6.65E-01 | 1.06E-01 | 9.37E-01 | 1.40E-03 | 4.56E-02 | 4.56E-02 | 1.25E+02 | 9.52E-03 | 3.25E-03 | 5.67E+00 |
| Agricultural Tractors | 176 | 250 | 3.65E-01 | 1.02E-01 | 1.18E+00 | 2.00E-03 | 3.50E-02 | 3.50E-02 | 1.78E+02 | 9.18E-03 | 4.62E-03 | 8.06E+00 |
| Agricultural Tractors | 251 | 500 | 6.02E-01 | 1.51E-01 | 1.70E+00 | 2.86E-03 | 5.33E-02 | 5.33E-02 | 2.91E+02 | 1.37E-02 | 7.56E-03 | 1.32E+01 |
| Air Compressors | 0 | 15 | 4.67E-02 | 1.09E-02 | 6.71E-02 | 1.12E-04 | 4.10E-03 | 4.10E-03 | 7.22E+00 | 9.82E-04 | 1.89E-04 | 3.30E-01 |
| Air Compressors | 16 | 25 | 6.85E-02 | 2.32E-02 | 1.25E-01 | 1.83E-04 | 7.08E-03 | 7.08E-03 | 1.44E+01 | 2.09E-03 | 3.78E-04 | 6.59E-01 |
| Air Compressors | 26 | 50 | 2.41E-01 | 7.80E-02 | 2.08E-01 | 2.88E-04 | 1.90E-02 | 1.90E-02 | 2.23E+01 | 7.04E-03 | 5.92E-04 | 1.03E+00 |
| Air Compressors | 51 | 120 | 3.20E-01 | 7.18E-02 | 4.45E-01 | 5.50E-04 | 3.91E-02 | 3.91E-02 | 4.69E+01 | 6.48E-03 | 1.23E-03 | 2.15E+00 |
| Air Compressors | 121 | 175 | 5.04E-01 | 9.35E-02 | 7.31E-01 | 9.95E-04 | 4.04E-02 | 4.04E-02 | 8.84E+01 | 8.44E-03 | 2.31E-03 | 4.03E+00 |
| Air Compressors | 176 | 250 | 2.83E-01 | 9.20E-02 | 9.64E-01 | 1.48E-03 | 2.98E-02 | 2.98E-02 | 1.31E+02 | 8.30E-03 | 3.40E-03 | 5.94E+00 |
| Air Compressors | 251 | 500 | 4.96E-01 | 1.51E-01 | 1.48E+00 | 2.27E-03 | 4.89E-02 | 4.89E-02 | 2.32E+02 | 1.36E-02 | 6.01E-03 | 1.05E+01 |
| Air Compressors | 501 | 750 | 7.67E-01 | 2.35E-01 | 2.38E+00 | 3.60E-03 | 7.74E-02 | 7.74E-02 | 3.58E+02 | 2.12E-02 | 9.29E-03 | 1.62E+01 |
| Air Compressors | 751 | 1000 | 1.20E+00 | 3.66E-01 | 4.57E+00 | 4.89E-03 | 1.28E-01 | 1.28E-01 | 4.86E+02 | 3.31E-02 | 1.26E-02 | 2.20E+01 |
| Air Conditioner | 0 | 175 | 7.70E-01 | 6.89E-02 | 6.42E-01 | 1.63E-03 | 2.79E-02 | 2.79E-02 | 1.45E+02 | 6.22E-03 | 3.79E-03 | 6.60E+00 |
| Air Conditioner | 176 | 250 | 3.75E-01 | 8.00E-02 | 7.13E-01 | 2.33E-03 | 2.19E-02 | 2.19E-02 | 2.07E+02 | 7.22E-03 | 5.38E-03 | 9.38E+00 |
| Air Conditioner | 251 | 500 | 7.30E-01 | 1.57E-01 | 1.32E+00 | 4.67E-03 | 4.28E-02 | 4.28E-02 | 4.15E+02 | 1.42E-02 | 1.08E-02 | 1.88E+01 |
| Air Start Unit | 0 | 175 | 7.79E-01 | 1.08E-01 | 1.04E+00 | 1.49E-03 | 4.76E-02 | 4.76E-02 | 1.52E+02 | 9.76E-03 | 3.95E-03 | 6.90E+00 |
| Air Start Unit | 176 | 250 | 4.16E-01 | 1.04E-01 | 1.31E+00 | 2.12E-03 | 3.69E-02 | 3.69E-02 | 2.16E+02 | 9.38E-03 | 5.61E-03 | 9.79E+00 |
| Air Start Unit | 251 | 500 | 8.31E-01 | 1.87E-01 | 2.33E+00 | 4.25E-03 | 6.91E-02 | 6.91E-02 | 4.33E+02 | 1.69E-02 | 1.12E-02 | 1.96E+01 |
| Air Start Unit | 501 | 750 | 1.25E+00 | 2.90E-01 | 3.60E+00 | 6.37E-03 | 1.06E-01 | 1.06E-01 | 6.49E+02 | 2.61E-02 | 1.68E-02 | 2.94E+01 |

**Table 15**
**Santa Barbara OFFROAD2007 Emission Factors for 2015[a]**

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aircraft Support | 0 | 120 | 3.12E-01 | 5.68E-02 | 4.28E-01 | 6.00E-04 | 3.04E-02 | 3.04E-02 | 5.11E+01 | 5.12E-03 | 1.34E-03 | 2.33E+00 |
| Aircraft Support | 121 | 175 | 5.40E-01 | 7.92E-02 | 7.62E-01 | 1.18E-03 | 3.47E-02 | 3.47E-02 | 1.05E+02 | 7.15E-03 | 2.75E-03 | 4.79E+00 |
| Baggage Tug | 0 | 120 | 3.65E-01 | 1.01E-01 | 5.83E-01 | 5.73E-04 | 5.21E-02 | 5.21E-02 | 4.89E+01 | 9.12E-03 | 1.29E-03 | 2.24E+00 |
| Balers | 0 | 50 | 2.34E-01 | 5.71E-02 | 2.98E-01 | 4.70E-04 | 1.83E-02 | 1.83E-02 | 3.63E+01 | 5.15E-03 | 9.53E-04 | 1.66E+00 |
| Balers | 51 | 120 | 3.16E-01 | 5.16E-02 | 4.33E-01 | 6.39E-04 | 2.69E-02 | 2.69E-02 | 5.45E+01 | 4.65E-03 | 1.42E-03 | 2.49E+00 |
| Belt Loader | 0 | 120 | 2.45E-01 | 6.32E-02 | 3.75E-01 | 3.99E-04 | 3.33E-02 | 3.33E-02 | 3.40E+01 | 5.71E-03 | 8.95E-04 | 1.56E+00 |
| Bobtail | 0 | 120 | 5.41E-01 | 1.36E-01 | 8.38E-01 | 9.11E-04 | 7.20E-02 | 7.20E-02 | 7.77E+01 | 1.23E-02 | 2.04E-03 | 3.56E+00 |
| Bore/Drill Rigs | 0 | 15 | 6.31E-02 | 1.20E-02 | 7.53E-02 | 1.61E-04 | 2.94E-03 | 2.94E-03 | 1.03E+01 | 1.09E-03 | 2.71E-04 | 4.72E-01 |
| Bore/Drill Rigs | 16 | 25 | 6.58E-02 | 1.93E-02 | 1.22E-01 | 2.03E-04 | 4.67E-03 | 4.67E-03 | 1.60E+01 | 1.74E-03 | 4.17E-04 | 7.28E-01 |
| Bore/Drill Rigs | 26 | 50 | 2.23E-01 | 2.34E-02 | 2.24E-01 | 4.01E-04 | 7.48E-03 | 7.48E-03 | 3.10E+01 | 2.11E-03 | 8.12E-04 | 1.42E+00 |
| Bore/Drill Rigs | 51 | 120 | 4.67E-01 | 3.75E-02 | 3.73E-01 | 9.04E-04 | 1.60E-02 | 1.60E-02 | 7.71E+01 | 3.38E-03 | 2.01E-03 | 3.51E+00 |
| Bore/Drill Rigs | 121 | 175 | 7.53E-01 | 6.17E-02 | 5.36E-01 | 1.59E-03 | 1.98E-02 | 1.98E-02 | 1.41E+02 | 5.57E-03 | 3.67E-03 | 6.41E+00 |
| Bore/Drill Rigs | 176 | 250 | 3.42E-01 | 6.80E-02 | 4.90E-01 | 2.11E-03 | 1.44E-02 | 1.44E-02 | 1.88E+02 | 6.14E-03 | 4.87E-03 | 8.50E+00 |
| Bore/Drill Rigs | 251 | 500 | 5.51E-01 | 1.12E-01 | 7.68E-01 | 3.05E-03 | 2.36E-02 | 2.36E-02 | 3.11E+02 | 1.01E-02 | 8.06E-03 | 1.41E+01 |
| Bore/Drill Rigs | 501 | 750 | 1.09E+00 | 2.21E-01 | 1.53E+00 | 6.18E-03 | 4.67E-02 | 4.67E-02 | 6.15E+02 | 1.99E-02 | 1.59E-02 | 2.78E+01 |
| Bore/Drill Rigs | 751 | 1000 | 1.65E+00 | 3.56E-01 | 4.97E+00 | 9.33E-03 | 1.19E-01 | 1.19E-01 | 9.27E+02 | 3.21E-02 | 2.40E-02 | 4.19E+01 |
| Cargo Loader | 0 | 120 | 4.34E-01 | 9.68E-02 | 6.00E-01 | 7.40E-04 | 5.22E-02 | 5.22E-02 | 6.31E+01 | 8.74E-03 | 1.66E-03 | 2.89E+00 |
| Cargo Tractor | 0 | 120 | 4.18E-01 | 9.07E-02 | 5.51E-01 | 6.70E-04 | 4.80E-02 | 4.80E-02 | 5.95E+01 | 8.18E-03 | 1.56E-03 | 2.73E+00 |
| Cart | 0 | 120 | 3.72E-01 | 6.76E-02 | 5.10E-01 | 7.14E-04 | 3.62E-02 | 3.62E-02 | 6.09E+01 | 6.10E-03 | 1.59E-03 | 2.78E+00 |
| Cart | 121 | 175 | 5.91E-01 | 8.66E-02 | 8.33E-01 | 1.29E-03 | 3.79E-02 | 3.79E-02 | 1.15E+02 | 7.81E-03 | 3.00E-03 | 5.24E+00 |
| Cart | 176 | 250 | 2.95E-01 | 7.56E-02 | 9.51E-01 | 1.67E-03 | 2.72E-02 | 2.72E-02 | 1.48E+02 | 6.82E-03 | 3.84E-03 | 6.70E+00 |
| Catering Truck | 0 | 250 | 2.75E-01 | 5.56E-02 | 7.12E-01 | 1.76E-03 | 1.94E-02 | 1.94E-02 | 1.56E+02 | 5.02E-03 | 4.05E-03 | 7.07E+00 |
| Cement and Mortar Mixers | 0 | 15 | 3.86E-02 | 7.38E-03 | 4.63E-02 | 9.83E-05 | 1.90E-03 | 1.90E-03 | 6.31E+00 | 6.66E-04 | 1.65E-04 | 2.88E-01 |
| Cement and Mortar Mixers | 16 | 25 | 7.81E-02 | 2.51E-02 | 1.45E-01 | 2.23E-04 | 7.41E-03 | 7.41E-03 | 1.75E+01 | 2.26E-03 | 4.59E-04 | 8.00E-01 |
| Chippers/Stump Grinders | 0 | 25 | 8.29E-02 | 2.43E-02 | 1.53E-01 | 2.55E-04 | 5.77E-03 | 5.77E-03 | 2.01E+01 | 2.19E-03 | 5.25E-04 | 9.16E-01 |
| Chippers/Stump Grinders | 26 | 120 | 4.81E-01 | 9.33E-02 | 6.57E-01 | 8.90E-04 | 5.06E-02 | 5.06E-02 | 7.59E+01 | 8.41E-03 | 1.99E-03 | 3.47E+00 |
| Chippers/Stump Grinders | 121 | 175 | 7.01E-01 | 1.11E-01 | 9.88E-01 | 1.48E-03 | 4.86E-02 | 4.86E-02 | 1.32E+02 | 1.00E-02 | 3.44E-03 | 6.00E+00 |
| Chippers/Stump Grinders | 176 | 250 | 4.57E-01 | 1.27E-01 | 1.48E+00 | 2.50E-03 | 4.42E-02 | 4.42E-02 | 2.22E+02 | 1.15E-02 | 5.77E-03 | 1.01E+01 |
| Chippers/Stump Grinders | 251 | 500 | 5.09E-01 | 1.29E-01 | 1.45E+00 | 2.42E-03 | 4.57E-02 | 4.57E-02 | 2.47E+02 | 1.16E-02 | 6.41E-03 | 1.12E+01 |
| Chippers/Stump Grinders | 501 | 750 | 1.22E+00 | 3.18E-01 | 3.62E+00 | 5.98E-03 | 1.12E-01 | 1.12E-01 | 5.94E+02 | 2.87E-02 | 1.54E-02 | 2.69E+01 |
| Chippers/Stump Grinders | 751 | 1000 | 1.96E+00 | 5.44E-01 | 7.40E+00 | 8.51E-03 | 1.95E-01 | 1.95E-01 | 8.46E+02 | 4.91E-02 | 2.20E-02 | 3.83E+01 |
| Combines | 0 | 120 | 5.57E-01 | 9.36E-02 | 7.64E-01 | 1.11E-03 | 4.91E-02 | 4.91E-02 | 9.47E+01 | 8.45E-03 | 2.48E-03 | 4.32E+00 |
| Combines | 121 | 175 | 6.16E-01 | 8.23E-02 | 8.66E-01 | 1.40E-03 | 3.56E-02 | 3.56E-02 | 1.25E+02 | 7.43E-03 | 3.25E-03 | 5.67E+00 |
| Combines | 176 | 250 | 3.30E-01 | 7.60E-02 | 1.07E+00 | 1.97E-03 | 2.78E-02 | 2.78E-02 | 1.75E+02 | 6.85E-03 | 4.55E-03 | 7.94E+00 |
| Combines | 251 | 500 | 4.56E-01 | 9.31E-02 | 1.32E+00 | 2.37E-03 | 3.63E-02 | 3.63E-02 | 2.41E+02 | 8.40E-03 | 6.25E-03 | 1.09E+01 |

**Table 15**
**Santa Barbara OFFROAD2007 Emission Factors for 2015[a]**

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Commercial Turf Equipment | 0 | 15 | 5.89E-02 | 1.00E-02 | 7.03E-02 | 1.50E-04 | 2.74E-03 | 2.74E-03 | 9.65E+00 | 9.03E-04 | 2.52E-04 | 4.40E-01 |
| Commercial Turf Equipment | 16 | 25 | 5.96E-02 | 1.75E-02 | 1.10E-01 | 1.84E-04 | 4.11E-03 | 4.11E-03 | 1.45E+01 | 1.58E-03 | 3.78E-04 | 6.59E-01 |
| Communications | 0 | 50 | 2.34E-01 | 6.48E-02 | 2.58E-01 | 3.89E-04 | 1.83E-02 | 1.83E-02 | 3.01E+01 | 5.85E-03 | 7.93E-04 | 1.38E+00 |
| Communications | 51 | 120 | 3.67E-01 | 6.68E-02 | 5.03E-01 | 7.05E-04 | 3.58E-02 | 3.58E-02 | 6.01E+01 | 6.03E-03 | 1.57E-03 | 2.75E+00 |
| Compressor (Entertainment) | 0 | 120 | 2.36E-01 | 5.01E-02 | 3.20E-01 | 4.09E-04 | 2.73E-02 | 2.73E-02 | 3.49E+01 | 4.52E-03 | 9.15E-04 | 1.60E+00 |
| Compressor (GSE) | 0 | 120 | 3.81E-01 | 7.56E-02 | 4.96E-01 | 6.70E-04 | 4.13E-02 | 4.13E-02 | 5.71E+01 | 6.82E-03 | 1.50E-03 | 2.61E+00 |
| Compressor (GSE) | 121 | 250 | 2.45E-01 | 7.55E-02 | 7.71E-01 | 1.31E-03 | 2.42E-02 | 2.42E-02 | 1.17E+02 | 6.81E-03 | 3.03E-03 | 5.28E+00 |
| Compressor (GSE) | 251 | 500 | 4.96E-01 | 1.45E-01 | 1.38E+00 | 2.36E-03 | 4.63E-02 | 4.63E-02 | 2.41E+02 | 1.31E-02 | 6.24E-03 | 1.09E+01 |
| Compressor (GSE) | 501 | 750 | 7.33E-01 | 2.17E-01 | 2.11E+00 | 3.57E-03 | 6.98E-02 | 6.98E-02 | 3.55E+02 | 1.96E-02 | 9.23E-03 | 1.61E+01 |
| Compressor (Military) | 0 | 50 | 2.87E-01 | 7.94E-02 | 3.15E-01 | 4.76E-04 | 2.24E-02 | 2.24E-02 | 3.68E+01 | 7.17E-03 | 9.71E-04 | 1.69E+00 |
| Compressor (Military) | 51 | 120 | 3.26E-01 | 5.93E-02 | 4.47E-01 | 6.26E-04 | 3.17E-02 | 3.17E-02 | 5.34E+01 | 5.35E-03 | 1.40E-03 | 2.44E+00 |
| Compressor (Military) | 121 | 175 | 6.45E-01 | 9.45E-02 | 9.09E-01 | 1.41E-03 | 4.13E-02 | 4.13E-02 | 1.26E+02 | 8.52E-03 | 3.28E-03 | 5.72E+00 |
| Compressor (Military) | 176 | 250 | 3.34E-01 | 8.55E-02 | 1.08E+00 | 1.89E-03 | 3.08E-02 | 3.08E-02 | 1.68E+02 | 7.72E-03 | 4.35E-03 | 7.59E+00 |
| Compressor (Military) | 251 | 500 | 5.65E-01 | 1.29E-01 | 1.61E+00 | 2.75E-03 | 4.83E-02 | 4.83E-02 | 2.80E+02 | 1.16E-02 | 7.27E-03 | 1.27E+01 |
| Compressor (Railyard) | 0 | 120 | 2.20E-01 | 4.67E-02 | 2.98E-01 | 3.81E-04 | 2.54E-02 | 2.54E-02 | 3.25E+01 | 4.21E-03 | 8.52E-04 | 1.49E+00 |
| Compressors (Workover) | 0 | 25 | 6.82E-02 | 2.07E-02 | 1.24E-01 | 1.83E-04 | 6.58E-03 | 6.58E-03 | 1.44E+01 | 1.86E-03 | 3.77E-04 | 6.59E-01 |
| Compressors (Workover) | 26 | 120 | 4.84E-01 | 1.06E-01 | 6.47E-01 | 8.11E-04 | 5.65E-02 | 5.65E-02 | 6.92E+01 | 9.56E-03 | 1.82E-03 | 3.17E+00 |
| Compressors (Workover) | 121 | 175 | 6.76E-01 | 1.25E-01 | 9.28E-01 | 1.29E-03 | 5.24E-02 | 5.24E-02 | 1.15E+02 | 1.13E-02 | 3.01E-03 | 5.25E+00 |
| Compressors (Workover) | 176 | 250 | 3.67E-01 | 1.25E-01 | 1.16E+00 | 1.82E-03 | 3.85E-02 | 3.85E-02 | 1.62E+02 | 1.13E-02 | 4.20E-03 | 7.33E+00 |
| Compressors (Workover) | 251 | 500 | 6.93E-01 | 2.25E-01 | 1.94E+00 | 3.03E-03 | 6.84E-02 | 6.84E-02 | 3.09E+02 | 2.03E-02 | 8.03E-03 | 1.40E+01 |
| Compressors (Workover) | 501 | 750 | 7.09E-01 | 2.32E-01 | 2.05E+00 | 3.10E-03 | 7.13E-02 | 7.13E-02 | 3.16E+02 | 2.09E-02 | 8.20E-03 | 1.43E+01 |
| Compressors (Workover) | 751 | 1000 | 1.42E+00 | 4.52E-01 | 5.29E+00 | 5.57E-03 | 1.52E-01 | 1.52E-01 | 5.68E+02 | 4.08E-02 | 1.48E-02 | 2.57E+01 |
| Concrete/Industrial Saws | 0 | 25 | 6.78E-02 | 1.99E-02 | 1.26E-01 | 2.09E-04 | 4.72E-03 | 4.72E-03 | 1.65E+01 | 1.79E-03 | 4.30E-04 | 7.50E-01 |
| Concrete/Industrial Saws | 26 | 50 | 2.74E-01 | 7.79E-02 | 2.65E-01 | 3.90E-04 | 2.05E-02 | 2.05E-02 | 3.02E+01 | 7.03E-03 | 7.98E-04 | 1.39E+00 |
| Concrete/Industrial Saws | 51 | 120 | 4.75E-01 | 8.89E-02 | 6.24E-01 | 8.69E-04 | 4.85E-02 | 4.85E-02 | 7.41E+01 | 8.03E-03 | 1.94E-03 | 3.39E+00 |
| Concrete/Industrial Saws | 121 | 175 | 8.67E-01 | 1.34E-01 | 1.16E+00 | 1.80E-03 | 5.83E-02 | 5.83E-02 | 1.60E+02 | 1.21E-02 | 4.18E-03 | 7.29E+00 |
| Crane | 0 | 120 | 4.47E-01 | 3.42E-02 | 4.29E-01 | 9.26E-04 | 2.08E-02 | 2.08E-02 | 7.89E+01 | 3.08E-03 | 2.06E-03 | 3.59E+00 |
| Crane | 121 | 175 | 5.26E-01 | 3.62E-02 | 4.56E-01 | 1.19E-03 | 1.71E-02 | 1.71E-02 | 1.06E+02 | 3.26E-03 | 2.76E-03 | 4.82E+00 |
| Crane | 176 | 250 | 2.72E-01 | 4.32E-02 | 5.44E-01 | 1.81E-03 | 1.51E-02 | 1.51E-02 | 1.61E+02 | 3.90E-03 | 4.17E-03 | 7.27E+00 |
| Crane (Rail-CHE) | 0 | 120 | 3.64E-01 | 7.74E-02 | 4.94E-01 | 6.32E-04 | 4.21E-02 | 4.21E-02 | 5.39E+01 | 6.98E-03 | 1.41E-03 | 2.47E+00 |
| Crane (Rail-CHE) | 121 | 175 | 3.55E-01 | 5.30E-02 | 5.00E-01 | 7.70E-04 | 2.32E-02 | 2.32E-02 | 6.84E+01 | 4.78E-03 | 1.79E-03 | 3.12E+00 |
| Cranes | 0 | 50 | 2.73E-01 | 8.51E-02 | 2.23E-01 | 2.99E-04 | 2.02E-02 | 2.02E-02 | 2.32E+01 | 7.68E-03 | 6.18E-04 | 1.08E+00 |
| Cranes | 51 | 120 | 3.56E-01 | 7.98E-02 | 4.81E-01 | 5.88E-04 | 4.14E-02 | 4.14E-02 | 5.01E+01 | 7.20E-03 | 1.32E-03 | 2.30E+00 |
| Cranes | 121 | 175 | 4.79E-01 | 9.17E-02 | 6.67E-01 | 9.03E-04 | 3.77E-02 | 3.77E-02 | 8.03E+01 | 8.27E-03 | 2.10E-03 | 3.67E+00 |
| Cranes | 176 | 250 | 2.71E-01 | 9.24E-02 | 8.27E-01 | 1.26E-03 | 2.86E-02 | 2.86E-02 | 1.12E+02 | 8.33E-03 | 2.91E-03 | 5.08E+00 |

**Table 15**
**Santa Barbara OFFROAD2007 Emission Factors for 2015[a]**

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cranes | 251 | 500 | 4.66E-01 | 1.39E-01 | 1.18E+00 | 1.77E-03 | 4.26E-02 | 4.26E-02 | 1.80E+02 | 1.26E-02 | 4.68E-03 | 8.16E+00 |
| Cranes | 501 | 750 | 7.84E-01 | 2.35E-01 | 2.04E+00 | 3.04E-03 | 7.27E-02 | 7.27E-02 | 3.03E+02 | 2.12E-02 | 7.87E-03 | 1.37E+01 |
| Cranes | 751 | 9999 | 2.90E+00 | 8.68E-01 | 9.25E+00 | 9.75E-03 | 2.77E-01 | 2.77E-01 | 9.70E+02 | 7.83E-02 | 2.52E-02 | 4.40E+01 |
| Crawler Tractors | 0 | 50 | 3.08E-01 | 1.01E-01 | 2.46E-01 | 3.21E-04 | 2.32E-02 | 2.32E-02 | 2.49E+01 | 9.15E-03 | 6.65E-04 | 1.16E+00 |
| Crawler Tractors | 51 | 120 | 4.77E-01 | 1.14E-01 | 6.80E-01 | 7.71E-04 | 5.77E-02 | 5.77E-02 | 6.58E+01 | 1.03E-02 | 1.73E-03 | 3.02E+00 |
| Crawler Tractors | 121 | 175 | 7.38E-01 | 1.51E-01 | 1.09E+00 | 1.36E-03 | 6.13E-02 | 6.13E-02 | 1.21E+02 | 1.36E-02 | 3.17E-03 | 5.53E+00 |
| Crawler Tractors | 176 | 250 | 4.61E-01 | 1.58E-01 | 1.35E+00 | 1.87E-03 | 5.13E-02 | 5.13E-02 | 1.66E+02 | 1.43E-02 | 4.32E-03 | 7.54E+00 |
| Crawler Tractors | 251 | 500 | 8.35E-01 | 2.30E-01 | 1.90E+00 | 2.54E-03 | 7.31E-02 | 7.31E-02 | 2.59E+02 | 2.07E-02 | 6.74E-03 | 1.18E+01 |
| Crawler Tractors | 501 | 750 | 1.50E+00 | 4.14E-01 | 3.47E+00 | 4.67E-03 | 1.32E-01 | 1.32E-01 | 4.64E+02 | 3.73E-02 | 1.21E-02 | 2.11E+01 |
| Crawler Tractors | 751 | 1000 | 2.37E+00 | 6.28E-01 | 6.64E+00 | 6.61E-03 | 2.07E-01 | 2.07E-01 | 6.58E+02 | 5.66E-02 | 1.71E-02 | 2.99E+01 |
| Crushing/Proc. Equipment | 0 | 50 | 4.64E-01 | 1.39E-01 | 4.02E-01 | 5.69E-04 | 3.45E-02 | 3.45E-02 | 4.40E+01 | 1.25E-02 | 1.17E-03 | 2.04E+00 |
| Crushing/Proc. Equipment | 51 | 120 | 5.64E-01 | 1.16E-01 | 7.36E-01 | 9.74E-04 | 6.28E-02 | 6.28E-02 | 8.31E+01 | 1.05E-02 | 2.18E-03 | 3.80E+00 |
| Crushing/Proc. Equipment | 121 | 175 | 9.55E-01 | 1.65E-01 | 1.28E+00 | 1.88E-03 | 6.98E-02 | 6.98E-02 | 1.67E+02 | 1.49E-02 | 4.37E-03 | 7.62E+00 |
| Crushing/Proc. Equipment | 176 | 250 | 5.17E-01 | 1.64E-01 | 1.63E+00 | 2.75E-03 | 5.05E-02 | 5.05E-02 | 2.44E+02 | 1.48E-02 | 6.34E-03 | 1.11E+01 |
| Crushing/Proc. Equipment | 251 | 500 | 7.78E-01 | 2.35E-01 | 2.17E+00 | 3.66E-03 | 7.21E-02 | 7.21E-02 | 3.73E+02 | 2.12E-02 | 9.69E-03 | 1.69E+01 |
| Crushing/Proc. Equipment | 501 | 750 | 1.22E+00 | 3.71E-01 | 3.53E+00 | 5.92E-03 | 1.15E-01 | 1.15E-01 | 5.88E+02 | 3.35E-02 | 1.53E-02 | 2.66E+01 |
| Crushing/Proc. Equipment | 751 | 9999 | 3.09E+00 | 9.71E-01 | 1.15E+01 | 1.31E-02 | 3.22E-01 | 3.22E-01 | 1.31E+03 | 8.76E-02 | 3.39E-02 | 5.92E+01 |
| Deicer | 0 | 120 | 5.05E-01 | 9.19E-02 | 6.92E-01 | 9.70E-04 | 4.92E-02 | 4.92E-02 | 8.27E+01 | 8.29E-03 | 2.16E-03 | 3.78E+00 |
| Drill Rig | 0 | 120 | 4.68E-01 | 2.13E-02 | 3.12E-01 | 9.81E-04 | 3.37E-03 | 3.37E-03 | 8.36E+01 | 1.92E-03 | 2.18E-03 | 3.80E+00 |
| Drill Rig | 121 | 175 | 7.50E-01 | 3.55E-02 | 4.22E-01 | 1.70E-03 | 4.18E-03 | 4.18E-03 | 1.51E+02 | 3.21E-03 | 3.94E-03 | 6.87E+00 |
| Drill Rig | 176 | 250 | 3.41E-01 | 3.57E-02 | 2.41E-01 | 2.27E-03 | 3.56E-03 | 3.56E-03 | 2.02E+02 | 3.22E-03 | 5.23E-03 | 9.13E+00 |
| Drill Rig | 251 | 500 | 6.14E-01 | 6.49E-02 | 4.38E-01 | 3.61E-03 | 6.47E-03 | 6.47E-03 | 3.67E+02 | 5.86E-03 | 9.51E-03 | 1.66E+01 |
| Drill Rig | 501 | 750 | 9.50E-01 | 1.00E-01 | 6.78E-01 | 5.72E-03 | 1.00E-02 | 1.00E-02 | 5.68E+02 | 9.06E-03 | 1.47E-02 | 2.57E+01 |
| Drill Rig | 751 | 1000 | 2.41E+00 | 2.81E-01 | 5.83E+00 | 1.45E-02 | 1.11E-01 | 1.11E-01 | 1.44E+03 | 2.54E-02 | 3.73E-02 | 6.50E+01 |
| Drill Rig (Mobile) | 0 | 50 | 4.55E-01 | 1.69E-01 | 3.37E-01 | 4.01E-04 | 3.59E-02 | 3.59E-02 | 3.10E+01 | 1.52E-02 | 8.37E-04 | 1.46E+00 |
| Drill Rig (Mobile) | 51 | 120 | 6.14E-01 | 1.78E-01 | 1.01E+00 | 9.04E-04 | 8.54E-02 | 8.54E-02 | 7.71E+01 | 1.60E-02 | 2.03E-03 | 3.55E+00 |
| Drill Rig (Mobile) | 121 | 175 | 9.44E-01 | 2.32E-01 | 1.64E+00 | 1.59E-03 | 9.30E-02 | 9.30E-02 | 1.41E+02 | 2.09E-02 | 3.70E-03 | 6.46E+00 |
| Drill Rig (Mobile) | 176 | 250 | 7.11E-01 | 2.53E-01 | 2.03E+00 | 2.11E-03 | 8.81E-02 | 8.81E-02 | 1.88E+02 | 2.28E-02 | 4.91E-03 | 8.56E+00 |
| Drill Rig (Mobile) | 251 | 500 | 1.74E+00 | 3.83E-01 | 3.07E+00 | 3.05E-03 | 1.29E-01 | 1.29E-01 | 3.11E+02 | 3.45E-02 | 8.14E-03 | 1.42E+01 |
| Drill Rig (Mobile) | 501 | 750 | 3.43E+00 | 7.59E-01 | 6.15E+00 | 6.18E-03 | 2.58E-01 | 2.58E-01 | 6.15E+02 | 6.84E-02 | 1.61E-02 | 2.81E+01 |
| Drill Rig (Mobile) | 751 | 1000 | 5.56E+00 | 1.20E+00 | 1.14E+01 | 9.33E-03 | 4.02E-01 | 4.02E-01 | 9.27E+02 | 1.08E-01 | 2.43E-02 | 4.24E+01 |
| Dumpers/Tenders | 0 | 25 | 3.15E-02 | 9.33E-03 | 5.90E-02 | 9.67E-05 | 2.51E-03 | 2.51E-03 | 7.62E+00 | 8.42E-04 | 1.99E-04 | 3.47E-01 |
| Excavators | 0 | 25 | 6.76E-02 | 1.98E-02 | 1.25E-01 | 2.08E-04 | 4.66E-03 | 4.66E-03 | 1.64E+01 | 1.79E-03 | 4.29E-04 | 7.48E-01 |
| Excavators | 26 | 50 | 2.68E-01 | 6.48E-02 | 2.25E-01 | 3.23E-04 | 1.67E-02 | 1.67E-02 | 2.50E+01 | 5.85E-03 | 6.63E-04 | 1.16E+00 |
| Excavators | 51 | 120 | 5.10E-01 | 9.10E-02 | 5.78E-01 | 8.63E-04 | 4.53E-02 | 4.53E-02 | 7.36E+01 | 8.21E-03 | 1.93E-03 | 3.37E+00 |

**Table 15**
**Santa Barbara OFFROAD2007 Emission Factors for 2015[a]**

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Excavators | 121 | 175 | 6.65E-01 | 1.05E-01 | 7.39E-01 | 1.26E-03 | 4.04E-02 | 4.04E-02 | 1.12E+02 | 9.47E-03 | 2.93E-03 | 5.11E+00 |
| Excavators | 176 | 250 | 3.43E-01 | 1.12E-01 | 8.92E-01 | 1.78E-03 | 2.97E-02 | 2.97E-02 | 1.59E+02 | 1.01E-02 | 4.12E-03 | 7.18E+00 |
| Excavators | 251 | 500 | 4.96E-01 | 1.58E-01 | 1.16E+00 | 2.29E-03 | 4.13E-02 | 4.13E-02 | 2.34E+02 | 1.42E-02 | 6.06E-03 | 1.06E+01 |
| Excavators | 501 | 750 | 8.22E-01 | 2.62E-01 | 1.98E+00 | 3.89E-03 | 6.95E-02 | 6.95E-02 | 3.87E+02 | 2.37E-02 | 1.01E-02 | 1.75E+01 |
| Forklift | 0 | 175 | 3.25E-01 | 5.33E-02 | 4.34E-01 | 6.58E-04 | 2.31E-02 | 2.31E-02 | 5.84E+01 | 4.81E-03 | 1.53E-03 | 2.66E+00 |
| Forklifts | 0 | 50 | 1.54E-01 | 3.34E-02 | 1.34E-01 | 1.90E-04 | 9.47E-03 | 9.47E-03 | 1.47E+01 | 3.02E-03 | 3.88E-04 | 6.77E-01 |
| Forklifts | 51 | 120 | 2.15E-01 | 3.54E-02 | 2.37E-01 | 3.66E-04 | 1.80E-02 | 1.80E-02 | 3.12E+01 | 3.20E-03 | 8.18E-04 | 1.43E+00 |
| Forklifts | 121 | 175 | 3.32E-01 | 4.96E-02 | 3.51E-01 | 6.30E-04 | 1.95E-02 | 1.95E-02 | 5.60E+01 | 4.48E-03 | 1.46E-03 | 2.55E+00 |
| Forklifts | 176 | 250 | 1.59E-01 | 5.28E-02 | 4.16E-01 | 8.67E-04 | 1.38E-02 | 1.38E-02 | 7.71E+01 | 4.76E-03 | 2.00E-03 | 3.49E+00 |
| Forklifts | 251 | 500 | 2.17E-01 | 7.38E-02 | 5.31E-01 | 1.09E-03 | 1.92E-02 | 1.92E-02 | 1.11E+02 | 6.66E-03 | 2.88E-03 | 5.02E+00 |
| Fuel Truck | 0 | 250 | 1.21E-01 | 3.48E-02 | 3.81E-01 | 6.65E-04 | 1.16E-02 | 1.16E-02 | 5.91E+01 | 3.14E-03 | 1.53E-03 | 2.67E+00 |
| Generator | 0 | 120 | 5.78E-01 | 1.21E-01 | 7.33E-01 | 9.24E-04 | 6.30E-02 | 6.30E-02 | 8.21E+01 | 1.09E-02 | 2.15E-03 | 3.76E+00 |
| Generator | 121 | 175 | 9.21E-01 | 1.66E-01 | 1.19E+00 | 1.74E-03 | 6.76E-02 | 6.76E-02 | 1.55E+02 | 1.50E-02 | 4.05E-03 | 7.06E+00 |
| Generator | 176 | 250 | 4.96E-01 | 1.72E-01 | 1.51E+00 | 2.52E-03 | 4.97E-02 | 4.97E-02 | 2.24E+02 | 1.55E-02 | 5.81E-03 | 1.01E+01 |
| Generator | 251 | 500 | 7.61E-01 | 2.58E-01 | 2.08E+00 | 3.99E-03 | 7.34E-02 | 7.34E-02 | 3.55E+02 | 2.33E-02 | 9.21E-03 | 1.61E+01 |
| Generator | 501 | 750 | 1.23E+00 | 4.19E-01 | 3.48E+00 | 6.44E-03 | 1.21E-01 | 1.21E-01 | 5.73E+02 | 3.78E-02 | 1.49E-02 | 2.59E+01 |
| Generator (Drilling) | 0 | 50 | 2.83E-01 | 8.63E-02 | 2.36E-01 | 3.21E-04 | 2.13E-02 | 2.13E-02 | 2.48E+01 | 7.79E-03 | 6.61E-04 | 1.15E+00 |
| Generator (Drilling) | 51 | 120 | 5.26E-01 | 1.15E-01 | 7.03E-01 | 8.82E-04 | 6.14E-02 | 6.14E-02 | 7.52E+01 | 1.04E-02 | 1.97E-03 | 3.44E+00 |
| Generator (Drilling) | 121 | 175 | 6.01E-01 | 1.11E-01 | 8.25E-01 | 1.15E-03 | 4.66E-02 | 4.66E-02 | 1.02E+02 | 1.01E-02 | 2.67E-03 | 4.67E+00 |
| Generator (Drilling) | 176 | 250 | 3.28E-01 | 1.12E-01 | 1.04E+00 | 1.62E-03 | 3.44E-02 | 3.44E-02 | 1.44E+02 | 1.01E-02 | 3.75E-03 | 6.54E+00 |
| Generator (Drilling) | 251 | 500 | 6.39E-01 | 2.21E-01 | 1.76E+00 | 2.74E-03 | 6.32E-02 | 6.32E-02 | 2.79E+02 | 1.99E-02 | 7.25E-03 | 1.26E+01 |
| Generator (Drilling) | 501 | 750 | 6.55E-01 | 2.14E-01 | 1.89E+00 | 2.86E-03 | 6.59E-02 | 6.59E-02 | 2.92E+02 | 1.93E-02 | 7.58E-03 | 1.32E+01 |
| Generator (Entertainment) | 0 | 50 | 3.50E-01 | 9.87E-02 | 3.76E-01 | 5.63E-04 | 2.73E-02 | 2.73E-02 | 4.36E+01 | 8.90E-03 | 1.15E-03 | 2.01E+00 |
| Generator (Entertainment) | 51 | 120 | 5.49E-01 | 1.02E-01 | 7.52E-01 | 1.04E-03 | 5.45E-02 | 5.45E-02 | 8.90E+01 | 9.16E-03 | 2.33E-03 | 4.07E+00 |
| Generator (Entertainment) | 121 | 175 | 7.73E-01 | 1.16E-01 | 1.09E+00 | 1.68E-03 | 5.06E-02 | 5.06E-02 | 1.49E+02 | 1.04E-02 | 3.90E-03 | 6.80E+00 |
| Generator (Entertainment) | 176 | 250 | 3.98E-01 | 1.04E-01 | 1.28E+00 | 2.22E-03 | 3.72E-02 | 3.72E-02 | 1.97E+02 | 9.39E-03 | 5.12E-03 | 8.94E+00 |
| Generator (Entertainment) | 251 | 500 | 5.63E-01 | 1.32E-01 | 1.60E+00 | 2.71E-03 | 4.87E-02 | 4.87E-02 | 2.76E+02 | 1.19E-02 | 7.17E-03 | 1.25E+01 |
| Generator (Entertainment) | 501 | 750 | 1.11E+00 | 2.67E-01 | 3.24E+00 | 5.45E-03 | 9.74E-02 | 9.74E-02 | 5.42E+02 | 2.41E-02 | 1.41E-02 | 2.45E+01 |
| Generator (Entertainment) | 751 | 9999 | 2.19E+00 | 6.03E-01 | 8.25E+00 | 9.69E-03 | 2.14E-01 | 2.14E-01 | 9.64E+02 | 5.44E-02 | 2.50E-02 | 4.37E+01 |
| Generator (Military) | 0 | 50 | 2.22E-01 | 6.16E-02 | 2.45E-01 | 3.69E-04 | 1.74E-02 | 1.74E-02 | 2.86E+01 | 5.56E-03 | 7.53E-04 | 1.31E+00 |
| Generator (Military) | 51 | 120 | 3.81E-01 | 6.93E-02 | 5.22E-01 | 7.32E-04 | 3.71E-02 | 3.71E-02 | 6.24E+01 | 6.25E-03 | 1.63E-03 | 2.85E+00 |
| Generator (Military) | 121 | 175 | 5.67E-01 | 8.32E-02 | 8.00E-01 | 1.24E-03 | 3.64E-02 | 3.64E-02 | 1.11E+02 | 7.50E-03 | 2.88E-03 | 5.03E+00 |
| Generator (Military) | 176 | 250 | 3.34E-01 | 8.55E-02 | 1.08E+00 | 1.89E-03 | 3.08E-02 | 3.08E-02 | 1.68E+02 | 7.72E-03 | 4.35E-03 | 7.59E+00 |
| Generator (Military) | 251 | 500 | 5.27E-01 | 1.20E-01 | 1.50E+00 | 2.57E-03 | 4.50E-02 | 4.50E-02 | 2.62E+02 | 1.09E-02 | 6.79E-03 | 1.18E+01 |
| Generator (Military) | 501 | 750 | 8.10E-01 | 1.91E-01 | 2.39E+00 | 4.04E-03 | 7.06E-02 | 7.06E-02 | 4.02E+02 | 1.73E-02 | 1.04E-02 | 1.82E+01 |

**Table 15**
**Santa Barbara OFFROAD2007 Emission Factors for 2015[a]**

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Generator (Railyard) | 0 | 175 | 7.21E-01 | 1.08E-01 | 1.02E+00 | 1.56E-03 | 4.71E-02 | 4.71E-02 | 1.39E+02 | 9.72E-03 | 3.63E-03 | 6.33E+00 |
| Generator (Railyard) | 176 | 9999 | 2.00E+00 | 5.49E-01 | 7.51E+00 | 8.83E-03 | 1.95E-01 | 1.95E-01 | 8.78E+02 | 4.95E-02 | 2.28E-02 | 3.98E+01 |
| Generator (Workover) | 0 | 120 | 4.95E-01 | 1.08E-01 | 6.61E-01 | 8.29E-04 | 5.77E-02 | 5.77E-02 | 7.07E+01 | 9.77E-03 | 1.86E-03 | 3.24E+00 |
| Generator (Workover) | 121 | 175 | 6.41E-01 | 1.19E-01 | 8.79E-01 | 1.23E-03 | 4.97E-02 | 4.97E-02 | 1.09E+02 | 1.07E-02 | 2.85E-03 | 4.98E+00 |
| Generator (Workover) | 176 | 250 | 3.14E-01 | 1.07E-01 | 9.94E-01 | 1.56E-03 | 3.29E-02 | 3.29E-02 | 1.38E+02 | 9.68E-03 | 3.59E-03 | 6.27E+00 |
| Generator (Workover) | 251 | 500 | 6.12E-01 | 1.99E-01 | 1.71E+00 | 2.68E-03 | 6.04E-02 | 6.04E-02 | 2.73E+02 | 1.79E-02 | 7.09E-03 | 1.24E+01 |
| Generator (Workover) | 501 | 750 | 7.22E-01 | 2.36E-01 | 2.09E+00 | 3.16E-03 | 7.26E-02 | 7.26E-02 | 3.22E+02 | 2.13E-02 | 8.36E-03 | 1.46E+01 |
| Generator (Workover) | 751 | 9999 | 2.54E+00 | 8.39E-01 | 9.45E+00 | 9.96E-03 | 2.71E-01 | 2.71E-01 | 1.01E+03 | 7.57E-02 | 2.64E-02 | 4.60E+01 |
| Generator Sets | 0 | 15 | 6.60E-02 | 1.37E-02 | 9.38E-02 | 1.59E-04 | 5.19E-03 | 5.19E-03 | 1.02E+01 | 1.23E-03 | 2.67E-04 | 4.66E-01 |
| Generator Sets | 16 | 25 | 8.36E-02 | 2.49E-02 | 1.53E-01 | 2.24E-04 | 8.18E-03 | 8.18E-03 | 1.76E+01 | 2.25E-03 | 4.61E-04 | 8.04E-01 |
| Generator Sets | 26 | 50 | 2.51E-01 | 7.37E-02 | 2.66E-01 | 3.96E-04 | 2.01E-02 | 2.01E-02 | 3.06E+01 | 6.65E-03 | 8.08E-04 | 1.41E+00 |
| Generator Sets | 51 | 120 | 4.83E-01 | 9.46E-02 | 6.77E-01 | 9.14E-04 | 5.04E-02 | 5.04E-02 | 7.79E+01 | 8.54E-03 | 2.04E-03 | 3.56E+00 |
| Generator Sets | 121 | 175 | 7.36E-01 | 1.16E-01 | 1.08E+00 | 1.60E-03 | 5.04E-02 | 5.04E-02 | 1.42E+02 | 1.05E-02 | 3.70E-03 | 6.46E+00 |
| Generator Sets | 176 | 250 | 4.18E-01 | 1.13E-01 | 1.43E+00 | 2.39E-03 | 3.97E-02 | 3.97E-02 | 2.12E+02 | 1.02E-02 | 5.51E-03 | 9.61E+00 |
| Generator Sets | 251 | 500 | 6.69E-01 | 1.60E-01 | 2.01E+00 | 3.30E-03 | 5.90E-02 | 5.90E-02 | 3.37E+02 | 1.45E-02 | 8.73E-03 | 1.52E+01 |
| Generator Sets | 501 | 750 | 1.08E+00 | 2.68E-01 | 3.36E+00 | 5.46E-03 | 9.72E-02 | 9.72E-02 | 5.43E+02 | 2.42E-02 | 1.41E-02 | 2.46E+01 |
| Generator Sets | 751 | 9999 | 2.40E+00 | 6.78E-01 | 9.20E+00 | 1.05E-02 | 2.39E-01 | 2.39E-01 | 1.05E+03 | 6.12E-02 | 2.72E-02 | 4.75E+01 |
| Graders | 0 | 50 | 3.08E-01 | 8.95E-02 | 2.57E-01 | 3.56E-04 | 2.16E-02 | 2.16E-02 | 2.75E+01 | 8.07E-03 | 7.32E-04 | 1.28E+00 |
| Graders | 51 | 120 | 5.22E-01 | 1.08E-01 | 6.71E-01 | 8.79E-04 | 5.53E-02 | 5.53E-02 | 7.49E+01 | 9.73E-03 | 1.97E-03 | 3.43E+00 |
| Graders | 121 | 175 | 7.31E-01 | 1.30E-01 | 9.51E-01 | 1.39E-03 | 5.24E-02 | 5.24E-02 | 1.24E+02 | 1.17E-02 | 3.24E-03 | 5.65E+00 |
| Graders | 176 | 250 | 4.04E-01 | 1.32E-01 | 1.16E+00 | 1.93E-03 | 3.99E-02 | 3.99E-02 | 1.72E+02 | 1.19E-02 | 4.47E-03 | 7.80E+00 |
| Graders | 251 | 500 | 5.74E-01 | 1.66E-01 | 1.37E+00 | 2.25E-03 | 4.95E-02 | 4.95E-02 | 2.29E+02 | 1.50E-02 | 5.96E-03 | 1.04E+01 |
| Graders | 501 | 750 | 1.21E+00 | 3.54E-01 | 2.98E+00 | 4.88E-03 | 1.06E-01 | 1.06E-01 | 4.85E+02 | 3.19E-02 | 1.26E-02 | 2.20E+01 |
| Ground Power Unit | 0 | 175 | 8.72E-01 | 1.41E-01 | 1.10E+00 | 1.72E-03 | 5.96E-02 | 5.96E-02 | 1.53E+02 | 1.27E-02 | 4.01E-03 | 6.99E+00 |
| Hydrant Truck | 0 | 175 | 8.44E-01 | 1.42E-01 | 1.18E+00 | 1.73E-03 | 6.17E-02 | 6.17E-02 | 1.53E+02 | 1.28E-02 | 4.01E-03 | 7.00E+00 |
| Hydraulic unit | 0 | 120 | 4.36E-01 | 7.93E-02 | 5.98E-01 | 8.38E-04 | 4.25E-02 | 4.25E-02 | 7.14E+01 | 7.16E-03 | 1.87E-03 | 3.26E+00 |
| Hydro Power Units | 0 | 15 | 3.67E-02 | 7.00E-03 | 4.38E-02 | 9.36E-05 | 1.71E-03 | 1.71E-03 | 6.01E+00 | 6.32E-04 | 1.57E-04 | 2.75E-01 |
| Hydro Power Units | 16 | 25 | 4.70E-02 | 1.38E-02 | 8.72E-02 | 1.45E-04 | 3.35E-03 | 3.35E-03 | 1.14E+01 | 1.24E-03 | 2.98E-04 | 5.20E-01 |
| Hydro Power Units | 26 | 50 | 2.19E-01 | 6.81E-02 | 1.94E-01 | 2.72E-04 | 1.68E-02 | 1.68E-02 | 2.10E+01 | 6.14E-03 | 5.59E-04 | 9.76E-01 |
| Hydro Power Units | 51 | 120 | 2.83E-01 | 5.97E-02 | 3.85E-01 | 4.94E-04 | 3.22E-02 | 3.22E-02 | 4.21E+01 | 5.38E-03 | 1.10E-03 | 1.93E+00 |
| Lav Truck | 0 | 175 | 3.08E-01 | 5.45E-02 | 4.01E-01 | 5.90E-04 | 2.26E-02 | 2.26E-02 | 5.25E+01 | 4.91E-03 | 1.37E-03 | 2.39E+00 |
| Lawn & Garden Tractors | 0 | 15 | 5.67E-02 | 9.69E-03 | 6.81E-02 | 1.44E-04 | 2.82E-03 | 2.82E-03 | 9.28E+00 | 8.74E-04 | 2.43E-04 | 4.24E-01 |
| Lawn & Garden Tractors | 16 | 25 | 5.88E-02 | 1.73E-02 | 1.09E-01 | 1.81E-04 | 4.30E-03 | 4.30E-03 | 1.43E+01 | 1.56E-03 | 3.73E-04 | 6.50E-01 |
| Leaf Blowers/Vacuums | 0 | 15 | 1.84E-02 | 3.12E-03 | 2.19E-02 | 4.68E-05 | 8.83E-04 | 8.83E-04 | 3.01E+00 | 2.82E-04 | 7.87E-05 | 1.37E-01 |
| Leaf Blowers/Vacuums | 16 | 120 | 2.83E-01 | 4.70E-02 | 3.87E-01 | 5.70E-04 | 2.49E-02 | 2.49E-02 | 4.86E+01 | 4.24E-03 | 1.27E-03 | 2.22E+00 |

**Table 15**
**Santa Barbara OFFROAD2007 Emission Factors for 2015**[a]

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Leaf Blowers/Vacuums | 121 | 250 | 1.88E-01 | 4.26E-02 | 6.10E-01 | 1.13E-03 | 1.58E-02 | 1.58E-02 | 1.00E+02 | 3.84E-03 | 2.60E-03 | 4.53E+00 |
| Lift | 0 | 120 | 4.79E-01 | 9.47E-02 | 6.25E-01 | 8.46E-04 | 5.17E-02 | 5.17E-02 | 7.21E+01 | 8.55E-03 | 1.89E-03 | 3.30E+00 |
| Lift (Drilling) | 0 | 120 | 5.79E-01 | 1.27E-01 | 7.73E-01 | 9.70E-04 | 6.75E-02 | 6.75E-02 | 8.27E+01 | 1.14E-02 | 2.17E-03 | 3.79E+00 |
| Lift (Drilling) | 121 | 175 | 6.52E-01 | 1.21E-01 | 8.95E-01 | 1.25E-03 | 5.06E-02 | 5.06E-02 | 1.11E+02 | 1.09E-02 | 2.90E-03 | 5.06E+00 |
| Lift (Drilling) | 176 | 250 | 3.84E-01 | 1.31E-01 | 1.21E+00 | 1.90E-03 | 4.03E-02 | 4.03E-02 | 1.69E+02 | 1.18E-02 | 4.39E-03 | 7.67E+00 |
| Lift (Drilling) | 251 | 500 | 6.46E-01 | 2.10E-01 | 1.80E+00 | 2.83E-03 | 6.37E-02 | 6.37E-02 | 2.88E+02 | 1.89E-02 | 7.48E-03 | 1.30E+01 |
| Lift (Drilling) | 501 | 750 | 6.44E-01 | 2.11E-01 | 1.86E+00 | 2.82E-03 | 6.48E-02 | 6.48E-02 | 2.87E+02 | 1.90E-02 | 7.46E-03 | 1.30E+01 |
| Lift (Military) | 0 | 120 | 4.36E-01 | 7.93E-02 | 5.98E-01 | 8.38E-04 | 4.25E-02 | 4.25E-02 | 7.14E+01 | 7.16E-03 | 1.87E-03 | 3.26E+00 |
| Light | 0 | 50 | 2.93E-01 | 8.10E-02 | 3.22E-01 | 4.86E-04 | 2.29E-02 | 2.29E-02 | 3.76E+01 | 7.31E-03 | 9.91E-04 | 1.73E+00 |
| Materials Handling (Rail-CHE) | 0 | 120 | 4.00E-01 | 8.50E-02 | 5.43E-01 | 6.65E-04 | 4.62E-02 | 4.62E-02 | 5.91E+01 | 7.67E-03 | 1.55E-03 | 2.71E+00 |
| Misc Portable Equipment | 0 | 120 | 4.39E-01 | 8.60E-02 | 6.01E-01 | 8.07E-04 | 4.65E-02 | 4.65E-02 | 6.88E+01 | 7.76E-03 | 1.80E-03 | 3.14E+00 |
| Misc Portable Equipment | 121 | 175 | 5.07E-01 | 8.13E-02 | 7.16E-01 | 1.07E-03 | 3.55E-02 | 3.55E-02 | 9.47E+01 | 7.33E-03 | 2.47E-03 | 4.32E+00 |
| Misc Portable Equipment | 176 | 250 | 3.31E-01 | 9.35E-02 | 1.07E+00 | 1.78E-03 | 3.26E-02 | 3.26E-02 | 1.59E+02 | 8.43E-03 | 4.12E-03 | 7.18E+00 |
| Misc Portable Equipment | 251 | 500 | 6.24E-01 | 1.59E-01 | 1.76E+00 | 2.91E-03 | 5.65E-02 | 5.65E-02 | 2.96E+02 | 1.43E-02 | 7.68E-03 | 1.34E+01 |
| Misc Portable Equipment | 501 | 750 | 8.87E-01 | 2.31E-01 | 2.59E+00 | 4.23E-03 | 8.19E-02 | 8.19E-02 | 4.21E+02 | 2.09E-02 | 1.09E-02 | 1.91E+01 |
| Misc Portable Equipment | 751 | 1000 | 1.32E+00 | 3.64E-01 | 4.93E+00 | 5.64E-03 | 1.30E-01 | 1.30E-01 | 5.61E+02 | 3.29E-02 | 1.46E-02 | 2.54E+01 |
| Off-Highway Tractors | 0 | 120 | 7.04E-01 | 1.90E-01 | 1.11E+00 | 1.10E-03 | 9.50E-02 | 9.50E-02 | 9.37E+01 | 1.72E-02 | 2.47E-03 | 4.30E+00 |
| Off-Highway Tractors | 121 | 175 | 8.21E-01 | 1.87E-01 | 1.37E+00 | 1.47E-03 | 7.70E-02 | 7.70E-02 | 1.30E+02 | 1.68E-02 | 3.42E-03 | 5.96E+00 |
| Off-Highway Tractors | 176 | 250 | 4.32E-01 | 1.49E-01 | 1.26E+00 | 1.47E-03 | 5.20E-02 | 5.20E-02 | 1.30E+02 | 1.34E-02 | 3.40E-03 | 5.93E+00 |
| Off-Highway Tractors | 251 | 750 | 2.53E+00 | 5.98E-01 | 5.07E+00 | 5.71E-03 | 2.05E-01 | 2.05E-01 | 5.68E+02 | 5.39E-02 | 1.48E-02 | 2.58E+01 |
| Off-Highway Tractors | 751 | 1000 | 3.95E+00 | 9.01E-01 | 9.19E+00 | 8.18E-03 | 3.06E-01 | 3.06E-01 | 8.14E+02 | 8.13E-02 | 2.13E-02 | 3.71E+01 |
| Off-Highway Trucks | 0 | 175 | 7.55E-01 | 1.26E-01 | 8.58E-01 | 1.41E-03 | 4.75E-02 | 4.75E-02 | 1.25E+02 | 1.13E-02 | 3.27E-03 | 5.70E+00 |
| Off-Highway Trucks | 176 | 250 | 3.70E-01 | 1.25E-01 | 9.80E-01 | 1.87E-03 | 3.27E-02 | 3.27E-02 | 1.66E+02 | 1.13E-02 | 4.32E-03 | 7.54E+00 |
| Off-Highway Trucks | 251 | 500 | 5.94E-01 | 1.96E-01 | 1.41E+00 | 2.67E-03 | 5.04E-02 | 5.04E-02 | 2.72E+02 | 1.77E-02 | 7.07E-03 | 1.23E+01 |
| Off-Highway Trucks | 501 | 750 | 9.64E-01 | 3.19E-01 | 2.36E+00 | 4.44E-03 | 8.31E-02 | 8.31E-02 | 4.41E+02 | 2.88E-02 | 1.15E-02 | 2.00E+01 |
| Off-Highway Trucks | 751 | 1000 | 1.48E+00 | 4.87E-01 | 5.21E+00 | 6.28E-03 | 1.50E-01 | 1.50E-01 | 6.24E+02 | 4.39E-02 | 1.62E-02 | 2.83E+01 |
| Other Agricultural Equipment | 0 | 15 | 4.68E-02 | 8.93E-03 | 5.59E-02 | 1.19E-04 | 2.20E-03 | 2.20E-03 | 7.67E+00 | 8.05E-04 | 2.01E-04 | 3.50E-01 |
| Other Agricultural Equipment | 16 | 25 | 6.00E-02 | 1.84E-02 | 1.12E-01 | 1.78E-04 | 5.34E-03 | 5.34E-03 | 1.41E+01 | 1.66E-03 | 3.67E-04 | 6.41E-01 |
| Other Agricultural Equipment | 26 | 50 | 2.12E-01 | 6.08E-02 | 2.21E-01 | 3.30E-04 | 1.65E-02 | 1.65E-02 | 2.56E+01 | 5.49E-03 | 6.75E-04 | 1.18E+00 |
| Other Agricultural Equipment | 51 | 120 | 3.18E-01 | 5.96E-02 | 4.36E-01 | 6.00E-04 | 3.18E-02 | 3.18E-02 | 5.11E+01 | 5.38E-03 | 1.34E-03 | 2.34E+00 |
| Other Agricultural Equipment | 121 | 175 | 4.85E-01 | 7.36E-02 | 6.82E-01 | 1.04E-03 | 3.19E-02 | 3.19E-02 | 9.27E+01 | 6.64E-03 | 2.42E-03 | 4.22E+00 |
| Other Agricultural Equipment | 176 | 250 | 2.69E-01 | 7.15E-02 | 8.68E-01 | 1.51E-03 | 2.50E-02 | 2.50E-02 | 1.34E+02 | 6.45E-03 | 3.48E-03 | 6.07E+00 |
| Other Agricultural Equipment | 251 | 500 | 3.91E-01 | 9.30E-02 | 1.11E+00 | 1.89E-03 | 3.36E-02 | 3.36E-02 | 1.93E+02 | 8.40E-03 | 5.01E-03 | 8.73E+00 |
| Other Construction Equipment | 0 | 15 | 6.17E-02 | 1.18E-02 | 7.36E-02 | 1.57E-04 | 2.87E-03 | 2.87E-03 | 1.01E+01 | 1.06E-03 | 2.64E-04 | 4.61E-01 |
| Other Construction Equipment | 16 | 25 | 5.44E-02 | 1.59E-02 | 1.01E-01 | 1.68E-04 | 3.86E-03 | 3.86E-03 | 1.32E+01 | 1.44E-03 | 3.45E-04 | 6.01E-01 |

**Table 15**
**Santa Barbara OFFROAD2007 Emission Factors for 2015[a]**

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Other Construction Equipment | 26 | 50 | 2.50E-01 | 5.95E-02 | 2.37E-01 | 3.62E-04 | 1.62E-02 | 1.62E-02 | 2.80E+01 | 5.37E-03 | 7.38E-04 | 1.29E+00 |
| Other Construction Equipment | 51 | 120 | 5.20E-01 | 8.25E-02 | 6.00E-01 | 9.48E-04 | 4.40E-02 | 4.40E-02 | 8.08E+01 | 7.44E-03 | 2.11E-03 | 3.69E+00 |
| Other Construction Equipment | 121 | 175 | 5.86E-01 | 7.94E-02 | 6.62E-01 | 1.20E-03 | 3.30E-02 | 3.30E-02 | 1.06E+02 | 7.17E-03 | 2.78E-03 | 4.85E+00 |
| Other Construction Equipment | 176 | 500 | 4.96E-01 | 1.31E-01 | 1.18E+00 | 2.49E-03 | 3.93E-02 | 3.93E-02 | 2.54E+02 | 1.18E-02 | 6.59E-03 | 1.15E+01 |
| Other General Industrial Equipmen | 0 | 15 | 3.90E-02 | 6.63E-03 | 4.66E-02 | 9.94E-05 | 1.82E-03 | 1.82E-03 | 6.39E+00 | 5.98E-04 | 1.67E-04 | 2.92E-01 |
| Other General Industrial Equipmen | 16 | 25 | 6.31E-02 | 1.85E-02 | 1.17E-01 | 1.95E-04 | 4.35E-03 | 4.35E-03 | 1.53E+01 | 1.67E-03 | 4.00E-04 | 6.98E-01 |
| Other General Industrial Equipmen | 26 | 50 | 2.58E-01 | 8.16E-02 | 2.10E-01 | 2.81E-04 | 1.98E-02 | 1.98E-02 | 2.17E+01 | 7.36E-03 | 5.80E-04 | 1.01E+00 |
| Other General Industrial Equipmen | 51 | 120 | 4.41E-01 | 1.02E-01 | 6.01E-01 | 7.27E-04 | 5.42E-02 | 5.42E-02 | 6.20E+01 | 9.22E-03 | 1.63E-03 | 2.84E+00 |
| Other General Industrial Equipmen | 121 | 175 | 5.71E-01 | 1.11E-01 | 8.08E-01 | 1.08E-03 | 4.64E-02 | 4.64E-02 | 9.58E+01 | 1.01E-02 | 2.51E-03 | 4.38E+00 |
| Other General Industrial Equipmen | 176 | 250 | 3.04E-01 | 1.08E-01 | 1.02E+00 | 1.52E-03 | 3.24E-02 | 3.24E-02 | 1.35E+02 | 9.73E-03 | 3.52E-03 | 6.14E+00 |
| Other General Industrial Equipmen | 251 | 500 | 5.85E-01 | 1.98E-01 | 1.72E+00 | 2.60E-03 | 5.91E-02 | 5.91E-02 | 2.65E+02 | 1.79E-02 | 6.89E-03 | 1.20E+01 |
| Other General Industrial Equipmen | 501 | 750 | 9.65E-01 | 3.29E-01 | 2.95E+00 | 4.39E-03 | 9.96E-02 | 9.96E-02 | 4.37E+02 | 2.97E-02 | 1.14E-02 | 1.98E+01 |
| Other General Industrial Equipmen | 751 | 1000 | 1.42E+00 | 4.67E-01 | 5.38E+00 | 5.62E-03 | 1.56E-01 | 1.56E-01 | 5.59E+02 | 4.21E-02 | 1.45E-02 | 2.54E+01 |
| Other GSE | 0 | 175 | 5.22E-01 | 1.13E-01 | 8.54E-01 | 1.14E-03 | 4.80E-02 | 4.80E-02 | 8.80E+01 | 1.02E-02 | 2.30E-03 | 4.02E+00 |
| Other Lawn & Garden Equipment | 0 | 15 | 7.46E-02 | 1.27E-02 | 8.90E-02 | 1.90E-04 | 3.50E-03 | 3.50E-03 | 1.22E+01 | 1.14E-03 | 3.20E-04 | 5.58E-01 |
| Other Lawn & Garden Equipment | 16 | 25 | 6.71E-02 | 1.96E-02 | 1.24E-01 | 2.07E-04 | 4.67E-03 | 4.67E-03 | 1.63E+01 | 1.77E-03 | 4.25E-04 | 7.42E-01 |
| Other Material Handling Equipment | 0 | 50 | 3.56E-01 | 1.13E-01 | 2.92E-01 | 3.92E-04 | 2.75E-02 | 2.75E-02 | 3.03E+01 | 1.02E-02 | 8.09E-04 | 1.41E+00 |
| Other Material Handling Equipment | 51 | 120 | 4.30E-01 | 9.93E-02 | 5.87E-01 | 7.11E-04 | 5.29E-02 | 5.29E-02 | 6.06E+01 | 8.96E-03 | 1.59E-03 | 2.78E+00 |
| Other Material Handling Equipment | 121 | 175 | 7.23E-01 | 1.41E-01 | 1.03E+00 | 1.37E-03 | 5.88E-02 | 5.88E-02 | 1.22E+02 | 1.27E-02 | 3.19E-03 | 5.57E+00 |
| Other Material Handling Equipment | 176 | 250 | 3.23E-01 | 1.14E-01 | 1.08E+00 | 1.63E-03 | 3.45E-02 | 3.45E-02 | 1.45E+02 | 1.03E-02 | 3.76E-03 | 6.57E+00 |
| Other Material Handling Equipment | 251 | 500 | 4.21E-01 | 1.41E-01 | 1.24E+00 | 1.88E-03 | 4.25E-02 | 4.25E-02 | 1.91E+02 | 1.27E-02 | 4.97E-03 | 8.68E+00 |
| Other Material Handling Equipment | 501 | 9999 | 1.87E+00 | 6.33E-01 | 7.11E+00 | 7.27E-03 | 2.05E-01 | 2.05E-01 | 7.41E+02 | 5.71E-02 | 1.93E-02 | 3.36E+01 |
| Other tactical support equipment | 0 | 50 | 2.93E-01 | 8.10E-02 | 3.22E-01 | 4.86E-04 | 2.29E-02 | 2.29E-02 | 3.76E+01 | 7.31E-03 | 9.91E-04 | 1.73E+00 |
| Other tactical support equipment | 51 | 120 | 3.63E-01 | 6.60E-02 | 4.97E-01 | 6.97E-04 | 3.53E-02 | 3.53E-02 | 5.94E+01 | 5.95E-03 | 1.55E-03 | 2.71E+00 |
| Other tactical support equipment | 121 | 175 | 5.71E-01 | 8.37E-02 | 8.06E-01 | 1.25E-03 | 3.66E-02 | 3.66E-02 | 1.11E+02 | 7.56E-03 | 2.90E-03 | 5.07E+00 |
| Other tactical support equipment | 176 | 250 | 3.27E-01 | 8.36E-02 | 1.05E+00 | 1.84E-03 | 3.01E-02 | 3.01E-02 | 1.64E+02 | 7.54E-03 | 4.25E-03 | 7.42E+00 |
| Other tactical support equipment | 251 | 500 | 4.09E-01 | 9.34E-02 | 1.16E+00 | 1.99E-03 | 3.49E-02 | 3.49E-02 | 2.03E+02 | 8.42E-03 | 5.26E-03 | 9.18E+00 |
| Other tactical support equipment | 501 | 750 | 9.48E-01 | 2.24E-01 | 2.79E+00 | 4.73E-03 | 8.26E-02 | 8.26E-02 | 4.71E+02 | 2.02E-02 | 1.22E-02 | 2.13E+01 |
| Other Workover Equipment | 0 | 120 | 4.69E-01 | 1.03E-01 | 6.26E-01 | 7.85E-04 | 5.46E-02 | 5.46E-02 | 6.69E+01 | 9.25E-03 | 1.76E-03 | 3.06E+00 |
| Other Workover Equipment | 121 | 175 | 6.68E-01 | 1.24E-01 | 9.16E-01 | 1.28E-03 | 5.18E-02 | 5.18E-02 | 1.14E+02 | 1.12E-02 | 2.97E-03 | 5.18E+00 |
| Other Workover Equipment | 176 | 250 | 3.67E-01 | 1.25E-01 | 1.16E+00 | 1.82E-03 | 3.85E-02 | 3.85E-02 | 1.62E+02 | 1.13E-02 | 4.20E-03 | 7.33E+00 |
| Other Workover Equipment | 251 | 750 | 6.95E-01 | 2.27E-01 | 2.01E+00 | 3.04E-03 | 6.99E-02 | 6.99E-02 | 3.10E+02 | 2.05E-02 | 8.05E-03 | 1.40E+01 |
| Other Workover Equipment | 751 | 1000 | 1.85E+00 | 5.89E-01 | 6.88E+00 | 7.25E-03 | 1.97E-01 | 1.97E-01 | 7.39E+02 | 5.31E-02 | 1.92E-02 | 3.35E+01 |
| Passenger Stand | 0 | 120 | 4.24E-01 | 6.32E-02 | 5.59E-01 | 8.70E-04 | 3.38E-02 | 3.38E-02 | 7.41E+01 | 5.70E-03 | 1.94E-03 | 3.38E+00 |
| Pavers | 0 | 25 | 7.79E-02 | 2.34E-02 | 1.46E-01 | 2.37E-04 | 6.55E-03 | 6.55E-03 | 1.86E+01 | 2.11E-03 | 4.87E-04 | 8.49E-01 |

**Table 15**
**Santa Barbara OFFROAD2007 Emission Factors for 2015[a]**

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pavers | 26 | 50 | 3.42E-01 | 1.20E-01 | 2.77E-01 | 3.62E-04 | 2.70E-02 | 2.70E-02 | 2.80E+01 | 1.08E-02 | 7.48E-04 | 1.31E+00 |
| Pavers | 51 | 120 | 4.96E-01 | 1.23E-01 | 7.47E-01 | 8.11E-04 | 6.35E-02 | 6.35E-02 | 6.91E+01 | 1.11E-02 | 1.82E-03 | 3.17E+00 |
| Pavers | 121 | 175 | 7.70E-01 | 1.60E-01 | 1.21E+00 | 1.44E-03 | 6.71E-02 | 6.71E-02 | 1.28E+02 | 1.45E-02 | 3.36E-03 | 5.86E+00 |
| Pavers | 176 | 250 | 5.58E-01 | 1.86E-01 | 1.67E+00 | 2.19E-03 | 6.40E-02 | 6.40E-02 | 1.94E+02 | 1.67E-02 | 5.05E-03 | 8.82E+00 |
| Pavers | 251 | 500 | 8.11E-01 | 2.06E-01 | 1.81E+00 | 2.29E-03 | 6.96E-02 | 6.96E-02 | 2.33E+02 | 1.86E-02 | 6.07E-03 | 1.06E+01 |
| Paving Equipment | 0 | 25 | 5.19E-02 | 1.52E-02 | 9.62E-02 | 1.60E-04 | 3.69E-03 | 3.69E-03 | 1.26E+01 | 1.37E-03 | 3.29E-04 | 5.75E-01 |
| Paving Equipment | 26 | 50 | 2.90E-01 | 1.02E-01 | 2.36E-01 | 3.09E-04 | 2.31E-02 | 2.31E-02 | 2.39E+01 | 9.21E-03 | 6.40E-04 | 1.12E+00 |
| Paving Equipment | 51 | 120 | 3.89E-01 | 9.67E-02 | 5.87E-01 | 6.39E-04 | 5.01E-02 | 5.01E-02 | 5.45E+01 | 8.72E-03 | 1.43E-03 | 2.50E+00 |
| Paving Equipment | 121 | 175 | 6.02E-01 | 1.25E-01 | 9.53E-01 | 1.14E-03 | 5.27E-02 | 5.27E-02 | 1.01E+02 | 1.13E-02 | 2.64E-03 | 4.61E+00 |
| Paving Equipment | 176 | 250 | 3.44E-01 | 1.14E-01 | 1.05E+00 | 1.37E-03 | 3.93E-02 | 3.93E-02 | 1.22E+02 | 1.03E-02 | 3.18E-03 | 5.55E+00 |
| Plate Compactors | 0 | 15 | 2.63E-02 | 5.02E-03 | 3.14E-02 | 6.71E-05 | 1.22E-03 | 1.22E-03 | 4.31E+00 | 4.53E-04 | 1.13E-04 | 1.97E-01 |
| Pressure Washers | 0 | 15 | 3.16E-02 | 6.54E-03 | 4.49E-02 | 7.60E-05 | 2.49E-03 | 2.49E-03 | 4.89E+00 | 5.90E-04 | 1.28E-04 | 2.23E-01 |
| Pressure Washers | 16 | 25 | 3.39E-02 | 1.01E-02 | 6.20E-02 | 9.06E-05 | 3.31E-03 | 3.31E-03 | 7.14E+00 | 9.11E-04 | 1.87E-04 | 3.26E-01 |
| Pressure Washers | 26 | 50 | 9.83E-02 | 2.62E-02 | 1.20E-01 | 1.85E-04 | 7.95E-03 | 7.95E-03 | 1.43E+01 | 2.36E-03 | 3.75E-04 | 6.55E-01 |
| Pressure Washers | 51 | 120 | 1.42E-01 | 2.55E-02 | 1.99E-01 | 2.82E-04 | 1.33E-02 | 1.33E-02 | 2.41E+01 | 2.30E-03 | 6.29E-04 | 1.10E+00 |
| Pressure Washers | 121 | 175 | 5.87E-01 | 8.60E-02 | 8.28E-01 | 1.29E-03 | 3.76E-02 | 3.76E-02 | 1.14E+02 | 7.76E-03 | 2.98E-03 | 5.20E+00 |
| Pressure Washers | 176 | 250 | 2.49E-01 | 3.08E-02 | 1.75E-01 | 1.62E-03 | 2.65E-03 | 2.65E-03 | 1.44E+02 | 2.78E-03 | 3.72E-03 | 6.49E+00 |
| Pump (Drilling) | 0 | 120 | 5.11E-01 | 1.12E-01 | 6.82E-01 | 8.55E-04 | 5.95E-02 | 5.95E-02 | 7.29E+01 | 1.01E-02 | 1.91E-03 | 3.34E+00 |
| Pump (Drilling) | 121 | 175 | 6.37E-01 | 1.18E-01 | 8.73E-01 | 1.22E-03 | 4.94E-02 | 4.94E-02 | 1.08E+02 | 1.07E-02 | 2.83E-03 | 4.94E+00 |
| Pump (Drilling) | 176 | 250 | 3.93E-01 | 1.34E-01 | 1.24E+00 | 1.95E-03 | 4.12E-02 | 4.12E-02 | 1.73E+02 | 1.21E-02 | 4.49E-03 | 7.84E+00 |
| Pump (Drilling) | 251 | 500 | 6.60E-01 | 2.14E-01 | 1.84E+00 | 3.31E-03 | 6.50E-02 | 6.50E-02 | 2.94E+02 | 1.93E-02 | 7.64E-03 | 1.33E+01 |
| Pump (Drilling) | 501 | 750 | 9.90E-01 | 3.24E-01 | 2.86E+00 | 4.33E-03 | 9.96E-02 | 9.96E-02 | 4.41E+02 | 2.92E-02 | 1.15E-02 | 2.00E+01 |
| Pump (Drilling) | 751 | 9999 | 1.99E+00 | 6.56E-01 | 7.40E+00 | 7.79E-03 | 2.12E-01 | 2.12E-01 | 7.94E+02 | 5.92E-02 | 2.06E-02 | 3.60E+01 |
| Pump (Military) | 0 | 50 | 2.28E-01 | 6.32E-02 | 2.51E-01 | 3.79E-04 | 1.78E-02 | 1.78E-02 | 2.93E+01 | 5.70E-03 | 7.73E-04 | 1.35E+00 |
| Pump (Military) | 51 | 120 | 4.59E-01 | 8.35E-02 | 6.29E-01 | 8.82E-04 | 4.47E-02 | 4.47E-02 | 7.52E+01 | 7.54E-03 | 1.97E-03 | 3.43E+00 |
| Pump (Workover) | 0 | 120 | 5.16E-01 | 1.13E-01 | 6.89E-01 | 8.64E-04 | 6.01E-02 | 6.01E-02 | 7.37E+01 | 1.02E-02 | 1.93E-03 | 3.37E+00 |
| Pump (Workover) | 121 | 175 | 6.41E-01 | 1.19E-01 | 8.79E-01 | 1.23E-03 | 4.97E-02 | 4.97E-02 | 1.09E+02 | 1.07E-02 | 2.85E-03 | 4.98E+00 |
| Pump (Workover) | 176 | 250 | 3.52E-01 | 1.20E-01 | 1.11E+00 | 1.74E-03 | 3.69E-02 | 3.69E-02 | 1.55E+02 | 1.08E-02 | 4.02E-03 | 7.02E+00 |
| Pump (Workover) | 251 | 500 | 6.41E-01 | 2.08E-01 | 1.79E+00 | 2.80E-03 | 6.32E-02 | 6.32E-02 | 2.86E+02 | 1.88E-02 | 7.42E-03 | 1.29E+01 |
| Pump (Workover) | 501 | 9999 | 2.91E+00 | 9.62E-01 | 1.08E+01 | 1.14E-02 | 3.11E-01 | 3.11E-01 | 1.16E+03 | 8.68E-02 | 3.02E-02 | 5.27E+01 |
| Pumps | 0 | 15 | 4.80E-02 | 1.12E-02 | 6.90E-02 | 1.15E-04 | 4.21E-03 | 4.21E-03 | 7.42E+00 | 1.01E-03 | 1.95E-04 | 3.39E-01 |
| Pumps | 16 | 25 | 9.24E-02 | 3.13E-02 | 1.69E-01 | 2.47E-04 | 9.54E-03 | 9.54E-03 | 1.95E+01 | 2.82E-03 | 5.10E-04 | 8.89E-01 |
| Pumps | 26 | 50 | 2.96E-01 | 8.93E-02 | 3.02E-01 | 4.43E-04 | 2.37E-02 | 2.37E-02 | 3.43E+01 | 8.05E-03 | 9.07E-04 | 1.58E+00 |
| Pumps | 51 | 120 | 4.91E-01 | 9.87E-02 | 6.88E-01 | 9.14E-04 | 5.29E-02 | 5.29E-02 | 7.79E+01 | 8.90E-03 | 2.04E-03 | 3.56E+00 |
| Pumps | 121 | 175 | 7.38E-01 | 1.20E-01 | 1.08E+00 | 1.58E-03 | 5.22E-02 | 5.22E-02 | 1.40E+02 | 1.08E-02 | 3.66E-03 | 6.38E+00 |

**Table 15**
**Santa Barbara OFFROAD2007 Emission Factors for 2015**[a]

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pumps | 176 | 250 | 4.03E-01 | 1.12E-01 | 1.38E+00 | 2.26E-03 | 3.92E-02 | 3.92E-02 | 2.01E+02 | 1.01E-02 | 5.22E-03 | 9.11E+00 |
| Pumps | 251 | 500 | 6.98E-01 | 1.74E-01 | 2.09E+00 | 3.39E-03 | 6.28E-02 | 6.28E-02 | 3.45E+02 | 1.57E-02 | 8.95E-03 | 1.56E+01 |
| Pumps | 501 | 750 | 1.15E+00 | 2.96E-01 | 3.58E+00 | 5.73E-03 | 1.06E-01 | 1.06E-01 | 5.70E+02 | 2.67E-02 | 1.48E-02 | 2.58E+01 |
| Pumps | 751 | 9999 | 3.16E+00 | 9.03E-01 | 1.20E+01 | 1.36E-02 | 3.16E-01 | 3.16E-01 | 1.35E+03 | 8.15E-02 | 3.52E-02 | 6.13E+01 |
| Rollers | 0 | 15 | 3.86E-02 | 7.35E-03 | 4.60E-02 | 9.83E-05 | 1.80E-03 | 1.80E-03 | 6.31E+00 | 6.63E-04 | 1.65E-04 | 2.88E-01 |
| Rollers | 16 | 25 | 5.49E-02 | 1.61E-02 | 1.02E-01 | 1.69E-04 | 3.90E-03 | 3.90E-03 | 1.33E+01 | 1.45E-03 | 3.48E-04 | 6.07E-01 |
| Rollers | 26 | 50 | 2.75E-01 | 8.69E-02 | 2.40E-01 | 3.36E-04 | 2.08E-02 | 2.08E-02 | 2.60E+01 | 7.84E-03 | 6.90E-04 | 1.20E+00 |
| Rollers | 51 | 120 | 4.00E-01 | 8.55E-02 | 5.49E-01 | 6.91E-04 | 4.53E-02 | 4.53E-02 | 5.89E+01 | 7.71E-03 | 1.55E-03 | 2.70E+00 |
| Rollers | 121 | 175 | 6.16E-01 | 1.10E-01 | 8.71E-01 | 1.22E-03 | 4.69E-02 | 4.69E-02 | 1.08E+02 | 9.94E-03 | 2.83E-03 | 4.93E+00 |
| Rollers | 176 | 250 | 3.57E-01 | 1.11E-01 | 1.09E+00 | 1.72E-03 | 3.68E-02 | 3.68E-02 | 1.53E+02 | 9.97E-03 | 3.97E-03 | 6.93E+00 |
| Rollers | 251 | 500 | 5.59E-01 | 1.47E-01 | 1.39E+00 | 2.15E-03 | 4.87E-02 | 4.87E-02 | 2.19E+02 | 1.32E-02 | 5.69E-03 | 9.92E+00 |
| Rough Terrain Forklifts | 0 | 50 | 3.55E-01 | 9.40E-02 | 3.06E-01 | 4.37E-04 | 2.42E-02 | 2.42E-02 | 3.38E+01 | 8.48E-03 | 8.98E-04 | 1.57E+00 |
| Rough Terrain Forklifts | 51 | 120 | 4.26E-01 | 7.99E-02 | 5.16E-01 | 7.32E-04 | 4.19E-02 | 4.19E-02 | 6.24E+01 | 7.21E-03 | 1.64E-03 | 2.85E+00 |
| Rough Terrain Forklifts | 121 | 175 | 7.23E-01 | 1.17E-01 | 8.73E-01 | 1.40E-03 | 4.76E-02 | 4.76E-02 | 1.25E+02 | 1.05E-02 | 3.26E-03 | 5.69E+00 |
| Rough Terrain Forklifts | 176 | 250 | 3.65E-01 | 1.17E-01 | 1.04E+00 | 1.92E-03 | 3.38E-02 | 3.38E-02 | 1.71E+02 | 1.05E-02 | 4.43E-03 | 7.73E+00 |
| Rough Terrain Forklifts | 251 | 500 | 5.33E-01 | 1.67E-01 | 1.36E+00 | 2.52E-03 | 4.76E-02 | 4.76E-02 | 2.56E+02 | 1.50E-02 | 6.66E-03 | 1.16E+01 |
| Rubber Tired Dozers | 0 | 175 | 8.33E-01 | 1.94E-01 | 1.39E+00 | 1.46E-03 | 7.89E-02 | 7.89E-02 | 1.29E+02 | 1.75E-02 | 3.39E-03 | 5.92E+00 |
| Rubber Tired Dozers | 176 | 250 | 6.30E-01 | 2.21E-01 | 1.82E+00 | 2.06E-03 | 7.62E-02 | 7.62E-02 | 1.83E+02 | 1.99E-02 | 4.78E-03 | 8.34E+00 |
| Rubber Tired Dozers | 251 | 500 | 1.25E+00 | 2.93E-01 | 2.39E+00 | 2.60E-03 | 9.85E-02 | 9.85E-02 | 2.65E+02 | 2.64E-02 | 6.91E-03 | 1.21E+01 |
| Rubber Tired Dozers | 501 | 750 | 1.88E+00 | 4.43E-01 | 3.66E+00 | 4.01E-03 | 1.49E-01 | 1.49E-01 | 3.98E+02 | 3.99E-02 | 1.04E-02 | 1.82E+01 |
| Rubber Tired Dozers | 751 | 1000 | 3.03E+00 | 6.89E-01 | 6.82E+00 | 5.95E-03 | 2.31E-01 | 2.31E-01 | 5.91E+02 | 6.22E-02 | 1.55E-02 | 2.70E+01 |
| Rubber Tired Loaders | 0 | 25 | 6.96E-02 | 2.04E-02 | 1.29E-01 | 2.15E-04 | 4.85E-03 | 4.85E-03 | 1.69E+01 | 1.84E-03 | 4.42E-04 | 7.70E-01 |
| Rubber Tired Loaders | 26 | 50 | 3.43E-01 | 9.90E-02 | 2.89E-01 | 4.02E-04 | 2.41E-02 | 2.41E-02 | 3.11E+01 | 8.93E-03 | 8.28E-04 | 1.44E+00 |
| Rubber Tired Loaders | 51 | 120 | 4.09E-01 | 8.33E-02 | 5.22E-01 | 6.90E-04 | 4.29E-02 | 4.29E-02 | 5.89E+01 | 7.52E-03 | 1.54E-03 | 2.69E+00 |
| Rubber Tired Loaders | 121 | 175 | 6.24E-01 | 1.09E-01 | 8.06E-01 | 1.20E-03 | 4.44E-02 | 4.44E-02 | 1.06E+02 | 9.85E-03 | 2.78E-03 | 4.85E+00 |
| Rubber Tired Loaders | 176 | 250 | 3.44E-01 | 1.12E-01 | 9.87E-01 | 1.67E-03 | 3.36E-02 | 3.36E-02 | 1.49E+02 | 1.01E-02 | 3.87E-03 | 6.75E+00 |
| Rubber Tired Loaders | 251 | 500 | 5.81E-01 | 1.68E-01 | 1.40E+00 | 2.32E-03 | 4.98E-02 | 4.98E-02 | 2.37E+02 | 1.51E-02 | 6.15E-03 | 1.07E+01 |
| Rubber Tired Loaders | 501 | 750 | 1.19E+00 | 3.45E-01 | 2.94E+00 | 4.88E-03 | 1.04E-01 | 1.04E-01 | 4.85E+02 | 3.11E-02 | 1.26E-02 | 2.20E+01 |
| Rubber Tired Loaders | 751 | 1000 | 1.64E+00 | 4.65E-01 | 5.28E+00 | 5.97E-03 | 1.55E-01 | 1.55E-01 | 5.93E+02 | 4.19E-02 | 1.54E-02 | 2.69E+01 |
| Sailboat Auxiliary Inboard Engine | 0 | 50 | 9.79E-02 | 6.52E-02 | 2.23E-01 | 1.53E-04 | 5.65E-03 | 5.65E-03 | 1.18E+01 | 5.88E-03 | 3.17E-04 | 5.52E-01 |
| Scrapers | 0 | 120 | 6.82E-01 | 1.66E-01 | 9.90E-01 | 1.10E-03 | 8.44E-02 | 8.44E-02 | 9.38E+01 | 1.50E-02 | 2.47E-03 | 4.30E+00 |
| Scrapers | 121 | 175 | 9.02E-01 | 1.87E-01 | 1.36E+00 | 1.66E-03 | 7.64E-02 | 7.64E-02 | 1.48E+02 | 1.68E-02 | 3.87E-03 | 6.76E+00 |
| Scrapers | 176 | 250 | 5.90E-01 | 2.02E-01 | 1.74E+00 | 2.35E-03 | 6.64E-02 | 6.64E-02 | 2.09E+02 | 1.82E-02 | 5.45E-03 | 9.50E+00 |
| Scrapers | 251 | 500 | 1.07E+00 | 2.88E-01 | 2.41E+00 | 3.15E-03 | 9.29E-02 | 9.29E-02 | 3.21E+02 | 2.60E-02 | 8.36E-03 | 1.46E+01 |
| Scrapers | 501 | 750 | 1.85E+00 | 5.00E-01 | 4.24E+00 | 5.58E-03 | 1.62E-01 | 1.62E-01 | 5.55E+02 | 4.51E-02 | 1.44E-02 | 2.52E+01 |

**Table 15**
**Santa Barbara OFFROAD2007 Emission Factors for 2015[a]**

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Service Truck | 0 | 175 | 2.32E-01 | 3.50E-02 | 3.11E-01 | 4.89E-04 | 1.53E-02 | 1.53E-02 | 4.35E+01 | 3.16E-03 | 1.14E-03 | 1.98E+00 |
| Signal Boards | 0 | 15 | 3.76E-02 | 7.18E-03 | 4.49E-02 | 9.59E-05 | 1.76E-03 | 1.76E-03 | 6.16E+00 | 6.47E-04 | 1.61E-04 | 2.82E-01 |
| Signal Boards | 16 | 50 | 3.22E-01 | 9.28E-02 | 3.14E-01 | 4.67E-04 | 2.43E-02 | 2.43E-02 | 3.62E+01 | 8.37E-03 | 9.56E-04 | 1.67E+00 |
| Signal Boards | 51 | 120 | 5.11E-01 | 9.68E-02 | 6.75E-01 | 9.40E-04 | 5.23E-02 | 5.23E-02 | 8.01E+01 | 8.73E-03 | 2.10E-03 | 3.66E+00 |
| Signal Boards | 121 | 175 | 8.29E-01 | 1.29E-01 | 1.12E+00 | 1.74E-03 | 5.57E-02 | 5.57E-02 | 1.54E+02 | 1.16E-02 | 4.03E-03 | 7.03E+00 |
| Signal Boards | 176 | 250 | 5.09E-01 | 1.41E-01 | 1.62E+00 | 2.87E-03 | 4.73E-02 | 4.73E-02 | 2.55E+02 | 1.28E-02 | 6.62E-03 | 1.15E+01 |
| Skid Steer Loaders | 0 | 25 | 6.01E-02 | 1.89E-02 | 1.12E-01 | 1.75E-04 | 5.61E-03 | 5.61E-03 | 1.38E+01 | 1.70E-03 | 3.60E-04 | 6.28E-01 |
| Skid Steer Loaders | 26 | 50 | 2.14E-01 | 3.78E-02 | 2.05E-01 | 3.30E-04 | 1.13E-02 | 1.13E-02 | 2.55E+01 | 3.41E-03 | 6.71E-04 | 1.17E+00 |
| Skid Steer Loaders | 51 | 120 | 2.71E-01 | 3.34E-02 | 2.70E-01 | 5.01E-04 | 1.70E-02 | 1.70E-02 | 4.27E+01 | 3.01E-03 | 1.12E-03 | 1.95E+00 |
| Snubbing | 0 | 120 | 5.26E-01 | 1.15E-01 | 7.03E-01 | 8.82E-04 | 6.14E-02 | 6.14E-02 | 7.52E+01 | 1.04E-02 | 1.97E-03 | 3.44E+00 |
| Sprayers | 0 | 25 | 5.64E-02 | 1.90E-02 | 1.02E-01 | 1.51E-04 | 5.71E-03 | 5.71E-03 | 1.19E+01 | 1.71E-03 | 3.12E-04 | 5.43E-01 |
| Sprayers | 26 | 50 | 1.44E-01 | 3.51E-02 | 1.85E-01 | 2.92E-04 | 1.13E-02 | 1.13E-02 | 2.26E+01 | 3.17E-03 | 5.92E-04 | 1.03E+00 |
| Sprayers | 51 | 120 | 3.30E-01 | 5.37E-02 | 4.53E-01 | 6.69E-04 | 2.80E-02 | 2.80E-02 | 5.70E+01 | 4.85E-03 | 1.49E-03 | 2.60E+00 |
| Sprayers | 121 | 175 | 4.61E-01 | 5.93E-02 | 6.48E-01 | 1.06E-03 | 2.56E-02 | 2.56E-02 | 9.46E+01 | 5.35E-03 | 2.47E-03 | 4.30E+00 |
| Sprayers | 176 | 250 | 2.87E-01 | 6.33E-02 | 9.31E-01 | 1.75E-03 | 2.35E-02 | 2.35E-02 | 1.55E+02 | 5.71E-03 | 4.03E-03 | 7.03E+00 |
| Sprayers | 251 | 500 | 3.14E-01 | 6.13E-02 | 9.20E-01 | 1.67E-03 | 2.45E-02 | 2.45E-02 | 1.70E+02 | 5.53E-03 | 4.40E-03 | 7.68E+00 |
| Start Cart | 0 | 120 | 4.59E-01 | 8.35E-02 | 6.29E-01 | 8.82E-04 | 4.47E-02 | 4.47E-02 | 7.52E+01 | 7.54E-03 | 1.97E-03 | 3.43E+00 |
| Start Cart | 121 | 500 | 4.28E-01 | 9.79E-02 | 1.22E+00 | 2.09E-03 | 3.66E-02 | 3.66E-02 | 2.13E+02 | 8.83E-03 | 5.52E-03 | 9.63E+00 |
| Surfacing Equipment | 0 | 50 | 1.33E-01 | 4.07E-02 | 1.26E-01 | 1.82E-04 | 1.01E-02 | 1.01E-02 | 1.41E+01 | 3.67E-03 | 3.74E-04 | 6.52E-01 |
| Surfacing Equipment | 51 | 120 | 4.15E-01 | 8.38E-02 | 5.75E-01 | 7.47E-04 | 4.38E-02 | 4.38E-02 | 6.37E+01 | 7.56E-03 | 1.67E-03 | 2.91E+00 |
| Surfacing Equipment | 121 | 175 | 4.70E-01 | 7.85E-02 | 6.69E-01 | 9.64E-04 | 3.34E-02 | 3.34E-02 | 8.57E+01 | 7.08E-03 | 2.24E-03 | 3.91E+00 |
| Surfacing Equipment | 176 | 250 | 3.11E-01 | 8.90E-02 | 9.32E-01 | 1.52E-03 | 3.09E-02 | 3.09E-02 | 1.35E+02 | 8.03E-03 | 3.50E-03 | 6.11E+00 |
| Surfacing Equipment | 251 | 500 | 5.76E-01 | 1.34E-01 | 1.38E+00 | 2.17E-03 | 4.68E-02 | 4.68E-02 | 2.21E+02 | 1.21E-02 | 5.74E-03 | 1.00E+01 |
| Surfacing Equipment | 501 | 750 | 9.03E-01 | 2.13E-01 | 2.21E+00 | 3.49E-03 | 7.43E-02 | 7.43E-02 | 3.47E+02 | 1.92E-02 | 9.01E-03 | 1.57E+01 |
| Swathers | 0 | 120 | 3.13E-01 | 5.15E-02 | 4.29E-01 | 6.31E-04 | 2.69E-02 | 2.69E-02 | 5.37E+01 | 4.65E-03 | 1.41E-03 | 2.45E+00 |
| Swathers | 121 | 175 | 5.06E-01 | 6.60E-02 | 7.11E-01 | 1.16E-03 | 2.85E-02 | 2.85E-02 | 1.03E+02 | 5.95E-03 | 2.70E-03 | 4.70E+00 |
| Sweeper | 0 | 120 | 1.90E-01 | 2.08E-02 | 2.13E-01 | 3.69E-04 | 1.20E-02 | 1.20E-02 | 3.28E+01 | 1.88E-03 | 8.56E-04 | 1.49E+00 |
| Sweepers/Scrubbers | 0 | 15 | 7.28E-02 | 1.24E-02 | 8.69E-02 | 1.86E-04 | 3.40E-03 | 3.40E-03 | 1.19E+01 | 1.12E-03 | 3.12E-04 | 5.45E-01 |
| Sweepers/Scrubbers | 16 | 25 | 8.07E-02 | 2.36E-02 | 1.49E-01 | 2.49E-04 | 5.62E-03 | 5.62E-03 | 1.96E+01 | 2.13E-03 | 5.12E-04 | 8.92E-01 |
| Sweepers/Scrubbers | 26 | 50 | 3.23E-01 | 8.11E-02 | 2.86E-01 | 4.08E-04 | 2.18E-02 | 2.18E-02 | 3.15E+01 | 7.32E-03 | 8.35E-04 | 1.46E+00 |
| Sweepers/Scrubbers | 51 | 120 | 5.08E-01 | 9.07E-02 | 6.02E-01 | 8.79E-04 | 4.83E-02 | 4.83E-02 | 7.50E+01 | 8.19E-03 | 1.97E-03 | 3.43E+00 |
| Sweepers/Scrubbers | 121 | 175 | 8.02E-01 | 1.22E-01 | 9.25E-01 | 1.56E-03 | 5.05E-02 | 5.05E-02 | 1.39E+02 | 1.10E-02 | 3.63E-03 | 6.33E+00 |
| Sweepers/Scrubbers | 176 | 250 | 3.30E-01 | 1.05E-01 | 9.38E-01 | 1.82E-03 | 3.00E-02 | 3.00E-02 | 1.62E+02 | 9.51E-03 | 4.20E-03 | 7.33E+00 |
| Swivel | 0 | 120 | 5.47E-01 | 1.20E-01 | 7.31E-01 | 9.17E-04 | 6.38E-02 | 6.38E-02 | 7.82E+01 | 1.08E-02 | 2.05E-03 | 3.58E+00 |
| Swivel | 121 | 175 | 5.84E-01 | 1.08E-01 | 8.01E-01 | 1.12E-03 | 4.52E-02 | 4.52E-02 | 9.92E+01 | 9.76E-03 | 2.60E-03 | 4.53E+00 |

**Table 15**

**Santa Barbara OFFROAD2007 Emission Factors for 2015[a]**

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Swivel | 176 | 250 | 3.67E-01 | 1.25E-01 | 1.16E+00 | 1.82E-03 | 3.85E-02 | 3.85E-02 | 1.62E+02 | 1.13E-02 | 4.20E-03 | 7.33E+00 |
| Swivel | 251 | 500 | 5.53E-01 | 1.08E-01 | 1.61E+00 | 2.88E-03 | 4.39E-02 | 4.39E-02 | 2.94E+02 | 9.77E-03 | 7.62E-03 | 1.33E+01 |
| Test Stand | 0 | 120 | 4.22E-01 | 7.68E-02 | 5.79E-01 | 8.11E-04 | 4.11E-02 | 4.11E-02 | 6.92E+01 | 6.93E-03 | 1.81E-03 | 3.16E+00 |
| Test Stand | 121 | 175 | 5.48E-01 | 8.03E-02 | 7.73E-01 | 1.20E-03 | 3.52E-02 | 3.52E-02 | 1.07E+02 | 7.25E-03 | 2.79E-03 | 4.86E+00 |
| Test Stand | 176 | 250 | 2.95E-01 | 7.56E-02 | 9.51E-01 | 1.67E-03 | 2.72E-02 | 2.72E-02 | 1.48E+02 | 6.82E-03 | 3.84E-03 | 6.70E+00 |
| Test Stand | 251 | 500 | 5.19E-01 | 1.19E-01 | 1.48E+00 | 2.53E-03 | 4.44E-02 | 4.44E-02 | 2.58E+02 | 1.07E-02 | 6.69E-03 | 1.17E+01 |
| Tillers | 0 | 15 | 4.18E-02 | 7.10E-03 | 4.99E-02 | 1.06E-04 | 2.00E-03 | 2.00E-03 | 6.84E+00 | 6.41E-04 | 1.79E-04 | 3.12E-01 |
| Tillers | 16 | 250 | 4.53E-01 | 1.06E-01 | 1.47E+00 | 2.69E-03 | 3.86E-02 | 3.86E-02 | 2.39E+02 | 9.56E-03 | 6.21E-03 | 1.08E+01 |
| Tillers | 251 | 500 | 8.12E-01 | 1.69E-01 | 2.35E+00 | 4.19E-03 | 6.52E-02 | 6.52E-02 | 4.27E+02 | 1.52E-02 | 1.11E-02 | 1.93E+01 |
| Tractors/Loaders/Backhoes | 0 | 25 | 6.53E-02 | 1.92E-02 | 1.22E-01 | 2.01E-04 | 4.90E-03 | 4.90E-03 | 1.58E+01 | 1.73E-03 | 4.14E-04 | 7.22E-01 |
| Tractors/Loaders/Backhoes | 26 | 50 | 3.02E-01 | 7.00E-02 | 2.64E-01 | 3.92E-04 | 1.85E-02 | 1.85E-02 | 3.03E+01 | 6.31E-03 | 8.02E-04 | 1.40E+00 |
| Tractors/Loaders/Backhoes | 51 | 120 | 3.48E-01 | 5.75E-02 | 3.86E-01 | 6.06E-04 | 2.93E-02 | 2.93E-02 | 5.17E+01 | 5.19E-03 | 1.35E-03 | 2.36E+00 |
| Tractors/Loaders/Backhoes | 121 | 175 | 5.85E-01 | 8.52E-02 | 6.32E-01 | 1.14E-03 | 3.34E-02 | 3.34E-02 | 1.01E+02 | 7.69E-03 | 2.65E-03 | 4.62E+00 |
| Tractors/Loaders/Backhoes | 176 | 250 | 3.56E-01 | 1.08E-01 | 9.03E-01 | 1.93E-03 | 2.93E-02 | 2.93E-02 | 1.72E+02 | 9.75E-03 | 4.45E-03 | 7.77E+00 |
| Tractors/Loaders/Backhoes | 251 | 500 | 7.08E-01 | 2.08E-01 | 1.60E+00 | 3.88E-03 | 5.58E-02 | 5.58E-02 | 3.45E+02 | 1.88E-02 | 8.94E-03 | 1.56E+01 |
| Tractors/Loaders/Backhoes | 501 | 750 | 1.06E+00 | 3.14E-01 | 2.48E+00 | 5.82E-03 | 8.50E-02 | 8.50E-02 | 5.17E+02 | 2.83E-02 | 1.34E-02 | 2.34E+01 |
| Transport Refrigeration Units | 0 | 15 | 4.90E-02 | 8.38E-03 | 5.89E-02 | 1.02E-04 | 2.51E-03 | 2.51E-03 | 8.02E+00 | 7.56E-04 | 2.10E-04 | 3.66E-01 |
| Transport Refrigeration Units | 16 | 25 | 5.61E-02 | 1.65E-02 | 1.05E-01 | 1.73E-04 | 4.26E-03 | 4.26E-03 | 1.36E+01 | 1.49E-03 | 3.56E-04 | 6.21E-01 |
| Transport Refrigeration Units | 26 | 50 | 2.07E-01 | 2.35E-02 | 1.97E-01 | 3.35E-04 | 7.67E-03 | 7.67E-03 | 2.59E+01 | 2.12E-03 | 6.79E-04 | 1.19E+00 |
| Trenchers | 0 | 15 | 5.16E-02 | 9.84E-03 | 6.16E-02 | 1.32E-04 | 2.41E-03 | 2.41E-03 | 8.46E+00 | 8.88E-04 | 2.21E-04 | 3.86E-01 |
| Trenchers | 16 | 25 | 1.35E-01 | 3.97E-02 | 2.51E-01 | 4.17E-04 | 9.42E-03 | 9.42E-03 | 3.29E+01 | 3.58E-03 | 8.59E-04 | 1.50E+00 |
| Trenchers | 26 | 50 | 3.90E-01 | 1.39E-01 | 3.23E-01 | 4.25E-04 | 3.12E-02 | 3.12E-02 | 3.29E+01 | 1.25E-02 | 8.80E-04 | 1.53E+00 |
| Trenchers | 51 | 120 | 4.59E-01 | 1.14E-01 | 7.05E-01 | 7.61E-04 | 5.88E-02 | 5.88E-02 | 6.48E+01 | 1.03E-02 | 1.70E-03 | 2.97E+00 |
| Trenchers | 121 | 175 | 8.53E-01 | 1.77E-01 | 1.37E+00 | 1.62E-03 | 7.47E-02 | 7.47E-02 | 1.44E+02 | 1.59E-02 | 3.76E-03 | 6.57E+00 |
| Trenchers | 176 | 250 | 6.51E-01 | 2.10E-01 | 1.94E+00 | 2.51E-03 | 7.50E-02 | 7.50E-02 | 2.23E+02 | 1.90E-02 | 5.80E-03 | 1.01E+01 |
| Trenchers | 251 | 500 | 1.14E+00 | 2.69E-01 | 2.45E+00 | 3.05E-03 | 9.46E-02 | 9.46E-02 | 3.11E+02 | 2.43E-02 | 8.10E-03 | 1.41E+01 |
| Trenchers | 501 | 750 | 2.14E+00 | 5.10E-01 | 4.71E+00 | 5.90E-03 | 1.80E-01 | 1.80E-01 | 5.86E+02 | 4.60E-02 | 1.53E-02 | 2.66E+01 |
| Vessels w/Inboard Engines | 0 | 250 | 8.85E-01 | 5.89E-01 | 2.02E+00 | 1.20E-03 | 5.18E-02 | 5.18E-02 | 1.07E+02 | 5.31E-02 | 2.86E-03 | 4.99E+00 |
| Welder | 0 | 50 | 2.05E-01 | 5.67E-02 | 2.25E-01 | 3.40E-04 | 1.60E-02 | 1.60E-02 | 2.63E+01 | 5.12E-03 | 6.93E-04 | 1.21E+00 |
| Welder | 51 | 120 | 2.85E-01 | 5.18E-02 | 3.90E-01 | 5.47E-04 | 2.77E-02 | 2.77E-02 | 4.66E+01 | 4.67E-03 | 1.22E-03 | 2.13E+00 |
| Welders | 0 | 15 | 4.01E-02 | 9.35E-03 | 5.77E-02 | 9.65E-05 | 3.52E-03 | 3.52E-03 | 6.20E+00 | 8.44E-04 | 1.63E-04 | 2.84E-01 |
| Welders | 16 | 25 | 5.35E-02 | 1.81E-02 | 9.79E-02 | 1.43E-04 | 5.53E-03 | 5.53E-03 | 1.13E+01 | 1.64E-03 | 2.95E-04 | 5.15E-01 |
| Welders | 26 | 50 | 2.62E-01 | 8.36E-02 | 2.38E-01 | 3.35E-04 | 2.08E-02 | 2.08E-02 | 2.59E+01 | 7.54E-03 | 6.89E-04 | 1.20E+00 |
| Welders | 51 | 120 | 2.62E-01 | 5.69E-02 | 3.66E-01 | 4.63E-04 | 3.09E-02 | 3.09E-02 | 3.95E+01 | 5.13E-03 | 1.04E-03 | 1.81E+00 |
| Welders | 121 | 175 | 5.44E-01 | 9.69E-02 | 7.93E-01 | 1.10E-03 | 4.22E-02 | 4.22E-02 | 9.81E+01 | 8.74E-03 | 2.56E-03 | 4.47E+00 |

**Table 15**

**Santa Barbara OFFROAD2007 Emission Factors for 2015[a]**

| Equipment | MinHP | MaxHP | CO (lb/hr) | ROC (lb/hr) | NOx (lb/hr) | $SO_2$ (lb/hr) | PM10 (lb/hr) | PM2.5 (lb/hr) | $CO_2$ (lb/hr) | $CH_4$ (lb/hr) | $N_2O$ (lb/hr) | Fuel Use (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Welders | 176 | 250 | 2.50E-01 | 7.74E-02 | 8.55E-01 | 1.34E-03 | 2.58E-02 | 2.58E-02 | 1.19E+02 | 6.98E-03 | 3.09E-03 | 5.39E+00 |
| Welders | 251 | 500 | 3.52E-01 | 9.98E-02 | 1.05E+00 | 1.64E-03 | 3.38E-02 | 3.38E-02 | 1.67E+02 | 9.00E-03 | 4.35E-03 | 7.58E+00 |
| Workover Rig (Mobile) | 0 | 50 | 4.55E-01 | 1.69E-01 | 3.37E-01 | 4.01E-04 | 3.59E-02 | 3.59E-02 | 3.10E+01 | 1.52E-02 | 8.37E-04 | 1.46E+00 |
| Workover Rig (Mobile) | 51 | 120 | 6.14E-01 | 1.78E-01 | 1.01E+00 | 9.04E-04 | 8.54E-02 | 8.54E-02 | 7.71E+01 | 1.60E-02 | 2.03E-03 | 3.55E+00 |
| Workover Rig (Mobile) | 121 | 175 | 9.44E-01 | 2.32E-01 | 1.64E+00 | 1.59E-03 | 9.30E-02 | 9.30E-02 | 1.41E+02 | 2.09E-02 | 3.70E-03 | 6.46E+00 |
| Workover Rig (Mobile) | 176 | 250 | 7.11E-01 | 2.53E-01 | 2.03E+00 | 2.11E-03 | 8.81E-02 | 8.81E-02 | 1.88E+02 | 2.28E-02 | 4.91E-03 | 8.56E+00 |
| Workover Rig (Mobile) | 251 | 500 | 1.74E+00 | 3.83E-01 | 3.07E+00 | 3.05E-03 | 1.29E-01 | 1.29E-01 | 3.11E+02 | 3.45E-02 | 8.14E-03 | 1.42E+01 |
| Workover Rig (Mobile) | 501 | 750 | 3.43E+00 | 7.59E-01 | 6.15E+00 | 6.18E-03 | 2.58E-01 | 2.58E-01 | 6.15E+02 | 6.84E-02 | 1.61E-02 | 2.81E+01 |
| Workover Rig (Mobile) | 751 | 1000 | 5.56E+00 | 1.20E+00 | 1.14E+01 | 9.33E-03 | 4.02E-01 | 4.02E-01 | 9.27E+02 | 1.08E-01 | 2.43E-02 | 4.24E+01 |

[a] CO, ROC, NOx, $SO_2$, PM10, PM2.5, $CO_2$, $CH_4$ and fuel use calculated by dividing total emissions in Santa Barbara County by total operating hours from OFFROAD 2007; $N_2O$ calculated from 0.26 g/gal from Table 13.7 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

**Table 16**
**Emission Factors in Santa Barbara County for 2015**

| Vehicle Class | Fuel | Emission Factors (g/mi)[a] | | | | | | | | | | Mileage (mpg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | TOG | $CH_4$ | $N_2O$ | |
| LDA | GAS | 1.93E+00 | 1.77E-01 | 1.89E-01 | 3.27E-03 | 4.70E-02 | 1.98E-02 | 2.73E+02 | 1.95E-01 | 1.65E-02 | 7.88E-03 | 26.05 |
| LDA | DSL | 1.94E-01 | 3.53E-02 | 5.56E-01 | 3.32E-03 | 7.02E-02 | 4.12E-02 | 2.93E+02 | 4.02E-02 | 1.93E-03 | 1.14E-02 | 29.01 |
| LDT1 | GAS | 4.78E+00 | 4.23E-01 | 4.68E-01 | 3.84E-03 | 4.92E-02 | 2.17E-02 | 3.35E+02 | 4.58E-01 | 3.15E-02 | 1.95E-02 | 22.15 |
| LDT1 | DSL | 3.23E-01 | 7.18E-02 | 7.53E-01 | 3.41E-03 | 1.05E-01 | 7.32E-02 | 3.06E+02 | 8.17E-02 | 3.92E-03 | 1.18E-02 | 28.20 |
| LDT2 | GAS | 3.17E+00 | 2.88E-01 | 4.55E-01 | 4.48E-03 | 4.77E-02 | 2.04E-02 | 3.95E+02 | 3.17E-01 | 2.63E-02 | 1.89E-02 | 19.01 |
| LDT2 | DSL | 2.59E-01 | 5.05E-02 | 7.32E-01 | 3.36E-03 | 8.50E-02 | 5.48E-02 | 3.09E+02 | 5.75E-02 | 2.76E-03 | 1.16E-02 | 28.65 |
| LHD1 | GAS | 6.94E+00 | 7.98E-01 | 1.26E+00 | 1.00E-02 | 4.92E-02 | 2.19E-02 | 9.68E+02 | 8.59E-01 | 5.27E-02 | 5.24E-02 | 8.47 |
| LHD1 | DSL | 1.27E+00 | 2.44E-01 | 4.11E+00 | 5.03E-03 | 1.43E-01 | 8.56E-02 | 5.14E+02 | 2.77E-01 | 1.33E-02 | 1.73E-02 | 19.14 |
| LHD2 | GAS | 5.13E+00 | 6.07E-01 | 1.10E+00 | 1.00E-02 | 4.82E-02 | 2.08E-02 | 9.69E+02 | 6.54E-01 | 4.22E-02 | 4.56E-02 | 8.49 |
| LHD2 | DSL | 1.20E+00 | 2.26E-01 | 3.87E+00 | 5.02E-03 | 1.52E-01 | 8.76E-02 | 5.13E+02 | 2.57E-01 | 1.24E-02 | 1.73E-02 | 19.16 |
| MCY | GAS | 3.07E+01 | 3.79E+00 | 1.37E+00 | 2.17E-03 | 4.58E-02 | 1.86E-02 | 1.55E+02 | 4.08E+00 | 2.41E-01 | 5.71E-02 | 39.25 |
| MDV | GAS | 3.93E+00 | 3.17E-01 | 5.98E-01 | 5.65E-03 | 4.74E-02 | 2.02E-02 | 5.13E+02 | 3.55E-01 | 3.57E-02 | 2.49E-02 | 15.04 |
| MDV | DSL | 1.81E-01 | 3.41E-02 | 4.72E-01 | 3.33E-03 | 7.26E-02 | 4.33E-02 | 3.15E+02 | 3.88E-02 | 1.86E-03 | 1.15E-02 | 28.86 |
| MH | GAS | 8.57E+00 | 3.23E-01 | 1.14E+00 | 6.91E-03 | 4.81E-02 | 2.08E-02 | 6.61E+02 | 3.71E-01 | 4.77E-02 | 4.74E-02 | 12.31 |
| MH | DSL | 7.54E-01 | 2.42E-01 | 7.50E+00 | 1.14E-02 | 3.53E-01 | 2.53E-01 | 1.17E+03 | 2.76E-01 | 1.32E-02 | 3.94E-02 | 8.41 |
| Motor Coach | DSL | 1.37E+00 | 2.94E-01 | 9.13E+00 | 1.75E-02 | 2.44E-01 | 1.53E-01 | 1.79E+03 | 3.35E-01 | 1.61E-02 | 6.04E-02 | 5.49 |
| OBUS | GAS | 1.83E+01 | 1.32E+00 | 3.36E+00 | 7.44E-03 | 4.68E-02 | 1.96E-02 | 6.95E+02 | 1.42E+00 | 8.25E-02 | 1.40E-01 | 11.44 |
| PTO | DSL | 1.99E+00 | 4.49E-01 | 1.18E+01 | 2.05E-02 | 2.08E-01 | 1.92E-01 | 2.10E+03 | 5.11E-01 | 2.45E-02 | 7.07E-02 | 4.69 |
| SBUS | GAS | 7.73E+00 | 6.36E-01 | 1.09E+00 | 7.64E-03 | 4.69E-02 | 1.97E-02 | 7.33E+02 | 6.93E-01 | 1.01E-01 | 4.53E-02 | 11.13 |
| SBUS | DSL | 8.34E-01 | 2.39E-01 | 1.19E+01 | 1.34E-02 | 8.76E-01 | 4.32E-01 | 1.37E+03 | 2.72E-01 | 1.30E-02 | 4.61E-02 | 7.20 |
| T6 Ag | DSL | 1.56E+00 | 5.03E-01 | 7.38E+00 | 1.16E-02 | 4.41E-01 | 3.34E-01 | 1.18E+03 | 5.73E-01 | 2.75E-02 | 3.98E-02 | 8.32 |
| T6 Public | DSL | 2.96E-01 | 7.82E-02 | 7.98E+00 | 1.18E-02 | 1.83E-01 | 9.63E-02 | 1.21E+03 | 8.90E-02 | 4.27E-03 | 4.08E-02 | 8.12 |
| T6 CAIRP heavy | DSL | 5.42E-01 | 1.56E-01 | 4.49E+00 | 1.14E-02 | 2.09E-01 | 1.20E-01 | 1.17E+03 | 1.77E-01 | 8.51E-03 | 3.94E-02 | 8.42 |
| T6 CAIRP small | DSL | 6.71E-01 | 1.89E-01 | 2.81E+00 | 1.14E-02 | 2.35E-01 | 1.44E-01 | 1.16E+03 | 2.15E-01 | 1.03E-02 | 3.91E-02 | 8.47 |
| T6 OOS heavy | DSL | 5.42E-01 | 1.56E-01 | 4.49E+00 | 1.14E-02 | 2.09E-01 | 1.20E-01 | 1.17E+03 | 1.77E-01 | 8.51E-03 | 3.94E-02 | 8.42 |
| T6 OOS small | DSL | 6.71E-01 | 1.89E-01 | 2.81E+00 | 1.14E-02 | 2.35E-01 | 1.44E-01 | 1.16E+03 | 2.15E-01 | 1.03E-02 | 3.91E-02 | 8.47 |
| T6 instate construction heavy | DSL | 6.12E-01 | 1.87E-01 | 7.82E+00 | 1.15E-02 | 2.33E-01 | 1.42E-01 | 1.18E+03 | 2.13E-01 | 1.02E-02 | 3.97E-02 | 8.34 |
| T6 instate construction small | DSL | 9.72E-01 | 2.84E-01 | 4.72E+00 | 1.14E-02 | 3.09E-01 | 2.12E-01 | 1.16E+03 | 3.24E-01 | 1.55E-02 | 3.93E-02 | 8.44 |
| T6 instate heavy | DSL | 6.07E-01 | 1.84E-01 | 7.22E+00 | 1.15E-02 | 2.29E-01 | 1.39E-01 | 1.18E+03 | 2.09E-01 | 1.00E-02 | 3.97E-02 | 8.36 |
| T6 instate small | DSL | 9.15E-01 | 2.67E-01 | 4.35E+00 | 1.14E-02 | 2.96E-01 | 2.00E-01 | 1.16E+03 | 3.04E-01 | 1.46E-02 | 3.92E-02 | 8.45 |
| T6 utility | DSL | 3.47E-01 | 8.38E-02 | 4.79E+00 | 1.17E-02 | 1.75E-01 | 8.89E-02 | 1.20E+03 | 9.54E-02 | 4.58E-03 | 4.05E-02 | 8.20 |
| T6TS | GAS | 1.67E+01 | 1.34E+00 | 2.51E+00 | 7.32E-03 | 4.81E-02 | 2.07E-02 | 6.86E+02 | 1.44E+00 | 8.89E-02 | 1.04E-01 | 11.62 |
| T7 Ag | DSL | 2.35E+00 | 5.19E-01 | 1.19E+01 | 1.71E-02 | 3.87E-01 | 3.01E-01 | 1.75E+03 | 5.91E-01 | 2.84E-02 | 5.90E-02 | 5.62 |
| T7 CAIRP | DSL | 1.77E+00 | 3.76E-01 | 6.43E+00 | 1.76E-02 | 2.00E-01 | 1.30E-01 | 1.80E+03 | 4.29E-01 | 2.06E-02 | 6.06E-02 | 5.47 |
| T7 CAIRP construction | DSL | 1.77E+00 | 3.77E-01 | 6.67E+00 | 1.76E-02 | 2.01E-01 | 1.31E-01 | 1.80E+03 | 4.29E-01 | 2.06E-02 | 6.06E-02 | 5.47 |
| T7 NNOOS | DSL | 1.72E+00 | 3.53E-01 | 3.83E+00 | 1.77E-02 | 1.81E-01 | 1.12E-01 | 1.81E+03 | 4.02E-01 | 1.93E-02 | 6.10E-02 | 5.44 |
| T7 NOOS | DSL | 1.90E+00 | 4.03E-01 | 6.58E+00 | 1.78E-02 | 2.04E-01 | 1.33E-01 | 1.82E+03 | 4.58E-01 | 2.20E-02 | 6.14E-02 | 5.40 |
| T7 other port | DSL | 2.23E+00 | 4.82E-01 | 7.47E+00 | 1.73E-02 | 1.99E-01 | 1.28E-01 | 1.76E+03 | 5.49E-01 | 2.64E-02 | 5.95E-02 | 5.57 |
| T7 POLA | DSL | 2.41E+00 | 5.13E-01 | 7.46E+00 | 1.76E-02 | 1.99E-01 | 1.28E-01 | 1.80E+03 | 5.84E-01 | 2.80E-02 | 6.07E-02 | 5.46 |

**Table 16**
**Emission Factors in Santa Barbara County for 2015**

| Vehicle Class | Fuel | Emission Factors (g/mi)[a] | | | | | | | | | | Mileage (mpg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | TOG | $CH_4$ | $N_2O$ | |
| T7 Public | DSL | 1.22E+00 | 2.51E-01 | 1.73E+01 | 2.01E-02 | 1.71E-01 | 1.03E-01 | 2.06E+03 | 2.85E-01 | 1.37E-02 | 6.95E-02 | 4.77 |
| T7 Single | DSL | 1.45E+00 | 3.22E-01 | 1.11E+01 | 1.70E-02 | 2.50E-01 | 1.76E-01 | 1.74E+03 | 3.66E-01 | 1.76E-02 | 5.87E-02 | 5.65 |
| T7 single construction | DSL | 1.46E+00 | 3.24E-01 | 1.14E+01 | 1.70E-02 | 2.53E-01 | 1.78E-01 | 1.74E+03 | 3.69E-01 | 1.77E-02 | 5.87E-02 | 5.65 |
| T7 SWCV | DSL | 9.79E-01 | 2.02E-01 | 1.42E+01 | 1.84E-02 | 1.66E-01 | 9.85E-02 | 1.88E+03 | 2.30E-01 | 1.10E-02 | 6.36E-02 | 5.21 |
| T7 tractor | DSL | 1.46E+00 | 3.21E-01 | 9.32E+00 | 1.69E-02 | 2.32E-01 | 1.59E-01 | 1.73E+03 | 3.65E-01 | 1.75E-02 | 5.82E-02 | 5.70 |
| T7 tractor construction | DSL | 1.89E+00 | 4.17E-01 | 1.04E+01 | 1.71E-02 | 2.86E-01 | 2.09E-01 | 1.75E+03 | 4.75E-01 | 2.28E-02 | 5.89E-02 | 5.63 |
| T7 utility | DSL | 1.71E+00 | 3.27E-01 | 1.14E+01 | 2.00E-02 | 1.48E-01 | 8.18E-02 | 2.04E+03 | 3.72E-01 | 1.79E-02 | 6.89E-02 | 4.82 |
| T7IS | GAS | 4.65E+01 | 1.60E+00 | 6.24E+00 | 6.70E-03 | 4.64E-02 | 1.91E-02 | 5.79E+02 | 1.78E+00 | 1.01E-01 | 2.60E-01 | 12.69 |
| UBUS | GAS | 1.92E+01 | 3.29E+00 | 4.67E+00 | 7.87E-03 | 4.85E-02 | 2.12E-02 | 7.29E+02 | 3.50E+00 | 1.30E-01 | 1.94E-01 | 10.81 |
| UBUS | DSL | 2.22E+00 | 4.84E-01 | 1.30E+01 | 2.37E-02 | 1.09E+00 | 5.84E-01 | 2.43E+03 | 5.51E-01 | 2.65E-02 | 8.18E-02 | 4.05 |
| All Other Buses | DSL | 7.55E-01 | 2.29E-01 | 6.93E+00 | 1.15E-02 | 2.51E-01 | 1.59E-01 | 1.17E+03 | 2.61E-01 | 1.25E-02 | 3.96E-02 | 8.36 |

[a] CO, ROC NOx, $SO_2$, PM10, PM2.5, TOG and $CO_2$ calculated by dividing total daily emissions in Santa Barbara County for 2015 by total miles, and mileage calculated by dividing total daily fuel use by total miles from EMFAC2011 online data (http://www.arb.ca.gov/emfac/). $CH_4$ for gasoline-fueled vehicles calculated by dividing total daily emissions in Santa Barbara County for 2015 by total miles calculated with EMFAC2011-LDV (http://www.arb.ca.gov/msei/emfac2011_ldv.htm). $CH_4$ for diesel-fueled vehciles calculated as 0.048 x TOG (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07). $N_2O$ for gasoline-fueled vehicles calculated as 0.046 x NOx, and $N_2O$ for diesel-fueled vehicles calculated as 0.3316 grams/gallon (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07)

# Attachment C.1

# Project Operation Emissions Calculations

**Table 1** **Criteria Pollutant Daily Emissions Summary without CSSR**

| Source | Emissions (lb/day) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| **Onsite** | | | | | | |
| CHP Engines | 24.97 | 20.51 | 9.99 | 1.34 | 9.82 | 9.82 |
| Flare | 47.41 | 0.00 | 18.97 | 12.07 | 9.96 | 9.96 |
| MRF Facility Equipment | 53.35 | 2.49 | 13.79 | 0.08 | 0.00 | 0.00 |
| AD Facility Equipment | 7.98 | 0.30 | 0.65 | 0.01 | 0.00 | 0.00 |
| Equipment Outside MRF and AD Fac. | 0.91 | 0.04 | 0.82 | 0.00 | 0.00 | 0.00 |
| Composting Equipment Exhaust | 7.89 | 0.36 | 0.77 | 0.02 | 0.02 | 0.02 |
| Emergency Engine | 0.69 | 0.04 | 0.13 | 0.00 | 0.01 | 0.01 |
| Diesel Fuel Storage Tanks | | 0.02 | | | | |
| Material Handling Fugitive PM | | | | | 5.91 | 0.89 |
| Compost Screening Fugitive PM | | | | | 0.06 | 0.00 |
| Chipper/Grinder Fugitive PM | | | | | 0.98 | 0.98 |
| Motor Vehicle Fugitive PM | | | | | 13.11 | 1.31 |
| AD Fugitive ROC | | 3.50 | | | | |
| Windrow ROC | | 12.59 | | | | |
| Motor Vehicle Exhaust | 0.12 | 0.03 | 0.06 | 0.00 | 0.00 | 0.00 |
| **Onsite Total** | **143.32** | **39.89** | **45.18** | **13.53** | **39.87** | **23.01** |
| | | | | | | |
| **Offsite** | | | | | | |
| Motor Vehicle Exhaust | 23.76 | 4.42 | 6.87 | 0.07 | 0.49 | 0.36 |
| Motor Vehicle Fugitive PM | | | | | 3.84 | 0.94 |
| **Offsite Total** | **23.76** | **4.42** | **6.87** | **0.07** | **4.33** | **1.30** |
| | | | | | | |
| **Total** | **167.08** | **44.31** | **52.04** | **13.61** | **44.20** | **24.31** |

**Table 2** **Criteria Pollutant Annual Emissions Summary without CSSR**

| Source | Emissions (ton/year) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| **Onsite** | | | | | | |
| CHP Engines | 8.74 | 3.49 | 3.58 | 0.64 | 3.41 | 3.41 |
| Flare | 0.90 | 0.01 | 0.36 | 0.23 | 0.19 | 0.19 |
| MRF Facility Equipment | 8.30 | 0.39 | 2.14 | 0.01 | 0.00 | 0.00 |
| AD Facility Equipment | 0.83 | 0.03 | 0.07 | 0.00 | 0.00 | 0.00 |
| Equipment Outside MRF and AD Fac. | 0.14 | 0.01 | 0.13 | 0.00 | 0.00 | 0.00 |
| Composting Equipment Exhaust | 0.10 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| Emergency Engine | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| Diesel Fuel Storage Tanks | | 0.00 | | | | |
| Material Handling Fugitive PM | | | | | 0.18 | 0.03 |
| Compost Screening Fugitive PM | | | | | 0.01 | 0.00 |
| Chipper/Grinder Fugitive PM | | | | | 0.15 | 0.15 |
| Motor Vehicle Fugitive PM | | | | | 2.04 | 0.20 |
| AD Fugitive ROC | | 0.64 | | | | |
| Windrow ROC | | 2.30 | | | | |
| Motor Vehicle Exhaust | 0.02 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| **Onsite Total[a]** | **19.06** | **6.88** | **6.30** | **0.89** | **5.97** | **3.98** |
| | | | | | | |
| **Offsite** | | | | | | |
| Motor Vehicle Exhaust | 3.69 | 0.69 | 1.07 | 0.01 | 0.08 | 0.06 |
| Motor Vehicle Fugitive PM | | | | | 0.60 | 0.15 |
| **Offsite Total** | **3.69** | **0.69** | **1.07** | **0.01** | **0.67** | **0.20** |
| | | | | | | |
| **Total** | **22.76** | **7.56** | **7.37** | **0.90** | **6.65** | **4.18** |

**Table 3** **Criteria Pollutant Daily Emissions Summary with CSSR**

| Source | Emissions (lb/day) | | | | | |
|---|---|---|---|---|---|---|
| | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| **Onsite** | | | | | | |
| CHP Engines | 54.62 | 20.51 | 20.81 | 0.00 | 19.64 | 19.64 |
| Flare | 0.25 | 0.00 | 0.10 | 12.14 | 0.05 | 0.05 |
| MRF Facility Equipment | 53.35 | 2.49 | 13.79 | 0.08 | 0.00 | 0.00 |
| AD Facility Equipment | 7.98 | 0.30 | 0.65 | 0.01 | 0.00 | 0.00 |
| Equipment Outside MRF and AD Fac. | 0.91 | 0.04 | 0.82 | 0.00 | 0.00 | 0.00 |
| Composting Equipment Exhaust | 7.89 | 0.36 | 0.77 | 0.02 | 0.02 | 0.02 |
| Emergency Engine | 0.69 | 0.04 | 0.13 | 0.00 | 0.01 | 0.01 |
| Diesel Fuel Storage Tanks | | 0.02 | | | | |
| Material Handling Fugitive PM | | | | | 5.91 | 0.89 |
| Compost Screening Fugitive PM | | | | | 0.06 | 0.00 |
| Chipper/Grinder Fugitive PM | | | | | 0.98 | 0.98 |
| Motor Vehicle Fugitive PM | | | | | 19.44 | 1.94 |
| AD Fugitive ROC | | 3.50 | | | | |
| Windrow ROC | | 12.59 | | | | |
| Motor Vehicle Exhaust | 0.19 | 0.06 | 0.14 | 0.00 | 0.00 | 0.00 |
| **Onsite Total** | **125.87** | **39.91** | **37.21** | **12.26** | **46.12** | **23.56** |
| | | | | | | |
| **Offsite** | | | | | | |
| Motor Vehicle Exhaust | 30.71 | 5.73 | 4.98 | 0.09 | 0.54 | 0.41 |
| Motor Vehicle Fugitive PM | | | | | 4.91 | 1.20 |
| **Offsite Total** | **30.71** | **5.73** | **4.98** | **0.09** | **5.45** | **1.62** |
| | | | | | | |
| **Total** | **156.58** | **45.64** | **42.19** | **12.35** | **51.57** | **25.17** |

**Table 4** **Criteria Pollutant Annual Emissions Summary with CSSR**

| Source | Emissions (ton/year) | | | | | |
|---|---|---|---|---|---|---|
| | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| **Onsite** | | | | | | |
| CHP Engines | 8.74 | 3.49 | 3.58 | 0.64 | 3.41 | 3.41 |
| Flare | 0.90 | 0.01 | 0.36 | 0.23 | 0.19 | 0.19 |
| MRF Facility Equipment | 8.30 | 0.39 | 2.14 | 0.01 | 0.00 | 0.00 |
| AD Facility Equipment | 0.83 | 0.03 | 0.07 | 0.00 | 0.00 | 0.00 |
| Equipment Outside MRF and AD Fac. | 0.14 | 0.01 | 0.13 | 0.00 | 0.00 | 0.00 |
| Composting Equipment Exhaust | 0.10 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| Emergency Engine | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| Diesel Fuel Storage Tanks | | 0.00 | | | | |
| Material Handling Fugitive PM | | | | | 0.18 | 0.03 |
| Compost Screening Fugitive PM | | | | | 0.01 | 0.00 |
| Chipper/Grinder Fugitive PM | | | | | 0.15 | 0.15 |
| Motor Vehicle Fugitive PM | | | | | 3.02 | 0.30 |
| AD Fugitive ROC | | 0.64 | | | | |
| Windrow ROC | | 2.30 | | | | |
| Motor Vehicle Exhaust | 0.03 | 0.01 | 0.02 | 0.00 | 0.00 | 0.00 |
| **Onsite Total**[a] | **19.07** | **6.88** | **6.32** | **0.89** | **6.96** | **4.08** |
| | | | | | | |
| **Offsite** | | | | | | |
| Motor Vehicle Exhaust | 4.77 | 0.89 | 0.77 | 0.01 | 0.08 | 0.06 |
| Motor Vehicle Fugitive PM | | | | | 0.76 | 0.19 |
| **Offsite Total** | **4.77** | **0.89** | **0.77** | **0.01** | **0.85** | **0.25** |
| | | | | | | |
| **Total** | **23.85** | **7.77** | **7.09** | **0.90** | **7.81** | **4.33** |

**Table 5**
**Greenhouse Gas Annual Emissions Summary without CSSR**

| Source | Emissions (MT/year)[a] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[b] |
| **Onsite** | | | | |
| CHP Engines Combustion | 8,899.71 | 0.21 | 0.03 | 8,912.91 |
| CHP Engines Pass-through $CO_2$ | 4,654.77 | | | 4,654.77 |
| Flare Combustion | 476.99 | 0.03 | 0.01 | 479.40 |
| Flare Pass-through $CO_2$ | 292.89 | | | 292.89 |
| MRF Facility Equipment | 1,163.43 | 0.07 | 0.03 | 1,173.91 |
| AD Facility Equipment | 118.93 | 0.01 | 0.00 | 120.00 |
| Equipment Outside MRF and AD Fac. | 76.21 | 0.00 | 0.00 | 76.89 |
| Composting Equipment Exhaust | 50.97 | 0.00 | 0.00 | 51.43 |
| Motor Vehicle Exhaust | 17.52 | 0.03 | 0.00 | 18.87 |
| **Onsite Total** | **15,751.42** | **0.34** | **0.07** | **15,781.07** |
| | | | | |
| **Offsite** | | | | |
| Motor Vehicle Exhaust | 1,560.81 | 2.38 | 0.22 | 1,685.56 |
| **Offsite Total** | **1,560.81** | **2.38** | **0.22** | **1,685.56** |
| | | | | |
| **Total** | **17,312.22** | **2.72** | **0.29** | **17,466.63** |

[a] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[b] $CO_2e$ = CO2-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

**Table 6**
**Greenhouse Gas Annual Emissions Summary with CSSR**

| Source | Emissions (MT/year)[a] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[b] |
| **Onsite** | | | | |
| CHP Engines Combustion | 8,899.71 | 0.21 | 0.03 | 8,912.91 |
| CHP Engines Pass-through $CO_2$ | 4,654.77 | | | 4,654.77 |
| Flare Combustion | 476.99 | 0.03 | 0.01 | 479.40 |
| Flare Pass-through $CO_2$ | 292.89 | | | 292.89 |
| MRF Facility Equipment | 1,163.43 | 0.07 | 0.03 | 1,173.91 |
| AD Facility Equipment | 118.93 | 0.01 | 0.00 | 120.00 |
| Equipment Outside MRF and AD Fac. | 76.21 | 0.00 | 0.00 | 76.89 |
| Composting Equipment Exhaust | 50.97 | 0.00 | 0.00 | 51.43 |
| Motor Vehicle Exhaust | 33.82 | 0.03 | 0.00 | 35.60 |
| **Onsite Total** | **15,767.73** | **0.35** | **0.07** | **15,797.81** |
| | | | | |
| **Offsite** | | | | |
| Motor Vehicle Exhaust | 1,951.40 | 3.18 | 0.29 | 2,116.99 |
| **Offsite Total** | **1,951.40** | **3.18** | **0.29** | **2,116.99** |
| | | | | |
| **Total** | **17,719.13** | **3.53** | **0.36** | **17,914.80** |

[a] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[b] $CO_2e$ = CO2-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

**Table 7** **Emission Rates for Dispersion Modeling**

**Table 7-A** **Daily Emissions Inside MRF Facility - 7:00 a.m. - 11:00 p.m.**

| | Emissions (g/s) | | | | | |
|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 7:00 a.m. - 11:00 p.m. | 4.05E-01 | 2.49E-02 | 9.49E-02 | 5.49E-04 | 5.77E-06 | 2.61E-06 |

**Table 7-B** **Annual Average Emissions Inside MRF Facility - 7:00 a.m. - 11:00 p.m.**

| | Emissions (g/s) | | | | | |
|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 7:00 a.m. - 11:00 p.m. | 3.45E-01 | 2.13E-02 | 8.09E-02 | 4.67E-04 | 4.92E-06 | 2.23E-06 |

**Table 7-C** **Daily Emissions Inside MRF Facility - 11:00 p.m. - 7:00 a.m.**

| | Emissions (g/s) | | | | | |
|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 11:00 p.m. - 7:00 a.m. | 3.04E-02 | 7.48E-03 | 2.74E-02 | 1.05E-04 | 1.65E-07 | 1.65E-07 |

**Table 7-D** **Annual Average Emissions Inside MRF Facility - 11:00 p.m. - 7:00 a.m.**

| | Emissions (g/s) | | | | | |
|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 11:00 p.m. - 7:00 a.m. | 2.59E-02 | 6.37E-03 | 2.33E-02 | 8.94E-05 | 1.40E-07 | 1.40E-07 |

**Table 7-E** **Daily Emissions Inside AD Facility - 8:00 a.m. - 4:00 p.m.**

| | Emissions (g/s) | | | | | |
|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 8:00 a.m. - 4:00 p.m. | 1.26E-01 | 1.12E-02 | 1.02E-02 | 1.84E-04 | 4.61E-06 | 1.13E-06 |

**Table 7-F** **Annual Average Emissions Inside AD Facility - 8:00 a.m. - 4:00 p.m.**

| | Emissions (g/s) | | | | | |
|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 8:00 a.m. - 4:00 p.m. | 7.16E-02 | 6.36E-03 | 5.81E-03 | 1.05E-04 | 2.63E-06 | 6.44E-07 |

**Table 7-G** **Daily Emissions from MRF Facility Biofilter (BF_TIP) - 7:00 a.m. - 11:00 p.m. (Emissions inside MRF except Cat 2P-6000)**

| | Emissions (g/s) | | | | | | (m²) | Emissions (g/s/m²) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **Area** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 7:00 a.m. - 11:00 p.m. | 3.67E-01 | 2.32E-02 | 6.09E-02 | 4.30E-04 | 5.57E-06 | 2.41E-06 | 585.3 | 6.27185E-04 | 3.95600E-05 | 1.04116E-04 | 7.35367E-07 | 9.51426E-09 | 4.11400E-09 | **BF_TIP** |

**Table 7-H** **Annual Average Emissions from MRF Facility Biofilter (BF_TIP) - 7:00 a.m. - 11:00 p.m. (Emissions inside MRF except Cat 2P-6000)**

| | Emissions (g/s) | | | | | | (m²) | Emissions (g/s/m²) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **Area** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 7:00 a.m. - 11:00 p.m. | 3.13E-01 | 1.97E-02 | 5.19E-02 | 3.67E-04 | 4.74E-06 | 2.05E-06 | 585.3 | 5.34396E-04 | 3.37073E-05 | 8.87123E-05 | 6.26573E-07 | 8.10667E-09 | 3.50535E-09 | **BF_TIP** |

**Table 7-I** **Daily Emissions from MRF Facility Biofilter (BF_TIP) - 11:00 p.m. - 7:00 a.m. (Emissions inside MRF except Cat 2P-6000)**

| | Emissions (g/s) | | | | | | (m²) | Emissions (g/s/m²) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **Area** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 11:00 p.m. - 7:00 a.m. | 3.04E-02 | 7.48E-03 | 2.74E-02 | 1.05E-04 | 1.65E-07 | 1.65E-07 | 585.3 | 5.20017E-05 | 1.27806E-05 | 4.67313E-05 | 1.79358E-07 | 2.81090E-10 | 2.81090E-10 | **BF_TIP** |

**Table 7-J** **Annual Average Emissions from MRF Facility Biofilter (BF_TIP) - 11:00 p.m. - 7:00 a.m. (Emissions inside MRF except Cat 2P-6000)**

| | Emissions (g/s) | | | | | | (m²) | Emissions (g/s/m²) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **Area** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 11:00 p.m. - 7:00 a.m. | 2.59E-02 | 6.37E-03 | 2.33E-02 | 8.94E-05 | 1.40E-07 | 1.40E-07 | 585.3 | 4.43083E-05 | 1.08897E-05 | 3.98176E-05 | 1.52823E-07 | 2.39504E-10 | 2.39504E-10 | **BF_TIP** |

**Table 7-K** **Daily Emissions from AD Facility Biofilters ADF1 & ADF2 - 7:00 a.m. - 11:00 p.m. (Emissions from Cat 2P-6000 inside MRF)**

| | Emissions (g/s) | | | | | | (m²) | Emissions (g/s/m² PER FILTER) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **Area** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 7:00 a.m. - 11:00 p.m. | 3.78E-02 | 7.69E-03 | 3.40E-02 | 1.18E-04 | 2.04E-07 | 2.04E-07 | 780.4 | 4.84428E-05 | 9.85714E-06 | 4.35330E-05 | 1.51333E-07 | 2.61853E-10 | 2.61853E-10 | **BF_ADF1, BF_ADF2** |

**Table 7-L** **Annual Average Emissions from AD Facility Biofilters ADF1 & ADF2 - 7:00 a.m. - 11:00 p.m. (Emissions from Cat 2P-6000 inside MRF)**

| | Emissions (g/s) | | | | | | (m²) | Emissions (g/s/m² PER FILTER) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **Area** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 7:00 a.m. - 11:00 p.m. | 3.22E-02 | 6.55E-03 | 2.89E-02 | 1.01E-04 | 1.74E-07 | 1.74E-07 | 780.4 | 4.12759E-05 | 8.39882E-06 | 3.70925E-05 | 1.28944E-07 | 2.23113E-10 | 2.23113E-10 | **BF_ADF1, BF_ADF2** |

**Table 7-M** **Daily Emissions from AD Facility Biofilter SCRUB - 8:00 a.m. - 4:00 p.m. (100% of emissions inside ADF)**

| | Emissions (g/s) | | | | | | (m²) | Emissions (g/s/m²) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **Area** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 8:00 a.m. - 4:00 p.m. | 1.26E-01 | 1.12E-02 | 1.02E-02 | 1.84E-04 | 4.61E-06 | 1.13E-06 | 662.2 | 1.89800E-04 | 1.68598E-05 | 1.53892E-05 | 2.77426E-07 | 6.96228E-09 | 1.70723E-09 | **BF_SCRUB** |

**Table 7-N** **Annual Average Emissions from AD Facility Biofilter SCRUB - 8:00 a.m. - 4:00 p.m. (100% of emissions inside ADF)**

| | Emissions (g/s) | | | | | | (m²) | Emissions (g/s/m²) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **Area** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 8:00 a.m. - 4:00 p.m. | 7.16E-02 | 6.36E-03 | 5.81E-03 | 1.05E-04 | 2.63E-06 | 6.44E-07 | 662.2 | 1.08160E-04 | 9.60777E-06 | 8.76971E-06 | 1.58095E-07 | 3.96754E-09 | 9.72886E-10 | **BF_SCRUB** |

**Table 7** **Emission Rates for Dispersion Modeling**

**Table 7-O** **Daily Emissions Outside MRF and AD Facility Buildings**

| | Emissions (g/s) | | | | | | (m²) |
|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **Area** |
| 11:00 a.m. - 5:00 p.m. | 1.92E-02 | 9.08E-04 | 1.73E-02 | 1.05E-04 | 1.04E-04 | 1.04E-04 | 10583.1 |

| Emissions (g/s/m²) | | | | | | |
|---|---|---|---|---|---|---|
| **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 1.81407E-06 | 8.58006E-08 | 1.63021E-06 | 9.91941E-09 | 9.80578E-09 | 9.80578E-09 | **SWEEP1, SWEEP2** |

**Table 7-P**
**Annual Average Hourly Emissions Outside MRF and AD Facility Buildings**

| | Emissions (g/s) | | | | | | (m²) |
|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **Area** |
| 11:00 a.m. - 5:00 p.m. | 1.64E-02 | 7.74E-04 | 1.47E-02 | 8.94E-05 | 8.84E-05 | 8.84E-05 | 10583.1 |

| Emissions (g/s/m²) | | | | | | |
|---|---|---|---|---|---|---|
| **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 1.54569E-06 | 7.31068E-08 | 1.38903E-06 | 8.45189E-09 | 8.35506E-09 | 8.35506E-09 | **SWEEP1, SWEEP2** |

**Table 7-Q** **Daily Exhaust Emissions from On-site Vehicles**

| | | Emissions (g/s) | | | | | |
|---|---|---|---|---|---|---|---|
| **Time Period** | **Segment** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 8:00 a.m. - 2:00 p.m. | MRF-Compost | 2.48E-04 | 6.84E-05 | 1.94E-04 | 2.83E-06 | 6.07E-06 | 6.07E-06 |
| 8:00 a.m. - 2:00 p.m. | MRF-Entrance | 3.78E-03 | 1.22E-03 | 2.72E-03 | 3.10E-05 | 9.55E-05 | 9.34E-05 |

| # | Emissions (g/s/volume) | | | | | |
|---|---|---|---|---|---|---|
| **Volumes** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 49 | 5.05E-06 | 1.40E-06 | 3.97E-06 | 5.77E-08 | 7.71E-04 | 7.72E-05 |
| 119 | 3.18E-05 | 1.03E-05 | 2.29E-05 | 2.61E-07 | 3.11E-03 | 3.13E-04 |

**Table 7-R** **Annual Average Exhaust Emissions from On-site Vehicles**

| | | Emissions (g/s) | | | | | |
|---|---|---|---|---|---|---|---|
| **Time Period** | **Segment** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 8:00 a.m. - 2:00 p.m. | MRF-Compost | 2.11E-04 | 5.83E-05 | 1.66E-04 | 2.41E-06 | 5.17E-06 | 5.17E-06 |
| 8:00 a.m. - 2:00 p.m. | MRF-Entrance | 3.22E-03 | 1.04E-03 | 2.32E-03 | 2.64E-05 | 8.14E-05 | 7.96E-05 |

| # | Emissions (g/s/volume) | | | | | |
|---|---|---|---|---|---|---|
| **Volumes** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 49 | 4.31E-06 | 1.19E-06 | 3.38E-06 | 4.92E-08 | 6.57E-04 | 6.58E-05 |
| 119 | 2.71E-05 | 8.74E-06 | 1.95E-05 | 2.22E-07 | 2.65E-03 | 2.67E-04 |

**Table 7-S** **Daily Emissions from CHP Engines** 165-166

| | Emissions, Each Engine (g/s) | | | | | | |
|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 12:00 a.m. - 12:00 a.m. | 1.31E-01 | 5.24E-02 | 5.24E-02 | 5.67E-03 | 5.16E-02 | 5.16E-02 | **CHPSTACK, CHP2 OR** |
| | 2.62E-01 | 1.05E-01 | 1.05E-01 | 1.13E-02 | 1.03E-01 | 1.03E-01 | **RBD** |

| | | | | | | |
|---|---|---|---|---|---|---|
| ST | 3.68E-05 | 1.17E-05 | 2.68E-05 | 3.18E-07 | 3.89E-03 | 3.90E-04 |
| Annual | 3.14E-05 | 9.93E-06 | 2.28E-05 | 2.71E-07 | 3.31E-03 | 3.33E-04 |

**Table 7-T** **Annual Average Hourly Emissions from CHP Engines**

| | Emissions, Each Engine (g/s) | | | | | | |
|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 12:00 a.m. - 12:00 a.m. | 1.26E-01 | 5.01E-02 | 5.15E-02 | 9.24E-03 | 4.90E-02 | 4.90E-02 | **CHPSTACK, CHP2 OR** |
| | 2.51E-01 | 1.00E-01 | 1.03E-01 | 1.85E-02 | 9.80E-02 | 9.80E-02 | **RBD** |

**Table 7-U** **Daily Emissions from Flare, Purging Only**

| | Emissions (g/s) | | | | | | |
|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 1 hour, daytime | 3.11E-02 | 4.20E-04 | 1.24E-02 | 7.92E-03 | 6.53E-03 | 6.53E-03 | **FLARE** |

**Table 7-V** **Daily Emissions from Flare, Purging and One CHP Engine Off-line**

| | Emissions (g/s) | | | | | | |
|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 12:00 a.m. - 12:00 a.m. | 2.50E-01 | 3.38E-03 | 1.00E-01 | 6.37E-02 | 5.25E-02 | 5.25E-02 | **FLARE** |

**Table 7-W** **Daily Emissions from CHP Engine during SCR Start-Up (1 engine)**

| | Emissions, Each Engine (g/s) | | | | | | |
|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 12:00 a.m. - 12:00 a.m. | 7.21E-01 | 1.20E-01 | 1.57E-01 | 3.66E-03 | 5.16E-02 | 5.16E-02 | **CHPSTACK, CHP2** |

**Table 7-X** **Daily Emissions from CHP Engine during SCR Burn-In (1 engine)**

| | Emissions, Each Engine (g/s) | | | | | | |
|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 12:00 a.m. - 12:00 a.m. | 1.31E-01 | 5.24E-02 | 1.57E-01 | 8.30E-04 | 5.16E-02 | 5.16E-02 | **CHPSTACK, CHP2** |

**Table 7-Y** **Annual Average Hourly Emissions from Flare**

| | Emissions (g/s) | | | | | | |
|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | |
| 12:00 a.m. - 12:00 a.m. | 2.59E-02 | 3.49E-04 | 1.04E-02 | 6.59E-03 | 5.43E-03 | 5.43E-03 | **FLARE** |

**Table 7-Z** **Daily Emissions from Compost Area (Loader Exhaust, Material Transfers)**

| | Emissions (g/s) | | | | | | (m²) |
|---|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **Area** |
| 8:00 a.m. - 4:00 p.m. | 6.28E-02 | 2.38E-03 | 5.10E-03 | 7.09E-05 | 9.64E-04 | 1.46E-04 | 1412.1 |

| Emissions (g/s/m²) for COMPMAT Source | | | | | |
|---|---|---|---|---|---|
| **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 4.45030E-05 | 1.68390E-06 | 3.60835E-06 | 5.01808E-08 | 6.82952E-07 | 1.03572E-07 |

**Table 7** **Emission Rates for Dispersion Modeling**

**Table 7-AA** **Annual Average Hourly Emissions from Compost Area (Loader Exhaust, Material Transfers)**

| | Emissions (g/s) | | | | | | (m²) |
|---|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 | Area |
| 8:00 a.m. - 4:00 p.m. | 5.35E-02 | 2.03E-03 | 4.34E-03 | 6.04E-05 | 8.22E-04 | 1.25E-04 | 1412.1 |

| Emissions (g/s/m²) for COMPMAT Source | | | | | |
|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 3.79190E-05 | 1.43477E-06 | 3.07451E-06 | 4.27568E-08 | 5.81912E-07 | 8.82486E-08 |

**Table 7-AB** **Daily Exhaust Emissions from Windrow Turner**

| | Emissions (g/s) | | | | | | (m²) |
|---|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 | Area |
| 8:00 a.m. - 4:00 p.m. | 6.14E-02 | 3.31E-03 | 7.08E-03 | 3.15E-04 | 3.54E-04 | 3.54E-04 | 18580.6 |

| Emissions (g/s/m²) for WINDROW Source | | | | | |
|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 3.30352E-06 | 1.77882E-07 | 3.81175E-07 | 1.69496E-08 | 4.92159E-06 | 7.61442E-07 |

3.55623E-06 Windrow ROC
3.73411E-06 Windrow Source Total

**Table 7-AC** **Annual Average Hourly Emissions from Windrow Turner Exhaust**

| | Emissions (g/s) | | | | | | (m²) |
|---|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 | Area |
| 8:00 a.m. - 4:00 p.m. | 8.74E-03 | 4.71E-04 | 1.01E-03 | 4.49E-05 | 5.05E-05 | 5.05E-05 | 18580.6 |

| Emissions (g/s/m²) for WINDROW Source | | | | | |
|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 4.70638E-07 | 2.53420E-08 | 5.43044E-08 | 2.41474E-09 | 7.57104E-07 | 1.16951E-07 |

**Table 7-AD** **Daily Fugitive PM Emissions from On-site Vehicles**

| | | Emissions (g/s) | | # | Emissions (g/s/vol) | |
|---|---|---|---|---|---|---|
| Time Period | Segment | PM10 | PM2.5 | Volumes | PM10 | PM2.5 |
| 8:00 a.m. - 2:00 p.m. | MRF-Compost | 3.78E-02 | 3.78E-03 | 49 | 7.71E-04 | 7.71E-05 |
| 8:00 a.m. - 2:00 p.m. | MRF-Entrance | 3.70E-01 | 3.70E-02 | 119 | 3.11E-03 | 3.11E-04 |

2.04E-02
8.40E-03
2.88E-02

**Table 7-AE** **Annual Average Fugitive PM Emissions from On-site Vehicles**

| | | Emissions (g/s) | | # | Emissions (g/s/vol) | |
|---|---|---|---|---|---|---|
| Time Period | Segment | PM10 | PM2.5 | Volumes | PM10 | PM2.5 |
| 8:00 a.m. - 2:00 p.m. | MRF-Compost | 3.22E-02 | 3.22E-03 | 49 | 6.57E-04 | 6.57E-05 |
| 8:00 a.m. - 2:00 p.m. | MRF-Entrance | 3.16E-01 | 3.16E-02 | 119 | 2.65E-03 | 2.65E-04 |

**Table 7-AF** **Daily Fugitive PM Emissions from Windrow Area Material Transfers**

| | | Emissions (g/s) | | |
|---|---|---|---|---|
| Time Period | Activity | PM10 | PM2.5 | **WINDROW** |
| 8:00 a.m. - 4:00 p.m. | Digestate to Windrow | 1.68E-03 | 2.54E-04 | |
| 8:00 a.m. - 4:00 p.m. | Windrow Turning | 8.94E-02 | 1.35E-02 | |

**Table 7-AG** **Annual Average Hourly Fugitive PM Emissions from Windrow Area Material Transfers**

| | | Emissions (g/s) | | |
|---|---|---|---|---|
| Time Period | Activity | PM10 | PM2.5 | **WINDROW** |
| 8:00 a.m. - 4:00 p.m. | Digestate to Windrow | 1.28E-03 | 1.94E-04 | |
| 8:00 a.m. - 4:00 p.m. | Windrow Turning | 1.27E-02 | 1.93E-03 | |

**Table 7-AH** **Daily Fugitive PM Emissions from Compost Screening**

| | Emissions (g/s) | | |
|---|---|---|---|
| Time Period | PM10 | PM2.5 | |
| 8:00 a.m. - 4:00 p.m. | 1.93E-03 | 2.11E-04 | **SCREEN** |

**Table 7-AI** **Annual Average Hourly Fugitive PM Emissions from Compost Screen**

| | Emissions (g/s) | | |
|---|---|---|---|
| Time Period | PM10 | PM2.5 | |
| 8:00 a.m. - 4:00 p.m. | 1.64E-03 | 1.80E-04 | **SCREEN** |

**Table 7-AJ** **Daily Fugitive PM Emissions from Chipper/Grinder**

| | Emissions (g/s) | | |
|---|---|---|---|
| Time Period | PM10 | PM2.5 | |
| 7:00 a.m. - 8:30 a.m. | 8.26E-02 | 8.26E-02 | **CHIPPER** |

**Table 7-AK** **Annual Average Hourly Fugitive PM Emissions from Chipper/Grinder**

| | Emissions (g/s) | | |
|---|---|---|---|
| Time Period | PM10 | PM2.5 | |
| 7:00 a.m. - 8:30 a.m. | 7.03E-02 | 7.03E-02 | **CHIPPER** |

**Table 8a** CHP Engine Emissions with biogas/natural gas

**Normal Operation, Both Engines Operating**

| Type | Engine Rating (hp) | Fuel Input @ Full Load (scfh)[a] | Heat Input @ Full Load (MMBtu/hr) | Number Engines | Daily Op. (hr/day) | Emission Factors (normal operation): CO (g/bhp-hr)[b] | ROC (g/bhp-hr)[b] | NOx (g/bhp-hr)[b] | SOx (g/scf)[c] | PM10 (g/bhp-hr)[d] | PM2.5 (g/bhp-hr)[d] | Combust. $CO_2$ (g/MMBtu)[e] | $CH_4$ (g/MMBtu)[f] | $N_2O$ (g/MMBtu)[f] | Pass-through $CO_2$ (g/scf)[g] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jenbacher/GE JMS416vB82 | 1,573 | 15,150 | 9.88 | 2 | 24 | 0.3 | 0.12 | 0.12 | 0.00135 | 0.118 | 0.118 | 53,020 | 1.0 | 0.10 | 18.47 |

Fuel heating value = 652 Btu/scf Based on Mustang estimate of 86.5% biogas at 587 Btu/scf and 13.5% natural gas at 1070 Btu/scf
Fuel sulfur = 18 ppmv Based on Mustang estimate of 86.5% biogas at 20 ppmv and 13.5% natural gas at 4.3 ppmv
Fuel $CO_2$ fraction = 0.357 Based on Mustang estimate of 86.5% biogas at 0.41 and 13.5% natural gas at 0.0154

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x $10^6$ [Btu/MMBtu] / Fuel heating value [Btu/scf]
[b] Control system vendor specifications
[c] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb
[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr. Filterable PM10 and PM2.5 assumed equal to filterable PM
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engibes from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2 is 9.91 x $10^{-3}$ lb/MMBtu = 9.91 x $10^{-3}$ lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.0118 g/bhp-hr.
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.
[g] "Pass-through" $CO_2$ emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole $CO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

**Normal Operation, One Engine Operating and One Engine Down**

| Type | Engine Rating (hp) | Fuel Input @ Full Load (scfh)[a] | Heat Input @ Full Load (MMBtu/hr) | Number Engines | Daily Op. (hr/day) | Emission Factors (normal operation): CO (g/bhp-hr)[b] | ROC (g/bhp-hr)[b] | NOx (g/bhp-hr)[b] | SOx (g/scf)[c] | PM10 (g/bhp-hr)[d] | PM2.5 (g/bhp-hr)[d] | Combust. $CO_2$ (g/MMBtu)[e] | $CH_4$ (g/MMBtu)[f] | $N_2O$ (g/MMBtu)[f] | Pass-through $CO_2$ (g/scf)[g] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jenbacher/GE JMS416vB82 | 1,573 | 16,828 | 9.88 | 1 | 24 | 0.3 | 0.12 | 0.12 | 0.00151 | 0.118 | 0.118 | 53,020 | 1.0 | 0.10 | 21.23 |

Fuel heating value = 587 Btu/scf Based on Mustang estimate for 100% biogas
Fuel sulfur = 20 ppmv Based on Mustang estimate for 100% biogas
Fuel $CO_2$ fraction = 0.410 Based on Mustang estimate for 100% biogas

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x $10^6$ [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Control system vendor specifications
[c] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb
[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr. Filterable PM10 and PM2.5 assumed equal to filterable PM
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engibes from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2 is 9.91 x $10^{-3}$ lb/MMBtu = 9.91 x $10^{-3}$ lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.0118 g/bhp-hr.
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.
[g] "Pass-through" $CO_2$ emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole $CO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

**Table 8a** CHP Engine Emissions with biogas/natural gas

**Start-up**

| Fuel Input @ Full Load (scfh)[a] | Heat Input @ Full Load (MMBtu/hr) | Emission Factors (start-up) CO (g/bhp-hr)[b] | ROC (g/bhp-hr)[b] | NOx (g/bhp-hr)[b] | SOx (g/scf)[d] | PM10 (g/bhp-hr)[c] | PM2.5 (g/bhp-hr)[c] | Combust. $CO_2$ (g/MMBtu)[c] | $CH_4$ (g/MMBtu)[c] | $N_2O$ (g/MMBtu)[c] | Pass-through $CO_2$ (g/scf)[e] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9,232 | 9.88 | 3 | 0.43 | 0.6 | 0.00032 | 0.11800 | 0.11800 | 53,020 | 1.0 | 0.10 | 0.80 |

Fuel heating value = 1,070 Btu/scf Based on 100% natural gas
Fuel sulfur = 4.3 ppmv Based on 100% natural gas at 0.5 grains/100 scf
Fuel $CO_2$ fraction = 0.0154 Based on 100% natural gas

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x $10^6$ [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Engine vendor specification
[c] Same as during normal operation
[d] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] "Pass-through" $CO_2$ emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole $CO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

**Catalyst Burn-in**

| Fuel Input @ Full Load (scfh)[a] | Heat Input @ Full Load (MMBtu/hr) | Emission Factors (SCR catalyst burn-in) CO (g/bhp-hr)[b] | ROC (g/bhp-hr)[b] | NOx (g/bhp-hr)[c] | SOx (g/scf)[d] | PM10 (g/bhp-hr)[b] | PM2.5 (g/bhp-hr)[b] | Combust. $CO_2$ (g/MMBtu)[b] | $CH_4$ (g/MMBtu)[b] | $N_2O$ (g/MMBtu)[b] | Pass-through $CO_2$ (g/scf)[e] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9,232 | 9.88 | 0.3 | 0.12 | 0.36 | 0.00032 | 0.11800 | 0.11800 | 53,020 | 1.0 | 0.10 | 0.80 |

Fuel heating value = 1,070 Btu/scf Based on 100% natural gas
Fuel sulfur = 4.3 ppmv Based on 100% natural gas at 0.5 grains/100 scf
Fuel $CO_2$ fraction = 0.0154 Based on 100% natural gas

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x $10^6$ [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Same as during normal operation
[c] Based on average of 50 percent of normal NOx control efficiency
[d] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] "Pass-through" $CO_2$ emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole $CO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

**Hourly Emissions per Engine, Normal Operation, Both Engines Operating (lb/hr)[a]**

| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 1.04 | 0.42 | 0.42 | 0.04 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 6.17E+02 |

[a] Except for SOx, $CO_2$, $CH_4$ and $N_2O$, Hourly emissions [lb/hr] = Engine rating [hp] x Emission factor [g/bhp-hr] / 453.6 [g/lb]
SOx and pass-though $CO_2$ hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]
Combustion $CO_2$, $CH_4$ and $N_2O$ hourly emisisons [lb/hr] = Heat input [MMBtu/hr] x Emission factor [g/MMBtu] / 453.6 [g/lb]

**Hourly Emissions per Engine, Normal Operation, One Engine Operating and One Engine Down (lb/hr)[a]**

| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 1.04 | 0.42 | 0.42 | 0.06 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 7.87E+02 |

[a] Except for SOx, $CO_2$, $CH_4$ and $N_2O$, Hourly emissions [lb/hr] = Engine rating [hp] x Emission factor [g/bhp-hr] / 453.6 [g/lb]
SOx and pass-though $CO_2$ hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]
Combustion $CO_2$, $CH_4$ and $N_2O$ hourly emisisons [lb/hr] = Heat input [MMBtu/hr] x Emission factor [g/MMBtu] / 453.6 [g/lb]

**Table 8a** **CHP Engine Emissions with biogas/natural gas**

| Hourly Emissions per Engine, Start-Up (lb/hr)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 5.72 | 0.95 | 1.25 | 0.03 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 3.25E+02 |

[a] Start-up is 30 minutes with no CO, ROC or NOx control by SCR/catalyst system. Emissions are for one-hour period that includes 30-minute start-up

| Hourly Emissions per Engine, SCR Catalyst Burn-In (lb/hr)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 1.04 | 0.42 | 1.25 | 0.01 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 1.62E+01 |

| Daily Emissions, both Engines Normal Operation (lb/day)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 49.94 | 19.97 | 19.97 | 2.16 | 19.64 | 19.64 | 5.54E+04 | 1.05E+00 | 1.05E-01 | 2.96E+04 |

[a] Daily emissions [lb/day] = Number engines x Daily operating time [hr/day] x Hourly emissions [lb/hr]

| Daily Emissions, One Engine Normal Operation (lb/day)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 24.97 | 9.99 | 9.99 | 1.34 | 9.82 | 9.82 | 2.77E+04 | 5.23E-01 | 5.23E-02 | 1.89E+04 |

[a] Daily emissions [lb/day] = Number engines x Daily operating time [hr/day] x Hourly emissions [lb/hr]

| Daily Emissions, both Engines Normal Operation plus one Start-up for One Engine (lb/day)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 54.62 | 20.51 | 20.81 | 2.14 | 19.64 | 19.64 | 5.54E+04 | 1.05E+00 | 1.05E-01 | 2.93E+04 |

| Annual Op. (hr/year-engine) | | Annual Emissions, both Engines (lb/year)[c] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| Start-Up[a] | 18 | 205.99 | 34.33 | 44.94 | 1.05 | 14.73 | 14.73 | 4.16E+04 | 7.84E-01 | 7.84E-02 | 1.17E+04 |
| SCR Catalyst Burn-In[a] | 120 | 249.68 | 99.87 | 299.62 | 1.58 | 98.21 | 98.21 | 2.77E+05 | 5.23E+00 | 5.23E-01 | 3.89E+03 |
| Normal Operation, Both Eng.[b] | 7,746 | 16,117.01 | 6,446.80 | 6,446.80 | 696.73 | 6,339.36 | 6,339.36 | 1.79E+07 | 3.37E+02 | 3.37E+01 | 9.56E+06 |
| Normal Operation, One Eng.[b] | 438 | 911.34 | 364.54 | 364.54 | 48.95 | 358.46 | 358.46 | 1.01E+06 | 1.91E+01 | 1.91E+00 | 6.90E+05 |
| Total | **8,322** | **17,484.02** | **6,945.54** | **7,155.90** | **748.30** | **6,810.76** | **6,810.76** | **1.92E+07** | **3.62E+02** | **3.62E+01** | **1.03E+07** |

[a] Mustang estimate

[b] Based on each engine operating 95% of the time, excluding start-up hours and SCR catalyst burn-in, with 5% downtime for maintenance or other reasons.

[c] Annual emissions [lb/year] = Operating time [hr/year-engine] x Hourly emissions at full load [lb/hr-engine] x Number engines

**Table 8b** **CHP Engine Emissions with biogas/propane**

**Normal Operation, Both Engines Operating**

| Type | Engine Rating (hp) | Fuel Input @ Full Load (scfh)[a] | Heat Input @ Full Load (MMBtu/hr) | Number Engines | Daily Op. (hr/day) | Emission Factors (normal operation) CO (g/bhp-hr)[b] | ROC (g/bhp-hr)[b] | NOx (g/bhp-hr)[b] | SOx (g/scf)[c] | PM10 (g/bhp-hr)[d] | PM2.5 (g/bhp-hr)[d] | Combust. $CO_2$ (g/MMBtu)[e] | $CH_4$ (g/MMBtu)[f] | $N_2O$ (g/MMBtu)[f] | Pass-through $CO_2$ (g/scf)[g] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jenbacher/GE JMS416vB82 | 1,573 | 11,704 | 9.88 | 2 | 24 | 0.3 | 0.12 | 0.12 | 0.00301 | 0.118 | 0.118 | 54,193 | 1.27 | 0.17 | 18.36 |

Fuel heating value = 844 Btu/scf Based on Mustang estimate of 86.5% biogas at 587 Btu/scf and 13.5% propane at 2,488 Btu/scf
Fuel sulfur = 40 ppmv Based on Mustang estimate of 86.5% biogas at 20 ppmv and 13.5% propane at 168.1 ppmv
Fuel CO2 factor = 54,193 g/MMBtu Based on Mustang estimate of 86.5% biogas at and 13.5% propane[e]
Fuel CH4 factor = 1.27 g/MMBtu Based on Mustang estimate of 86.5% biogas at and 13.5% propane[f]
Fuel N2O factor = 0.17 g/MMBtu Based on Mustang estimate of 86.5% biogas at and 13.5% propane[f]
Fuel pass-through $CO_2$ fraction = 0.355 Based on Mustang estimate of 86.5% biogas at 0.41 and 13.5% propane at 0

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x $10^6$ [Btu/MMBtu] / Fuel heating value [Btu/scf]
[b] Control system vendor specifications
[c] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb
[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr based on firing biogas and natural gas. Assumed similar for firing biogas and propane. Filterable PM10 and PM2.5 assumed equal to filterable PM.
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engibes from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2
is 9.91 x $10^{-3}$ lb/MMBtu = 9.91 x $10^{-3}$ lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.0118 g/bhp-hr.
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.
Propane based on Liquefied Petroleum Gases (LPG) fuel type.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98. Biogas assumed same as natural gas because heat content is primarily from methane. Propane based on Petroleum fuel type.
[g] "Pass-through" $CO_2$ emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole $CO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

**Normal Operation, One Engine Operating and One Engine Down**

| Type | Engine Rating (hp) | Fuel Input @ Full Load (scfh)[a] | Heat Input @ Full Load (MMBtu/hr) | Number Engines | Daily Op. (hr/day) | Emission Factors (normal operation) CO (g/bhp-hr)[b] | ROC (g/bhp-hr)[b] | NOx (g/bhp-hr)[b] | SOx (g/scf)[c] | PM10 (g/bhp-hr)[d] | PM2.5 (g/bhp-hr)[d] | Combust. $CO_2$ (g/MMBtu)[e] | $CH_4$ (g/MMBtu)[f] | $N_2O$ (g/MMBtu)[f] | Pass-through $CO_2$ (g/scf)[g] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jenbacher/GE JMS416vB82 | 1,573 | 16,828 | 9.88 | 1 | 24 | 0.3 | 0.12 | 0.12 | 0.00151 | 0.118 | 0.118 | 53,020 | 1.0 | 0.10 | 21.23 |

Fuel heating value = 587 Btu/scf Based on Mustang estimate for 100% biogas
Fuel sulfur = 20 ppmv Based on Mustang estimate for 100% biogas
Fuel $CO_2$ fraction = 0.410 Based on Mustang estimate for 100% biogas

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x $10^6$ [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Control system vendor specifications
[c] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb
[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr. Filterable PM10 and PM2.5 assumed equal to filterable PM
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engibes from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2
is 9.91 x $10^{-3}$ lb/MMBtu = 9.91 x $10^{-3}$ lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.0118 g/bhp-hr.
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from fuel.
[g] "Pass-through" $CO_2$ emission factor [g/scf] = Fuel CO2 volume fraction [unitless] x 44 [lb/lb-mole $CO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

**Table 8b** **CHP Engine Emissions with biogas/propane**

**Start-up**

| Fuel Input @ Full Load (scfh)[a] | Heat Input @ Full Load (MMBtu/ hr) | Emission Factors (start-up) CO (g/bhp-hr)[b] | ROC (g/bhp-hr)[b] | NOx (g/bhp-hr)[b] | SOx (g/scf)[d] | PM10 (g/bhp-hr)[c] | PM2.5 (g/bhp-hr)[c] | Combust. $CO_2$ (g/MMBtu)[e] | $CH_4$ (g/MMBtu)[f] | $N_2O$ (g/MMBtu)[f] | Pass-through $CO_2$ (g/scf)[g] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3,970 | 9.88 | 3 | 0.86 | 0.6 | 0.01266 | 0.11800 | 0.11800 | 61,710 | 3.0 | 0.60 | 0.00 |

Fuel heating value = 2,488 Btu/scf Based on 100% propane
Fuel sulfur = 168.1 ppmv Based on 100% propane at 123 ppmw
Fuel $CO_2$ fraction = 0 Based on 100% propane

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x $10^6$ [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Engine vendor specification for natural gas fuel, assumed same for propane fuel except double for uncontrolled ROC.
[c] Same as during normal operation
[d] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98. Propane based on Liquefied Petroleum Gases (LPG) fuel type.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98. Propane based on Petroleum fuel type.
[g] "Pass-through" $CO_2$ not expected with 100% propane/LPG fuel

**Catalyst Burn-in**

| Fuel Input @ Full Load (scfh)[a] | Heat Input @ Full Load (MMBtu/ hr) | Emission Factors (SCR catalyst burn-in) CO (g/bhp-hr)[b] | ROC (g/bhp-hr)[b] | NOx (g/bhp-hr)[c] | SOx (g/scf)[d] | PM10 (g/bhp-hr)[b] | PM2.5 (g/bhp-hr)[b] | Combust. $CO_2$ (g/MMBtu)[e] | $CH_4$ (g/MMBtu)[f] | $N_2O$ (g/MMBtu)[f] | Pass-through $CO_2$ (g/scf)[g] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3,970 | 9.88 | 0.3 | 0.12 | 0.36 | 0.01266 | 0.11800 | 0.11800 | 61,710 | 3.0 | 0.60 | 0.00 |

Fuel heating value = 2,488 Btu/scf Based on 100% propane
Fuel sulfur = 168.1 ppmv Based on 100% propane at 123 ppmw
Fuel $CO_2$ fraction = 0 Based on 100% propane

[a] Fuel input at full load [scfh] = Heat input at full load [MMBtu/hr] x $10^6$ [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Same as during normal operation
[c] Based on average of 50 percent of normal NOx control efficiency
[d] SOx emission factor [g/scf] = Fuel sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98. Propane based on Liquefied Petroleum Gases (LPG) fuel type.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98. Propane based on Petroleum fuel type.
[g] "Pass-through" $CO_2$ not expected with 100% propane/LPG fuel

**Hourly Emissions per Engine, Normal Operation, Both Engines Operating (lb/hr)[a]**

| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 1.04 | 0.42 | 0.42 | 0.08 | 0.41 | 0.41 | 1.18E+03 | 2.77E-02 | 3.65E-03 | 4.74E+02 |

[a] Except for SOx, $CO_2$, $CH_4$ and $N_2O$, Hourly emissions [lb/hr] = Engine rating [hp] x Emission factor [g/bhp-hr] / 453.6 [g/lb]
SOx and pass-though $CO_2$ hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]
Combustion $CO_2$, $CH_4$ and $N_2O$ hourly emisisons [lb/hr] = Heat input [MMBtu/hr] x Emission factor [g/MMBtu] / 453.6 [g/lb]

**Hourly Emissions per Engine, Normal Operation, One Engine Operating and One Engine Down (lb/hr)[a]**

| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 1.04 | 0.42 | 0.42 | 0.06 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 7.87E+02 |

[a] Except for SOx, $CO_2$, $CH_4$ and $N_2O$, Hourly emissions [lb/hr] = Engine rating [hp] x Emission factor [g/bhp-hr] / 453.6 [g/lb]
SOx and pass-though $CO_2$ hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]
Combustion $CO_2$, $CH_4$ and $N_2O$ hourly emisisons [lb/hr] = Heat input [MMBtu/hr] x Emission factor [g/MMBtu] / 453.6 [g/lb]

**Table 8b** **CHP Engine Emissions with biogas/propane**

| Hourly Emissions per Engine, Start-Up (lb/hr)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 5.72 | 1.70 | 1.25 | 0.15 | 0.41 | 0.41 | 1.18E+03 | 2.77E-02 | 3.65E-03 | 2.37E+02 |

[a] Start-up is 30 minutes with no CO, ROC or NOx control by SCR/catalyst system. Emissions are for one-hour period that includes 30-minute start-up

| Hourly Emissions per Engine, SCR Catalyst Burn-In (lb/hr)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 1.04 | 0.42 | 1.25 | 0.11 | 0.41 | 0.41 | 1.18E+03 | 2.77E-02 | 3.65E-03 | 0.00E+00 |

| Daily Emissions, both Engines Normal Operation (lb/day)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 49.94 | 19.97 | 19.97 | 3.73 | 19.64 | 19.64 | 5.66E+04 | 1.33E+00 | 1.75E-01 | 2.27E+04 |

[a] Daily emissions [lb/day] = Number engines x Daily operating time [hr/day] x Hourly emissions [lb/hr]

| Daily Emissions, One Engine Normal Operation (lb/day)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 24.97 | 9.99 | 9.99 | 1.34 | 9.82 | 9.82 | 2.77E+04 | 5.23E-01 | 5.23E-02 | 1.89E+04 |

[a] Daily emissions [lb/day] = Number engines x Daily operating time [hr/day] x Hourly emissions [lb/hr]

| Daily Emissions, both Engines Normal Operation plus one Start-up for One Engine (lb/day)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 54.62 | 21.26 | 20.81 | 3.80 | 19.64 | 19.64 | 5.66E+04 | 1.33E+00 | 1.75E-01 | 2.25E+04 |

| Annual Op. (hr/year-engine) | | Annual Emissions, both Engines (lb/year)[c] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| Start-Up[a] | 18 | 205.99 | 61.17 | 44.94 | 5.39 | 14.73 | 14.73 | 4.25E+04 | 9.96E-01 | 1.31E-01 | 8.53E+03 |
| SCR Catalyst Burn-In[a] | 120 | 249.68 | 99.87 | 299.62 | 26.59 | 98.21 | 98.21 | 2.83E+05 | 6.64E+00 | 8.75E-01 | 0.00E+00 |
| Normal Operation, Both Eng.[b] | 7,746 | 16,117.01 | 6,446.80 | 6,446.80 | 1,203.87 | 6,339.36 | 6,339.36 | 1.83E+07 | 4.28E+02 | 5.65E+01 | 7.34E+06 |
| Normal Operation, One Eng.[b] | 438 | 911.34 | 364.54 | 364.54 | 48.95 | 358.46 | 358.46 | 1.01E+06 | 1.91E+01 | 1.91E+00 | 6.90E+05 |
| Total | **8,322** | **17,484.02** | **6,972.38** | **7,155.90** | **1,284.79** | **6,810.76** | **6,810.76** | **1.96E+07** | **4.55E+02** | **5.94E+01** | **8.04E+06** |

[a] Mustang estimate

[b] Based on each engine operating 95% of the time, excluding start-up hours and SCR catalyst burn-in, with 5% downtime for maintenance or other reasons.

[c] Annual emissions [lb/year] = Operating time [hr/year-engine] x Hourly emissions at full load [lb/hr-engine] x Number engines

**Table 8c** **CHP Engine Emissions**

| | Hourly Emissions per Engine, Normal Operation, Both Engines Operating (lb/hr)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| Operating with biogas/natural gas | 1.04 | 0.42 | 0.42 | 0.04 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 6.17E+02 |
| Operating with biogas/propane | 1.04 | 0.42 | 0.42 | 0.08 | 0.41 | 0.41 | 1.18E+03 | 2.77E-02 | 3.65E-03 | 4.74E+02 |
| **Maximum case for Normal Op. lb/hr** | **1.04** | **0.42** | **0.42** | **0.08** | **0.41** | **0.41** | **1.18E+03** | **2.77E-02** | **3.65E-03** | **6.17E+02** |

| | Hourly Emissions per Engine, Normal Operation, One Engine Operating and One Engine Down (lb/hr)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| | 1.04 | 0.42 | 0.42 | 0.06 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 7.87E+02 |
| | 1.04 | 0.42 | 0.42 | 0.06 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 7.87E+02 |
| **Max. case for Normal Op. 1 engine lb/hr** | **1.04** | **0.42** | **0.42** | **0.06** | **0.41** | **0.41** | **1.15E+03** | **2.18E-02** | **2.18E-03** | **7.87E+02** |

| | Hourly Emissions per Engine, Start-Up (lb/hr)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| | 5.72 | 0.95 | 1.25 | 0.03 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 3.25E+02 |
| | 5.72 | 1.70 | 1.25 | 0.15 | 0.41 | 0.41 | 1.18E+03 | 2.77E-02 | 3.65E-03 | 2.37E+02 |
| **Maximum case for engine startup lb/hr** | **5.72** | **1.70** | **1.25** | **0.15** | **0.41** | **0.41** | **1.18E+03** | **2.77E-02** | **3.65E-03** | **3.25E+02** |

[a] Start-up is 30 minutes with no CO, ROC or NOx control by SCR/catalyst system. Emissions are for one-hour period that includes 30-minute start-up

| | Hourly Emissions per Engine, SCR Catalyst Burn-In (lb/hr)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| | 1.04 | 0.42 | 1.25 | 0.01 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 1.62E+01 |
| | 1.04 | 0.42 | 1.25 | 0.11 | 0.41 | 0.41 | 1.18E+03 | 2.77E-02 | 3.65E-03 | 0.00E+00 |
| **Maximum case for SCR burn-in lb/hr** | **1.04** | **0.42** | **1.25** | **0.11** | **0.41** | **0.41** | **1.18E+03** | **2.77E-02** | **3.65E-03** | **1.62E+01** |

| | Daily Emissions, both Engines Normal Operation (lb/day)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| | 49.94 | 19.97 | 19.97 | 2.16 | 19.64 | 19.64 | 5.54E+04 | 1.05E+00 | 1.05E-01 | 2.96E+04 |
| | 49.94 | 19.97 | 19.97 | 3.73 | 19.64 | 19.64 | 5.66E+04 | 1.33E+00 | 1.75E-01 | 2.27E+04 |
| **Max. case for Normal Op. 2 eng. lb/day** | **49.94** | **19.97** | **19.97** | **3.73** | **19.64** | **19.64** | **5.66E+04** | **1.33E+00** | **1.75E-01** | **2.96E+04** |

**Table 8c** **CHP Engine Emissions**

| | Daily Emissions, One Engine Normal Operation (lb/day)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| | 24.97 | 9.99 | 9.99 | 1.34 | 9.82 | 9.82 | 2.77E+04 | 5.23E-01 | 5.23E-02 | 1.89E+04 |
| | 24.97 | 9.99 | 9.99 | 1.34 | 9.82 | 9.82 | 2.77E+04 | 5.23E-01 | 5.23E-02 | 1.89E+04 |
| **Max. case for Normal Op. 1 eng. lb/day** | **24.97** | **9.99** | **9.99** | **1.34** | **9.82** | **9.82** | **2.77E+04** | **5.23E-01** | **5.23E-02** | **1.89E+04** |

| | Daily Emissions, both Engines Normal Operation plus one Start-up for One Engine (lb/day)[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| | 54.62 | 20.51 | 20.81 | 2.14 | 19.64 | 19.64 | 5.54E+04 | 1.05E+00 | 1.05E-01 | 2.93E+04 |
| | 54.62 | 21.26 | 20.81 | 3.80 | 19.64 | 19.64 | 5.66E+04 | 1.33E+00 | 1.75E-01 | 2.25E+04 |
| **Maximum case for Normal Op. + 1 SU** | **54.62** | **21.26** | **20.81** | **3.80** | **19.64** | **19.64** | **5.66E+04** | **1.33E+00** | **1.75E-01** | **2.93E+04** |

| Annual Op. (hr/year-engine) | | Annual Emissions, both Engines (lb/year)[c] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| Start-Up[a] | 18 | 205.99 | 61.17 | 44.94 | 5.39 | 14.73 | 14.73 | 42,485.71 | 1.00 | 0.13 | 11,687.69 |
| SCR Catalyst Burn-In[a] | 120 | 249.68 | 99.87 | 299.62 | 26.59 | 98.21 | 98.21 | 2.83E+05 | 6.64E+00 | 8.75E-01 | 3.89E+03 |
| Normal Operation, Both Eng.[b] | 7,746 | 16,117.01 | 6,446.80 | 6,446.80 | 1,203.87 | 6,339.36 | 6,339.36 | 1.83E+07 | 4.28E+02 | 5.65E+01 | 9.56E+06 |
| Normal Operation, One Eng.[b] | 438 | 911.34 | 364.54 | 364.54 | 48.95 | 358.46 | 358.46 | 1.01E+06 | 1.91E+01 | 1.91E+00 | 6.90E+05 |
| Total | **8,322** | **17,484.02** | **6,972.38** | **7,155.90** | **1,284.79** | **6,810.76** | **6,810.76** | **1.96E+07** | **4.55E+02** | **5.94E+01** | **1.03E+07** |

[a] Mustang estimate

[b] Based on each engine operating 95% of the time, excluding start-up hours and SCR catalyst burn-in, with 5% downtime for maintenance or other reasons.

[c] Annual emissions [lb/year] = Operating time [hr/year-engine] x Hourly emissions at full load [lb/hr-engine] x Number engines based on maximum emissions by opeartional case

**Table 9** **Flare Emissions**

| Type | Heat Input (MMBtu/hr)[a] | Biogas Flow Rate (scfh)[a] | Daily Op. (hr/day) | Emission Factors: CO (lb/MMBtu)[b] | ROC (lb/MMBtu)[c] | NOx (lb/MMBtu)[b] | SOx (g/scf)[d] | PM10 (lb/MMBtu)[b] | PM2.5 (lb/MMBtu)[b] | Combust. $CO_2$ (g/MMBtu)[e] | $CH_4$ (g/MMBtu)[f] | $N_2O$ (g/MMBtu)[f] | Pass-through $CO_2$ (g/scf)[g] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| John Zink ZTOF | 1.23 | 1,894 | 1 | 0.2 | 0.0027 | 0.08 | 0.01506 | 0.042 | 0.042 | 53,020 | 3.2 | 0.63 | 21.23 |

Biogas sulfur = 200 ppmv

Biogas $CO_2$ fraction = 0.41 Conservative estimate

[a] Heat input assumed to be 1/16 of heat input to two CHP engines when purging one digester. Biogas flow rate assumed to be 1/16 of biogas to two CHP engines.

[b] Manufacturer's specifications

[c] From SBCAPCD Rule 359

[d] SOx emission factor [g/scf] = Biogas sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.

[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.

[g] "Pass-through" $CO_2$ emission factor [g/scf] = Biogas $CO_2$ volume fraction [unitless] x 44 [lb/lb-mole $CO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

| Heat Input (MMBtu/hr)[a] | Biogas Flow Rate (scfh)[a] | Digester Purging Hourly Emissions[b]: CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.23 | 1,894 | 0.25 | 0.00 | 0.10 | 0.06 | 0.05 | 0.05 | 144.33 | 0.01 | 0.00 | 88.62 |

[a] Heat input assumed to be 1/16 of heat input to two CHP engines when purging one digester. Biogas flow rate assumed to be 1/16 of biogas to two CHP engines.

[b] Except for SOx and pass-through $CO_2$, Hourly emissions [lb/hr] = Heat input [MMBtu/hr] x Emission factor [lb/MMBtu]

SOx and pass-through $CO_2$ hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]

| Daily Op. (hr/day) | Digester Purging Daily Emissions[a]: CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.25 | 0.00 | 0.10 | 0.06 | 0.05 | 0.05 | 144.33 | 0.01 | 0.00 | 88.62 |

[a] Daily emissions [lb/day] = Daily operating time [hr/day] x Hourly emissions [lb/hr]

| Annual Op. (hr/year) | Digester Purging Annual Emissions[a]: CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 278 | 68.65 | 0.93 | 27.46 | 17.48 | 14.42 | 14.42 | 40,122.73 | 2.42 | 0.48 | 24,637.03 |

[a] Annual emissions [lb/year] = Annual op. [hr/year] x Hourly emissions [lb/hr]

**Table 9** **Flare Emissions**

| Heat Input (MMBtu/hr)[a] | Flow Rate (scfh)[a] | Hourly Flaring Emissions for One Engine Off-Line[b] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 9.88 | 15,150 | 1.98 | 0.03 | 0.79 | 0.50 | 0.41 | 0.41 | 1,154.61 | 0.07 | 0.01 | 708.98 |

[a] Heat input assumed to be heat input to two CHP engines. Flow rate assumed to be biogas flow rate to two CHP engines.

[b] Except for SOx and pass-through $CO_2$, Hourly emissions [lb/hr] = Heat input [MMBtu/hr] x Emission factor [lb/MMBtu]

SOx and pass-through $CO_2$ hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]

| Daily Op. (hr/day) | Daily Flaring Emissions for One Engine Off-Line[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 24 | 47.41 | 0.64 | 18.97 | 12.07 | 9.96 | 9.96 | 27,710.66 | 1.67 | 0.33 | 17,015.50 |

[a] Daily emissions [lb/day] = Daily operating time [hr/day] x Hourly emissions [lb/hr]

| Annual Op. (hr/year) | Annual Flaring Emissions for Engines Off-Line[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 876 | 1,730.63 | 23.36 | 692.25 | 440.67 | 363.43 | 363.43 | 1,011,439.26 | 61.04 | 12.02 | 621,065.90 |

[a] Annual operating hours assumes each engine is off-line 5% of the time during a year (438 hrs/engine)

[b] Annual emissions [lb/year] = Annual op. [hr/year] x Hourly emissions [lb/hr]

**Table 10 - Revised for smaller backup generator** **Emergency Generator Testing Emissions**

| Equipment | Horsepower | Hours/Day | Fuel Use (gal/hr) | Emission Factors (g/bhp-hr)[a] CO | ROC | NOx | PM10[b] | PM2.5[b] | Emission Factors (g/gal) $CO_2$[c] | $CH_4$[d] | $N_2O$[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Caterpillar D 150-8 150 ekW | 239 | 0.5 | 11.3 | 2.6 | 0.14 | 0.5 | 0.02 | 0.02 | 10,210 | 0.41 | 0.083 |

[a] Emission factors are Tier 4 emission standards. 11.1% of prior 1,400 ekW generator

[b] PM10 and PM2.5 assumed to be same as PM emission standards.

[c] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.

[d] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.

| Equipment | Load Factor | Emission Rates (lb/hr) CO[a] | ROC[a] | NOx[a] | SOx[b] | PM10[a] | PM2.5[a] | $CO_2$[c] | $CH_4$[c] | $N_2O$[c] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Caterpillar D 150-8 150 ekW | 1 | 1.37 | 0.07 | 0.26 | 0.002 | 0.01 | 0.01 | 254.35 | 0.01 | 0.00 | |
| Diesel Fuel Density = | 6.943 | 10.7% | 10.7% | 10.7% | 11.1% | 10.7% | 10.7% | 11.1% | 11.1% | 11.1% | of prior 1,400 ekW generator |
| Diesel Fuel Sulfur = | 15 | ppmw | | | | | | | | | |

[a] Emission Rate [lb/hr] = Emission Factor [g/bhp-hr] x Engine Horsepower [hp] x Load Factor [unitless] / 453.6 [g/lb]

[b] Emission Rate [lb/hr] = Fuel Use [gal/hr] x Fuel Density [lb/gal] x Fuel Sulfur [ppmw] x $10^{6}$ x 2 [lb $SO_2$/lb S]

[c] Emission Rate [lb/hr] = Emission Factor [g/gal] x Fuel Use [gal/hr] / 453.6 [g/lb]

| Equipment | Daily Emissions (lb/day)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| Caterpillar D 150-8 150 ekW | 0.69 | 0.04 | 0.13 | 0.00 | 0.01 | 0.01 | 127.17 | 0.01 | 0.00 | |
| | 10.7% | 10.7% | 10.7% | 11.1% | 10.7% | 10.7% | 11.1% | 11.1% | 11.1% | of prior 1,400 ekW generator |

[a] Daily Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Operating Time [hr/day]

| Equipment | Annual Op. (hr/year) | Annual Emissions (lb/year)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Caterpillar D 150-8 150 ekW | 50 | 68.63 | 3.70 | 13.20 | 0.12 | 0.53 | 0.53 | 12,717.48 | 0.51 | 0.10 | |
| | | 20.6% | 20.6% | 20.6% | 21.4% | 20.6% | 20.6% | 21.4% | 21.4% | 21.4% | of prior 1,400 ekW generator |

[a] Annual Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Operating Time [hr/year]

| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
|---|---|---|---|---|---|---|
| ST (g/s) | 1.7295E-01 | 9.3127E-03 | 3.3259E-02 | 2.9656E-04 | 1.3304E-03 | 1.3304E-03 |
| Ann (g/s) | | | 1.8983E-04 | 1.6927E-06 | 7.5933E-06 | 7.5933E-06 |

**Table 11a** **Materials Recovery Facility and Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions**



# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | MRF/AD Tank |
| City: | Santa Barbara |
| State: | California |
| Company: | Mustang |
| Type of Tank: | Horizontal Tank |
| Description: | Diesel Storage tank for MRF & AD equipment. |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 27.00 |
| Diameter (ft): | 8.00 |
| Volume (gallons): | 10,000.00 |
| Turnovers: | 24.00 |
| Net Throughput(gal/yr): | 240,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Santa Barbara, California (Avg Atmospheric Pressure = 14.65 psia)

**Table 11a Materials Recovery Facility and Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions**



## TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**MRF/AD Tank - Horizontal Tank**
**Santa Barbara, California**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diesel | All | 61.28 | 55.71 | 66.86 | 59.13 | 0.0068 | 0.0056 | 0.0082 | 130.0000 | | | 188.00 | Option 1: VP60 = .0065 VP70 = .009 |
| 1,2,4-Trimethylbenzene | | | | | | 0.0215 | 0.0172 | 0.0268 | 120.1900 | 0.0100 | 0.0456 | 120.19 | Option 2: A=7.04383, B=1573.267, C=208.56 |
| Benzene | | | | | | 1.2100 | 1.0356 | 1.4082 | 78.1100 | 0.0000 | 0.0021 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Ethylbenzene | | | | | | 0.1135 | 0.0933 | 0.1372 | 106.1700 | 0.0001 | 0.0031 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Hexane (-n) | | | | | | 1.9782 | 1.7095 | 2.2807 | 86.1700 | 0.0000 | 0.0004 | 86.17 | Option 2: A=6.876, B=1171.17, C=224.41 |
| Toluene | | | | | | 0.3436 | 0.2885 | 0.4073 | 92.1300 | 0.0003 | 0.0233 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Unidentified Components | | | | | | 0.0058 | 0.0053 | 0.0056 | 134.4372 | 0.9866 | 0.8674 | 189.60 | |
| Xylene (-m) | | | | | | 0.0945 | 0.0776 | 0.1146 | 106.1700 | 0.0029 | 0.0581 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

## TANKS 4.0.9d
## Emissions Report - Detail Format
## Detail Calculations (AP-42)

### MRF/AD Tank - Horizontal Tank
### Santa Barbara, California

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 1.9420 |
| Vapor Space Volume (cu ft): | 864.4382 |
| Vapor Density (lb/cu ft): | 0.0002 |
| Vapor Space Expansion Factor: | 0.0389 |
| Vented Vapor Saturation Factor: | 0.9986 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 864.4382 |
| Tank Diameter (ft): | 8.0000 |
| Effective Diameter (ft): | 16.5879 |
| Vapor Space Outage (ft): | 4.0000 |
| Tank Shell Length (ft): | 27.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0002 |
| Vapor Molecular Weight (lb/lb-mole): | 130.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0068 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 520.9532 |
| Daily Average Ambient Temp. (deg. F): | 59.1125 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 518.8025 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,608.0000 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0389 |
| Daily Vapor Temperature Range (deg. R): | 22.2881 |
| Daily Vapor Pressure Range (psia): | 0.0026 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0068 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.0056 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.0082 |
| Daily Avg. Liquid Surface Temp. (deg R): | 520.9532 |
| Daily Min. Liquid Surface Temp. (deg R): | 515.3812 |
| Daily Max. Liquid Surface Temp. (deg R): | 526.5253 |
| Daily Ambient Temp. Range (deg. R): | 20.3250 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9986 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.0068 |
| Vapor Space Outage (ft): | 4.0000 |
| Working Losses (lb): | 5.0669 |
| Vapor Molecular Weight (lb/lb-mole): | 130.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0068 |
| Annual Net Throughput (gal/yr.): | 240,000.0000 |
| Annual Turnovers: | 24.0000 |
| Turnover Factor: | 1.0000 |
| Tank Diameter (ft): | 8.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 7.0089 |

**Table 11a** **Materials Recovery Facility and Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions**



**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

## Emissions Report for: Annual

**MRF/AD Tank - Horizontal Tank**
**Santa Barbara, California**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Diesel | 5.07 | 1.94 | 7.01 |
| Benzene | 0.01 | 0.00 | 0.01 |
| Toluene | 0.12 | 0.05 | 0.16 |
| Ethylbenzene | 0.02 | 0.01 | 0.02 |
| Xylene (-m) | 0.29 | 0.11 | 0.41 |
| 1,2,4-Trimethylbenzene | 0.23 | 0.09 | 0.32 |
| Unidentified Components | 4.39 | 1.68 | 6.08 |
| Hexane (-n) | 0.00 | 0.00 | 0.00 |

**Table 11b** **Emergency Generator Diesel Fuel Storage Tank Emissions**



## TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

| | |
|---|---|
| **Identification** | |
| User Identification: | Emergency Generator Tank |
| City: | |
| State: | California |
| Company: | |
| Type of Tank: | Horizontal Tank |
| Description: | Diesel tank in skid for emergency generator |
| **Tank Dimensions** | |
| Shell Length (ft): | 13.00 |
| Diameter (ft): | 3.00 |
| Volume (gallons): | 402.00 |
| Turnovers: | 2.50 |
| Net Throughput(gal/yr): | 1,005.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |
| **Paint Characteristics** | |
| Shell Color/Shade: | Gray/Medium |
| Shell Condition | Good |
| **Breather Vent Settings** | |
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Santa Barbara, California (Avg Atmospheric Pressure = 14.65 psia)

## TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

### Emergency Generator Tank - Horizontal Tank

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Distillate fuel oil no. 2 | All | 69.48 | 58.16 | 80.79 | 62.19 | 0.0089 | 0.0061 | 0.0123 | 130.0000 | | | 188.00 | Option 1: VP60 = .0065 VP70 = .009 |

**Table 11b** **Emergency Generator Diesel Fuel Storage Tank Emissions**



## Emergency Generator Tank - Horizontal Tank

| Annual Emission Calcaulations | |
|---|---|
| Standing Losses (lb): | 0.3547 |
| Vapor Space Volume (cu ft): | 58.5297 |
| Vapor Density (lb/cu ft): | 0.0002 |
| Vapor Space Expansion Factor: | 0.0818 |
| Vented Vapor Saturation Factor: | 0.9993 |
| | |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 58.5297 |
| Tank Diameter (ft): | 3.0000 |
| Effective Diameter (ft): | 7.0485 |
| Vapor Space Outage (ft): | 1.5000 |
| Tank Shell Length (ft): | 13.0000 |
| | |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0002 |
| Vapor Molecular Weight (lb/lb-mole): | 130.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0089 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 529.1455 |
| Daily Average Ambient Temp. (deg. F): | 59.1125 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 521.8625 |
| Tank Paint Solar Absorptance (Shell): | 0.6800 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,608.0000 |
| | |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0818 |
| Daily Vapor Temperature Range (deg. R): | 45.2503 |
| Daily Vapor Pressure Range (psia): | 0.0062 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0089 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.0061 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.0123 |
| Daily Avg. Liquid Surface Temp. (deg R): | 529.1455 |
| Daily Min. Liquid Surface Temp. (deg R): | 517.8329 |
| Daily Max. Liquid Surface Temp. (deg R): | 540.4581 |
| Daily Ambient Temp. Range (deg. R): | 20.3250 |
| | |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9993 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.0089 |
| Vapor Space Outage (ft): | 1.5000 |
| | |
| Working Losses (lb): | 0.0276 |
| Vapor Molecular Weight (lb/lb-mole): | 130.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0089 |
| Annual Net Throughput (gal/yr.): | 1,005.0000 |
| Annual Turnovers: | 2.5000 |
| Turnover Factor: | 1.0000 |
| Tank Diameter (ft): | 3.0000 |
| Working Loss Product Factor: | 1.0000 |
| | |
| Total Losses (lb): | 0.3823 |

**Table 11b** **Emergency Generator Diesel Fuel Storage Tank Emissions**



# TANKS 4.0.9d
# Emissions Report - Detail Format
# Individual Tank Emission Totals

## Emissions Report for: Annual

### Emergency Generator Tank - Horizontal Tank

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Distillate fuel oil no. 2 | 0.03 | 0.35 | 0.38 |


# TANKS 4.0.9d
# Emissions Report - Detail Format
# Individual Tank Emission Totals

## Emissions Report for: Annual

### Emergency Generator Tank - Horizontal Tank


| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Hexane (-n) | 0.00 | 0.00 | 0.00 |
| Benzene | 0.00 | 0.00 | 0.00 |
| Toluene | 0.00 | 0.01 | 0.01 |
| Ethylbenzene | 0.00 | 0.00 | 0.00 |
| Distillate fuel oil no. 2 | 0.03 | 0.35 | 0.38 |
| Xylene (-m) | 0.00 | 0.02 | 0.02 |
| 1,2,4-Trimethylbenzene | 0.00 | 0.02 | 0.02 |
| Unidentified Components | 0.02 | 0.31 | 0.33 |

**Table 12** **Equipment Exhaust Emissions**

| Equipment | Horsepower | Number | Hours/Day | Fuel Use (gal/hr) | Emission Stds. | Emission Factors (g/bhp-hr)[a] | | | | | Emission Factor [g/gal] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | CO | ROC[b] | NOx[b] | PM10[c] | PM2.5[c] | $CO_2$[d] | $CH_4$[e] | $N_2O$[e] |
| **Materials Recovery Facility Building** | | | | | | | | | | | | | |
| Caterpillar M322D Material Handler | 173 | 1 | 16 | 2.7 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| **CAT 980 M Loader** | 386 | 2 | 16 | 3.5 | Tier 4 | 2.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| **CAT 938 K Loader** | 169 | 1 | 16 | 2.7 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| **CAT 2P-6000 Forklift** | 61 | 3 | 16 | 1.5 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |
| Tennant 800 Sweeper | 65 | 1 | 24 | 4 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |
| **Anaerobic Digestion Facility Building** | | | | | | | | | | | | | |
| **CAT 938 M Loader** | 169 | 2 | 8 | 3.5 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| **Outside MRF and AD Facility Buildings** | | | | | | | | | | | | | |
| **Tennant M30 Scrubber-Sweeper** | 41 | 1 | 6 | 4 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |
| **Composting Area** | | | | | | | | | | | | | |
| **CAT 938 K Loader** | 169 | 1 | 8 | 2.7 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Vermeer CT1010 TX Windrow Turner | 215 | 1 | 8 | 12 | Tier 4 | 2.6 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |

[a] Emission factors assumed the same as emission standards.

[b] Where standard is for NMHC+NOx (Volvo L20F, Toyota forklifts and Tennant sweeper), emissions assumed to be 5 percent ROC and 95 percent NOx, from Table D-25 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[c] PM10 and PM2.5 assumed to be same as PM emission standards.

[d] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.

[e] $CH_4$ and $N_2O$ from Table 13.7 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

| Equipment | Load Factor[c] | Emission Rates Each Unit (lb/hr) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO[a] | ROC[a] | NOx[a] | SOx[b] | PM10[a, d] | PM2.5[a, d] | $CO_2$[e] | $CH_4$[e] | $N_2O$[e] |
| **Materials Recovery Facility Building** | | | | | | | | | | |
| Caterpillar M322D Material Handler | 0.3618 | 0.511 | 0.019 | 0.041 | 0.00056 | 2.07E-06 | 2.07E-06 | 60.77 | 3.45E-03 | 1.55E-03 |
| CAT 980 M Loader | 0.3618 | 0.831 | 0.043 | 0.092 | 0.00073 | 4.62E-06 | 4.62E-06 | 78.78 | 4.48E-03 | 2.01E-03 |
| CAT 938 K Loader | 0.3618 | 0.499 | 0.019 | 0.040 | 0.00056 | 2.02E-06 | 2.02E-06 | 60.77 | 3.45E-03 | 1.55E-03 |
| CAT 2P-6000 Forklift | 0.201 | 0.100 | 0.005 | 0.090 | 0.00031 | 5.41E-07 | 5.41E-07 | 33.76 | 1.92E-03 | 8.60E-04 |
| Tennant 800 Sweeper | 0.4556 | 0.242 | 0.011 | 0.217 | 0.00083 | 1.31E-06 | 1.31E-06 | 90.04 | 5.11E-03 | 2.29E-03 |
| **Anaerobic Digestion Facility Building** | | | | | | | | | | |
| CAT 938 M Loader | 0.3618 | 0.499 | 0.019 | 0.040 | 0.00073 | 2.02E-06 | 2.02E-06 | 78.78 | 4.48E-03 | 2.01E-03 |
| **Outside MRF and AD Facility Buildings** | | | | | | | | | | |
| Tennant M30 Scrubber-Sweeper | 0.4556 | 0.152 | 0.007 | 0.137 | 0.00083 | 8.24E-04 | 8.24E-04 | 90.04 | 5.11E-03 | 2.29E-03 |
| **Composting Area** | | | | | | | | | | |
| CAT 938 K Loader | 0.3618 | 0.499 | 0.019 | 0.040 | 0.00056 | 2.02E-06 | 2.02E-06 | 60.77 | 3.45E-03 | 1.55E-03 |
| Vermeer CT820 Windrow Turner | 0.3953 | 0.487 | 0.026 | 0.056 | 0.00250 | 0.00281 | 0.00281 | 270.11 | 1.53E-02 | 6.88E-03 |

Diesel Fuel Density = 6.943 lb/gal

Diesel Fuel Sulfur = 15 ppmw

[a] Emission Rate [lb/hr] = Emission Factor [g/bhp-hr] x Engine Horsepower [hp] x Load Factor [unitless] / 453.6 [g/lb]

[b] Emission Rate [lb/hr] = Fuel Use [gal/hr] x Fuel Density [lb/gal] x Fuel Sulfur [ppmw] x $10^{-6}$ x 2 [lb $SO_2$/lb S]

[c] From OFFROAD 2011 model

[d] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

[e] Emission rate [lb/hr] = Fuel use [gal/hr] x Emission factor [g/gal] / 453.6 [lb/gal]

**Table 12** **Equipment Exhaust Emissions**

| Equipment | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| **Materials Recovery Facility Building** | | | | | | | | | |
| Caterpillar M322D Material Handler | 8.17 | 0.31 | 0.66 | 0.01 | 3.31E-05 | 3.31E-05 | 972.38 | 0.06 | 0.02 |
| CAT 980 M Loader | 26.60 | 1.38 | 2.96 | 0.02 | 1.48E-04 | 1.48E-04 | 2,520.99 | 0.14 | 0.06 |
| CAT 938 K Loader | 7.98 | 0.30 | 0.65 | 0.01 | 3.24E-05 | 3.24E-05 | 972.38 | 0.06 | 0.02 |
| CAT 2P-6000 Forklift | 4.80 | 0.23 | 4.31 | 0.01 | 2.59E-05 | 2.59E-05 | 1,620.63 | 0.09 | 0.04 |
| Tennant 800 Sweeper | 5.80 | 0.27 | 5.21 | 0.02 | 3.13E-05 | 3.13E-05 | 2,160.85 | 0.12 | 0.06 |
| **Total** | **53.35** | **2.49** | **13.79** | **0.08** | **0.00** | **0.00** | **8,247.23** | **0.47** | **0.21** |
| **Anaerobic Digestion Facility Building** | | | | | | | | | |
| CAT 938 M Loader | 7.98 | 0.30 | 0.65 | 0.01 | 3.24E-05 | 3.24E-05 | 1,260.49 | 0.07 | 0.03 |
| **Total** | **7.98** | **0.30** | **0.65** | **0.01** | **0.00** | **0.00** | **1,260.49** | **0.07** | **0.03** |
| **Outside MRF and AD Facility Buildings** | | | | | | | | | |
| Tennant M30 Scrubber-Sweeper | 0.91 | 0.04 | 0.82 | 0.00 | 4.94E-03 | 4.94E-03 | 540.21 | 0.03 | 0.01 |
| **Total** | **0.91** | **0.04** | **0.82** | **0.00** | **0.00** | **0.00** | **540.21** | **0.03** | **0.01** |
| **Composting Area** | | | | | | | | | |
| CAT 938 K Loader | 3.99 | 0.15 | 0.32 | 0.00 | 0.00 | 0.00 | 486.19 | 0.03 | 0.01 |
| Vermeer CT820 Windrow Turner | 3.90 | 0.21 | 0.45 | 0.02 | 0.02 | 0.02 | 2,160.85 | 0.12 | 0.06 |
| **Total** | **7.89** | **0.36** | **0.77** | **0.02** | **0.02** | **0.02** | **2,647.04** | **0.15** | **0.07** |

[a] Daily Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Number Units x Operating Time [hr/day]

| Equipment | Days/Year | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| **Materials Recovery Facility Building** | | | | | | | | | | |
| Caterpillar M322D Material Handler | 311 | 2,540.53 | 96.13 | 205.99 | 2.80 | 0.01 | 0.01 | 3.02E+05 | 17.18 | 7.70 |
| CAT 980 M Loader | 311 | 8,272.88 | 428.96 | 919.21 | 7.26 | 0.05 | 0.05 | 7.84E+05 | 44.54 | 19.97 |
| CAT 938 K Loader | 311 | 2,481.79 | 93.91 | 201.23 | 2.80 | 0.01 | 0.01 | 3.02E+05 | 17.18 | 7.70 |
| CAT 2P-6000 Forklift | 311 | 1,492.99 | 70.61 | 1,341.67 | 4.66 | 0.01 | 0.01 | 5.04E+05 | 28.63 | 12.83 |
| Tennant 800 Sweeper | 311 | 1,803.01 | 85.28 | 1,620.27 | 6.22 | 0.01 | 0.01 | 6.72E+05 | 38.18 | 17.11 |
| **Total** | | **16,591.19** | **774.89** | **4,288.36** | **23.73** | **0.08** | **0.08** | **2.56E+06** | **145.70** | **65.32** |
| **Anaerobic Digestion Facility Building** | | | | | | | | | | |
| CAT 938 M Loader | 208 | 1,659.84 | 62.80 | 134.58 | 2.43 | 0.01 | 0.01 | 2.62E+05 | 14.89 | 6.68 |
| **Total** | | **1,659.84** | **62.80** | **134.58** | **2.43** | **0.01** | **0.01** | **2.62E+05** | **14.89** | **6.68** |
| **Outside MRF and AD Facility Buildings** | | | | | | | | | | |
| Tennant M30 Scrubber-Sweeper | 311 | 284.32 | 13.45 | 255.50 | 1.55 | 1.54 | 1.54 | 1.68E+05 | 9.54 | 4.28 |
| **Total** | | **284.32** | **13.45** | **255.50** | **1.55** | **1.54** | **1.54** | **1.68E+05** | **9.54** | **4.28** |
| **Composting Area** | | | | | | | | | | |
| CAT 938 K Loader | 311 | 1,240.89 | 46.95 | 100.61 | 1.40 | 0.01 | 0.01 | 1.51E+05 | 8.59 | 3.85 |
| Vermeer CT820 Windrow Turner | 52 | 202.66 | 10.91 | 23.38 | 1.04 | 1.17 | 1.17 | 1.12E+05 | 6.38 | 2.86 |
| **Total** | | **202.66** | **10.91** | **23.38** | **1.04** | **1.17** | **1.17** | **1.12E+05** | **6.38** | **2.86** |

[a] Annual Emissions [lb/year] = Daily Emissions [lb/day] x Operating Days [days/year]

**Table 13** **On-Site Motor Vehicle Exhaust Emissions without CSSR**

| Vehicle | Use | Fuel | Segment | Mileage (mpg)[c] | Round-Trip Dist. (mi) | Round-Trips/Day | Miles/ Day | Fuel Use (gal/day)[d] |
|---|---|---|---|---|---|---|---|---|
| Freightliner Tractor | Compost Export[a] | CNG | MRF-Compost | 6 | 0.90 | 4 | 3.61 | 0.60 |
| Freightliner Tractor | Compost Export[a] | CNG | MRF-Entrance | 6 | 2.23 | 4 | 8.92 | 1.49 |
| Freightliner Tractor | Recycleables to POLA[b] | CNG | MRF-Entrance | 6 | 2.23 | 13 | 28.99 | 4.83 |
| Ford F350 XL | Utility truck and trailer | Diesel | MRF-Compost | 14 | 0.90 | 6 | 5.41 | 0.39 |
| Ford F350 XL | Utility truck and trailer | Diesel | MRF-Entrance | 14 | 2.23 | 6 | 13.38 | 0.96 |

[a] Round trips/day = 25,760 tons/yr / 311 op. days/yr / 22 tons/trip = 3.8 trips/day rounded up to 4 trips/day

[b] Round trips/day = 90,000 tons/yr / 311 op. days/yr / 22 tons/trip = 13.2 one-way trips/day rounded to 13

[c] Mileage for Freightliner Tractor is diesel-equivalent

[d] Fuel use [gal/day] = Daily mileage (miles/day) / Mileage [mpg]

| Vehicle | Use | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO[a] | ROC[b] | NOx[b] | SOx[c] | PM10[b] | PM2.5[b] | $CO_2$[d] | $CH_4$[e] | $N_2O$[e,f] |
| Freightliner Tractor | Compost Export | 1.23E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Freightliner Tractor | Recycleables to POLA | 1.23E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Ford F350 XL | Utility truck and trailer | 1.71E-01 | 2.63E-02 | 4.69E-01 | 6.75E-03 | 4.90E-03 | 4.90E-03 | 4.93E+02 | 1.00E-03 | 2.37E-02 |

| | | | |
|---|---|---|---|
| Diesel Fuel HV = | 128,450 | Btu/gal | |
| Natural Gas HV = | 1,020 | Btu/scf | |
| Natural Gas S = | 0.5 | grains/100 scf | |
| Diesel Fuel Density = | 6.943 | lb/gal | from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from |
| Diesel Fuel Sulfur = | 15 | ppmw | http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf |
| Natural Gas $CO_2$ EF = | 0.054 | Kg/scf | |

[a] Freightliner tractor is 2010 and later model year standard in g/bhp-hr converted to g/mi using conversion factor from Table D-28 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[b] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[c] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g $SO_2$/g S)
Ford F350 XL calculated from (1/diesel mpg) x diesel fuel density (lb/gal) x diesel fuel sulfur (ppmw) x $10^6$ x 453.6 (g/lb) x 2 (g $SO_2$/g S)

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (kg/scf) x 1,000 (g/kg)
CO2 emission factor from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[e] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[f] Emission factor for Ford F350 XL calculated as 0.3316 [g/gal] / mileage [mpg]; see: http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 13** **On-Site Motor Vehicle Exhaust Emissions without CSSR**

| Vehicle | Use | Segment | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractor | Compost Export | MRF-Compost | 9.76E-03 | 2.94E-03 | 3.66E-03 | 5.41E-05 | 2.31E-04 | 2.31E-04 | 9.02E+00 | 1.56E-02 | 1.39E-03 |
| Freightliner Tractor | Compost Export | MRF-Entrance | 2.41E-02 | 7.28E-03 | 9.05E-03 | 1.34E-04 | 5.70E-04 | 5.70E-04 | 2.23E+01 | 3.87E-02 | 3.44E-03 |
| Freightliner Tractor | Recycleables to POLA | MRF-Entrance | 7.84E-02 | 2.36E-02 | 2.94E-02 | 4.35E-04 | 1.85E-03 | 1.85E-03 | 7.24E+01 | 1.26E-01 | 1.12E-02 |
| Ford F350 XL | Utility truck and trailer | MRF-Compost | 2.04E-03 | 3.14E-04 | 5.60E-03 | 8.05E-05 | 5.85E-05 | 5.85E-05 | 5.88E+00 | 1.19E-05 | 2.83E-04 |
| Ford F350 XL | Utility truck and trailer | MRF-Entrance | 5.04E-03 | 7.76E-04 | 1.38E-02 | 1.99E-04 | 1.45E-04 | 1.45E-04 | 1.45E+01 | 2.95E-05 | 6.99E-04 |
| **Total** | | | **1.19E-01** | **3.50E-02** | **6.15E-02** | **9.02E-04** | **2.86E-03** | **2.86E-03** | **1.24E+02** | **1.80E-01** | **1.70E-02** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Segment | Days/Year | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractor | Compost Export | MRF-Compost | 311 | 3.03 | 0.92 | 1.14 | 0.02 | 0.07 | 0.07 | 2,803.69 | 4.86 | 0.43 |
| Freightliner Tractor | Compost Export | MRF-Entrance | 311 | 7.50 | 2.26 | 2.81 | 0.04 | 0.18 | 0.18 | 6,931.52 | 12.02 | 1.07 |
| Freightliner Tractor | Recycleables to POLA | MRF-Entrance | 311 | 24.38 | 7.35 | 9.14 | 0.14 | 0.58 | 0.58 | 22,527.45 | 39.08 | 3.48 |
| Ford F350 XL | Utility truck and trailer | MRF-Compost | 311 | 0.63 | 0.10 | 1.74 | 0.03 | 0.02 | 0.02 | 1,829.51 | 0.00 | 0.09 |
| Ford F350 XL | Utility truck and trailer | MRF-Entrance | 311 | 1.57 | 0.24 | 4.30 | 0.06 | 0.04 | 0.04 | 4,523.06 | 0.01 | 0.22 |
| **Total** | | | | **37.12** | **10.87** | **19.14** | **0.28** | **0.89** | **0.89** | **38,615.23** | **55.98** | **5.29** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 14** **On-Site Motor Vehicle Exhaust Emissions with CSSR**

| Vehicle | Use | Fuel | Segment | Mileage (mpg)[d] | Round-Trip Dist. (mi) | Round-Trips/Day | Miles/ Day | Fuel Use (gal/day)[e] |
|---|---|---|---|---|---|---|---|---|
| Freightliner Tractor | Compost Export[a] | CNG | MRF-Compost | 6 | 0.90 | 4 | 3.61 | 0.60 |
| Freightliner Tractor | Compost Export[a] | CNG | MRF-Entrance | 6 | 2.23 | 4 | 8.92 | 1.49 |
| Freightliner Tractor | Recycleables to POLA[b] | CNG | MRF-Entrance | 6 | 2.23 | 18 | 40.14 | 6.69 |
| Tractor/Trailer | CSSR Import[c] | Diesel | MRF-Entrance | 6 | 2.23 | 7 | 15.61 | 2.60 |
| Ford F350 XL | Utility truck and trailer | Diesel | MRF-Compost | 14 | 0.90 | 6 | 5.41 | 0.39 |
| Ford F350 XL | Utility truck and trailer | Diesel | MRF-Entrance | 14 | 2.23 | 6 | 13.38 | 0.96 |

[a] Round trips/day = 25,760 tons/yr / 311 op. days/yr / 22 tons/trip = 3.8 trips/day rounded up to 4 trips/day

[b] Round trips/day = 126,000 tons/yr / 311 op. days/yr / 22 tons/trip = 18.4 round trips/day rounded to 18

[c] Trips/day are from Project Traffic Study.

[d] Mileage for Freightliner Tractor is diesel-equivalent

[e] Fuel use [gal/day] = Daily mileage [miles/day] / Mileage [mpg]

| | | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Vehicle | Use | CO[a] | ROC[b] | NOx[b] | SOx[c] | PM10[b] | PM2.5[b] | $CO_2$[d] | $CH_4$[e] | $N_2O$[e,f] |
| Freightliner Tractor | Compost Export | 1.23E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Freightliner Tractor | Recycleables to POLA | 1.23E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Tractor/Trailer | CSSR Import | 1.23E+00 | 5.04E-01 | 1.91E+00 | 1.57E-02 | 3.68E-02 | 3.39E-02 | 2.55E+03 | 1.00E-03 | 5.53E-02 |
| Ford F350 XL | Utility truck and trailer | 1.71E-01 | 2.63E-02 | 4.69E-01 | 6.75E-03 | 4.90E-03 | 4.90E-03 | 4.93E+02 | 1.00E-03 | 2.37E-02 |

| | | | |
|---|---|---|---|
| Diesel Fuel HV = | 128,450 | Btu/gal | |
| Natural Gas HV = | 1,020 | Btu/scf | |
| Natural Gas S = | 0.5 | grains/100 scf | |
| Diesel Fuel Density = | 6.943 | lb/gal | |
| Diesel Fuel Sulfur = | 15 | ppmw | from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from |
| Natural Gas $CO_2$ EF = | 0.054 | Kg/scf | http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf |

[a] Freightliner tractor is 2010 and later model year standard in g/bhp-hr converted to g/mi using conversion factor from
Table D-28 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County
at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County
at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[b] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines -
http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County
at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County
at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[c] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) /
natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g SO2/g S)
Ford F350 XL and Tractor/trailer calculated from (1/diesel mpg) x diesel fuel density (lb/gal) x diesel fuel sulfur (ppmw) x $10^{-6}$ x 453.6 (g/lb) x 2(g SO2/g S)

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) /
natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (kg/scf) x 1,000 (g/kg)
CO2 emission factor from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County
at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County
at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[e] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County
at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County
at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[f] Emission factor for Ford F350 XL calculated as 0.3316 [g/gal] / mileage [mpg]; see:
http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 14** **On-Site Motor Vehicle Exhaust Emissions with CSSR**

| Vehicle | Use | Segment | Daily Emissions (lb/day)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Freightliner Tractor | Compost Export | MRF-Compost | 9.76E-03 | 2.94E-03 | 3.66E-03 | 5.41E-05 | 2.31E-04 | 2.31E-04 | 9.02E+00 | 1.56E-02 | 1.39E-03 |
| Freightliner Tractor | Compost Export | MRF-Entrance | 2.41E-02 | 7.28E-03 | 9.05E-03 | 1.34E-04 | 5.70E-04 | 5.70E-04 | 2.23E+01 | 3.87E-02 | 3.44E-03 |
| Freightliner Tractor | Recycleables to POLA | MRF-Entrance | 1.09E-01 | 3.27E-02 | 4.07E-02 | 6.02E-04 | 2.57E-03 | 2.57E-03 | 1.00E+02 | 1.74E-01 | 1.55E-02 |
| Tractor/Trailer | CSSR Import | MRF-Entrance | 4.22E-02 | 1.73E-02 | 6.59E-02 | 5.42E-04 | 1.27E-03 | 1.17E-03 | 8.77E+01 | 3.44E-05 | 1.90E-03 |
| Ford F350 XL | Utility truck and trailer | MRF-Compost | 2.04E-03 | 3.14E-04 | 5.60E-03 | 8.05E-05 | 5.85E-05 | 5.85E-05 | 5.88E+00 | 1.19E-05 | 2.83E-04 |
| Ford F350 XL | Utility truck and trailer | MRF-Entrance | 5.04E-03 | 7.76E-04 | 1.38E-02 | 1.99E-04 | 1.45E-04 | 1.45E-04 | 1.45E+01 | 2.95E-05 | 6.99E-04 |
| **Total** | | | **1.92E-01** | **6.14E-02** | **1.39E-01** | **1.61E-03** | **4.84E-03** | **4.74E-03** | **2.40E+02** | **2.28E-01** | **2.32E-02** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Segment | Days/Year | Annual Emissions (lb/year)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Freightliner Tractor | Compost Export | MRF-Compost | 311 | 3.03 | 0.92 | 1.14 | 0.02 | 0.07 | 0.07 | 2,803.69 | 4.86 | 0.43 |
| Freightliner Tractor | Compost Export | MRF-Entrance | 311 | 7.50 | 2.26 | 2.81 | 0.04 | 0.18 | 0.18 | 6,931.52 | 12.02 | 1.07 |
| Freightliner Tractor | Recycleables to POLA | MRF-Entrance | 311 | 33.76 | 10.18 | 12.66 | 0.19 | 0.80 | 0.80 | 31,191.85 | 54.11 | 4.82 |
| Tractor/Trailer | CSSR Import | MRF-Entrance | 311 | 13.13 | 5.39 | 20.49 | 0.17 | 0.39 | 0.36 | 27,284.63 | 0.01 | 0.59 |
| Ford F350 XL | Utility truck and trailer | MRF-Compost | 311 | 0.63 | 0.10 | 1.74 | 0.03 | 0.02 | 0.02 | 1,829.51 | 0.00 | 0.09 |
| Ford F350 XL | Utility truck and trailer | MRF-Entrance | 311 | 1.57 | 0.24 | 4.30 | 0.06 | 0.04 | 0.04 | 4,523.06 | 0.01 | 0.22 |
| **Total** | | | | **59.62** | **19.09** | **43.15** | **0.50** | **1.50** | **1.47** | **74,564.26** | **71.02** | **7.22** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 15** **Off-Site Motor Vehicle Exhaust Emissions without CSSR**

| Vehicle | Use | Fuel | One-Way Trips/Day | Mileage (mpg)[d] | One-Way Trip Dist. (mi) | Miles/ Day |
|---|---|---|---|---|---|---|
| Freightliner Tractors | Compost to North County[a] | CNG | 8 | 6 | 57 | 456 |
| Freightliner Tractors | Recycleables to POLA[b] | CNG | 26 | 6 | 131 | 3,406 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous[c] | Diesel | 8 | 19 | 25 | 200 |
| Worker Commuting | From the North[e] | Gasoline | 45 | 22 | 37 | 1,665 |
| Worker Commuting | From the South[e] | Gasoline | 5 | 22 | 15 | 75 |

[a] Round trips/day = 25,760 tons/yr / 311 op. days/yr / 22 tons/trip = 3.8 one-way trips/day x 2 = 7.6 one-way trips/day rounded up to 8

[b] Round trips/day = 90,000 tons/yr / 311 op. days/yr / 22 tons/trip = 13.2 one-way trips/day x 2 = 26.4 one-way trips/day rounded to 26

[c] Round trips/day are Mustang estimates

[d] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2017 by total miles in Santa Barbara County
Mileage for Freightliner Tractor is diesel-equivalent, Mustang estimate

[e] Trips/day are from Project Traffic Study

| Vehicle | Use | EMFAC Vehicle Class | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO[a,b] | ROC[a,c] | NOx[a,c] | SOx[a,d] | PM10[a,c] | PM2.5[a,c] | $CO_2$[a,e] | $CH_4$[a,f] | $N_2O$[f,g] |
| Freightliner Tractors | Compost to North County | N/A | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Freightliner Tractors | Recycleables to POLA | N/A | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | LHD1 | 1.22E+00 | 2.23E-01 | 3.57E+00 | 5.02E-03 | 1.38E-01 | 8.12E-02 | 4.99E+02 | 1.22E-02 | 1.73E-02 |
| Worker Commuting | From the North | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |
| Worker Commuting | From the South | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |

| | | |
|---|---|---|
| Diesel Fuel HV = | 128,450 | Btu/gal |
| Natural Gas HV = | 1,020 | Btu/scf |
| Natural Gas S = | 0.5 | grains/100 scf |
| Diesel Fuel Density = | 6.943 | lb/gal |
| Diesel Fuel Sulfur = | 15 | ppmw |
| Natural Gas $CO_2$ EF = | 0.054 | Kg/scf |

from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2017 by total miles in Santa Barbara County

[b] Freightliner tractor calculated by dividing EMFAC2011 calculated total daily CO emissions from 2017 model year T7 tractors in Santa Barbara County in 2017
by total miles in Santa Barbara County

[c] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines -
http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) /
natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x
2 (g $SO_2$/g S)

[e] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) /
natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (Kg/scf) x 1,000 (g/Kg)

[f] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[g] Emission factor for gasoline calculated from 0.0416 x NOx emission factor; emission factor for diesel calculated as 0.3316 g/gal; see:
http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 15** **Off-Site Motor Vehicle Exhaust Emissions without CSSR**

| Vehicle | Use | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractors | Compost to North County | 1.17 | 0.37 | 0.46 | 0.01 | 0.03 | 0.03 | 1,139.38 | 1.98 | 0.18 |
| Freightliner Tractors | Recycleables to POLA | 8.76 | 2.78 | 3.45 | 0.05 | 0.22 | 0.22 | 8,510.36 | 14.76 | 1.31 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 0.54 | 0.10 | 1.57 | 0.00 | 0.06 | 0.04 | 220.21 | 0.01 | 0.01 |
| Worker Commuting | From the North | 12.72 | 1.12 | 1.32 | 0.01 | 0.18 | 0.08 | 1,142.67 | 0.09 | 0.05 |
| Worker Commuting | From the South | 0.57 | 0.05 | 0.06 | 0.00 | 0.01 | 0.00 | 51.47 | 0.00 | 0.00 |
| **Total** | | **23.76** | **4.42** | **6.87** | **0.07** | **0.49** | **0.36** | **11,064.08** | **16.84** | **1.55** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Op. Days/yr | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractors | Compost to North County | 311 | 364.69 | 115.68 | 143.82 | 2.13 | 9.07 | 9.07 | 354,346.90 | 614.66 | 54.71 |
| Freightliner Tractors | Recycleables to POLA | 311 | 2,723.97 | 864.04 | 1,074.21 | 15.88 | 67.72 | 67.72 | 2,646,722.64 | 4,591.09 | 408.67 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 311 | 167.22 | 30.62 | 489.43 | 0.69 | 18.90 | 11.14 | 68,483.80 | 1.67 | 2.37 |
| Worker Commuting | From the North | 311 | 3,955.46 | 349.49 | 409.44 | 4.35 | 55.17 | 23.98 | 355,369.04 | 28.77 | 17.03 |
| Worker Commuting | From the South | 311 | 178.17 | 15.74 | 18.44 | 0.20 | 2.49 | 1.08 | 16,007.61 | 1.30 | 0.77 |
| **Total** | | | **7,389.51** | **1,375.57** | **2,135.35** | **23.24** | **153.34** | **112.98** | **3,440,929.99** | **5,237.48** | **483.55** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Off-Site Motor Vehicle Fugitive PM Emissions**

**Emission Factors for Vehicles on Off-Site Paved Roads**

| Parameter | Value | Comments |
|---|---|---|
| Road silt loading ($g/m^2$) | 0.1 | CalEEMod default |
| Onroad vehicles average weight (tons) | 2.4 | CalEEMod Default for Santa Barbara County |
| PM10 emission factor (lb/mile) | 6.61E-04 | 0.0022 x (silt loading [$g/m^2$])$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |
| PM2.5 emission factor (lb/mile) | 1.62E-04 | 0.00054 x (silt loading [$g/m^2$])$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |

| Vehicle | Use | Miles/ Day | Op. Days/yr | Daily Emissions (lb/day)[a] | | Annual Emissions (lb/year)[b] | |
|---|---|---|---|---|---|---|---|
| | | | | PM10 | PM2.5 | PM10 | PM2.5 |
| Freightliner Tractors | Compost to North County | 456 | 311 | 0.30 | 0.07 | 93.75 | 23.01 |
| Freightliner Tractors | Recycleables to POLA | 3,406 | 311 | 2.25 | 0.55 | 700.23 | 171.88 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 200 | 311 | 0.13 | 0.03 | 41.12 | 10.09 |
| Worker Commuting | From the North | 1,665 | 311 | 1.10 | 0.27 | 342.30 | 84.02 |
| Worker Commuting | From the South | 75 | 311 | 0.05 | 0.01 | 15.42 | 3.78 |
| **Total** | | | | **3.84** | **0.94** | **1,192.82** | **292.78** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]

[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 16** **Off-Site Motor Vehicle Exhaust Emissions with CSSR**

| Vehicle | Use | Fuel | One-Way Trips/Day | Mileage (mpg)[d] | One-Way Trip Dist. (mi) | Miles/ Day |
|---|---|---|---|---|---|---|
| Freightliner Tractors | Compost to North County[a] | CNG | 8 | 6 | 57 | 456 |
| Freightliner Tractors | Recycleables to POLA[b] | CNG | 36 | 6 | 131 | 4,716 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast[e] | Diesel | 14 | 6 | -17 | -238 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous[c] | Diesel | 8 | 19 | 25 | 200 |
| Worker Commuting | From the North[f] | Gasoline | 59 | 22 | 37 | 2,183 |
| Worker Commuting | From the South[f] | Gasoline | 7 | 22 | 15 | 105 |

[a] Round trips/day = 25,760 tons/yr / 311 op. days/yr / 22 tons/trip = 3.8 one-way trips/day x 2 = 7.6 one-way trips/day rounded up to 8

[b] Round trips/day = 126,000 tons/yr / 311 op. days/yr / 22 tons/trip = 18.4 one-way trips/day x 2 = 36.8 one-way trips/day rounded to 36

[c] Round trips/day are Mustang estimates

[d] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2017 by total miles in Santa Barbara County
Mileage for Freightliner Tractor is diesel-equivalent, Mustang estimate

[e] Trips/day are from Project Traffic Study. Mileage is difference between SCRTS to Tajiguas (22 mi.) and SCRTS to Gold Coast (39 mi.)

[f] Trips/day are from Project Traffic Study

| Vehicle | Use | EMFAC Vehicle Class | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO[a,b] | ROC[a,c] | NOx[a,c] | SOx[a,d] | PM10[a,c] | PM2.5[a,c] | $CO_2$[a,e] | $CH_4$[a,f] | $N_2O$[f,g] |
| Freightliner Tractors | Compost to North County | N/A | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Freightliner Tractors | Recycleables to POLA | N/A | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast | T7 tractor | 1.16E+00 | 2.53E-01 | 6.95E+00 | 1.69E-02 | 1.80E-01 | 1.11E-01 | 1.68E+03 | 1.38E-02 | 5.81E-02 |
| Pick-up Trucks (Ford F250 XL) | Miscellaneous | LHD1 | 1.22E+00 | 2.23E-01 | 3.57E+00 | 5.02E-03 | 1.38E-01 | 8.12E-02 | 4.99E+02 | 1.22E-02 | 1.73E-02 |
| Worker Commuting | From the North | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |
| Worker Commuting | From the South | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |

| | | | |
|---|---|---|---|
| Diesel Fuel HV = | 128,450 | Btu/gal | |
| Natural Gas HV = | 1,020 | Btu/scf | |
| Natural Gas S = | 0.5 | grains/100 scf | |
| Diesel Fuel Density = | 6.943 | lb/gal | |
| Diesel Fuel Sulfur = | 15 | ppmw | |
| Natural Gas $CO_2$ EF = | 0.054 | Kg/scf | from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from |

http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2017 by total miles in Santa Barbara County

[b] Freightliner tractor calculated by dividing EMFAC2011 calculated total daily CO emissions from 2017 model year T7 tractors in Santa Barbara County in 2017 by total miles in Santa Barbara County

[c] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g $SO_2$/g S)

[e] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (kg/scf) x 1,000 (g/kg)

[f] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[g] Emission factor for gasoline calculated from 0.0416 x NOx emission factor; emission factor for diesel calculated as 0.3316 [g/gal] / mileage [mpg]; see:
http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 16** **Off-Site Motor Vehicle Exhaust Emissions with CSSR**

| Vehicle | Use | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractors | Compost to North County | 1.17 | 0.37 | 0.46 | 0.01 | 0.03 | 0.03 | 1,139.38 | 1.98 | 0.18 |
| Freightliner Tractors | Recycleables to POLA | 12.13 | 3.85 | 4.78 | 0.07 | 0.30 | 0.30 | 11,783.58 | 20.44 | 1.82 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast | -0.61 | -0.13 | -3.65 | -0.01 | -0.09 | -0.06 | -880.47 | -0.01 | -0.03 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 0.54 | 0.10 | 1.57 | 0.00 | 0.06 | 0.04 | 220.21 | 0.01 | 0.01 |
| Worker Commuting | From the North | 16.68 | 1.47 | 1.73 | 0.02 | 0.23 | 0.10 | 1,498.16 | 0.12 | 0.07 |
| Worker Commuting | From the South | 0.80 | 0.07 | 0.08 | 0.00 | 0.01 | 0.00 | 72.06 | 0.01 | 0.00 |
| **Total** | | **30.71** | **5.73** | **4.98** | **0.09** | **0.54** | **0.41** | **13,832.92** | **22.54** | **2.05** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Op. Days/yr | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractors | Compost to North County | 311 | 364.69 | 115.68 | 143.82 | 2.13 | 9.07 | 9.07 | 354,346.90 | 614.66 | 54.71 |
| Freightliner Tractors | Recycleables to POLA | 311 | 3,771.65 | 1,196.36 | 1,487.37 | 21.99 | 93.77 | 93.77 | 3,664,692.89 | 6,356.89 | 565.85 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast | 311 | -189.68 | -41.25 | -1,134.46 | -2.75 | -29.39 | -18.15 | -273,825.41 | -2.25 | -9.48 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 311 | 167.22 | 30.62 | 489.43 | 0.69 | 18.90 | 11.14 | 68,483.80 | 1.67 | 2.37 |
| Worker Commuting | From the North | 311 | 5,186.04 | 458.22 | 536.82 | 5.70 | 72.33 | 31.44 | 465,928.30 | 37.72 | 22.33 |
| Worker Commuting | From the South | 311 | 249.44 | 22.04 | 25.82 | 0.27 | 3.48 | 1.51 | 22,410.66 | 1.81 | 1.07 |
| **Total** | | | **9,549.37** | **1,781.67** | **1,548.80** | **28.03** | **168.16** | **128.77** | **4,302,037.13** | **7,010.50** | **636.86** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Off-Site Motor Vehicle Fugitive PM Emissions**

**Emission Factors for Vehicles on Off-Site Paved Roads**

| Parameter | Value | Comments |
|---|---|---|
| Road silt loading ($g/m^2$) | 0.1 | CalEEMod default |
| Onroad vehicles average weight (tons) | 2.4 | CalEEMod Default for Santa Barbara County |
| PM10 emission factor (lb/mile) | 6.61E-04 | 0.0022 x (silt loading $[g/m^2])^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |
| PM2.5 emission factor (lb/mile) | 1.62E-04 | 0.00054 x (silt loading $[g/m^2])^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |

| Vehicle | Use | Miles/ Day | Op. Days/yr | Daily Emissions (lb/day)[a] | | Annual Emissions (lb/year)[b] | |
|---|---|---|---|---|---|---|---|
| | | | | PM10 | PM2.5 | PM10 | PM2.5 |
| Freightliner Tractors | Compost to North County | 456 | 311 | 0.30 | 0.07 | 93.75 | 23.01 |
| Freightliner Tractors | Recycleables to POLA | 4,716 | 311 | 3.12 | 0.77 | 969.55 | 237.98 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast | -238 | 311 | -0.16 | -0.04 | -48.93 | -12.01 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 200 | 311 | 0.13 | 0.03 | 41.12 | 10.09 |
| Worker Commuting | From the North | 2,183 | 311 | 1.44 | 0.35 | 448.80 | 110.16 |
| Worker Commuting | From the South | 105 | 311 | 0.07 | 0.02 | 21.59 | 5.30 |
| **Total** | | | | **4.91** | **1.20** | **1,525.88** | **374.53** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]

[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 17 On-Site Fugitive PM Emissions without CSSR**

**On-Site Motor Vehicle Fugitive PM Emissions without CSSR**

| Vehicle | Use | Route | Weight (tons)[a] | Miles/Day | Annual Op. (Days/year) | Emission Factors (lb/mi)[b] | | Control Efficiency (%)[c] | Emissions (lb/day)[d] | | Emissions (lb/year)[e] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | PM10 | PM2.5 | | PM10 | PM2.5 | PM10 | PM2.5 |
| Freightliner Tractor | Compost Export | MRF-Compost | 13.75 | 3.61 | 311 | 1.69 | 0.17 | 86 | 0.85 | 0.09 | 265.51 | 26.55 |
| Freightliner Tractor | Compost Export | MRF-Entrance | 13.75 | 8.92 | 311 | 1.69 | 0.17 | 86 | 2.11 | 0.21 | 656.41 | 65.64 |
| Freightliner Tractor | Recycleables to POLA | MRF-Entrance | 13.75 | 28.99 | 311 | 1.69 | 0.17 | 86 | 6.86 | 0.69 | 2,133.33 | 213.33 |
| Ford F350 XL | Utility truck and trailer | MRF-Compost | 7 | 5.41 | 311 | 1.25 | 0.12 | 86 | 0.95 | 0.09 | 293.92 | 29.39 |
| Ford F350 XL | Utility truck and trailer | MRF-Entrance | 7 | 13.38 | 311 | 1.25 | 0.12 | 86 | 2.34 | 0.23 | 726.65 | 72.66 |

[a] Freightliner tractor + trailer = average of 40,000 lbs loaded and 15,000 lbs empty.
Ford F350 XL based on specification of 14,000 lbs gross vehicle weight rating

[b] Emission factor [lb/mi] = k x (silt content [%] / 12)$^{0.9}$ (weight [tons] / 3)$^{0.45}$
from AP-42, Section 13.2.2 (Unpaved Roads), Equation 1a (11/06)

k = 1.5 for PM10
0.15 for PM2.5

silt content = 6.4 % from AP-42, Section 13.2.2 (Unpaved Roads), Table 13.2.2-1 (11/06)

[c] Based on hourly watering at 0.18 gal/sq. yd. and 15 mph speed limit, from Appendix E.7, page 3, of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5.

[d] Emissions [lb/day] = Emission factor [lb/mi] x Miles/day x (1- control efficiency [%] / 100)

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

**Material Transfers without CSSR**

| Material | Transfer | Moisture (%)[a] | Daily Amount (tons)[b] | Annual Op. (Days/year) | Emission Factors (lb/ton)[c] | | Emissions (lb/day)[d, f] | | Emissions (lb/year)[e] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| Digestate | Into Truck | 4.8 | 288 | 208 | 3.70E-04 | 5.60E-05 | 1.07E-04 | 1.61E-05 | 0.02 | 0.00 |
| Digestate | Onto Windrow | 4.8 | 288 | 208 | 3.70E-04 | 5.60E-05 | 1.07E-01 | 1.61E-02 | 22.17 | 3.36 |
| Windrow | Windrow turning | 4.8 | 15,363 | 52 | 3.70E-04 | 5.60E-05 | 5.68E+00 | 8.60E-01 | 295.21 | 44.70 |
| Compost | Into Screen | 4.8 | 83 | 311 | 3.70E-04 | 5.60E-05 | 3.06E-02 | 4.63E-03 | 9.52 | 1.44 |
| Compost | Out of Screen | 4.8 | 83 | 311 | 3.70E-04 | 5.60E-05 | 3.06E-02 | 4.63E-03 | 9.52 | 1.44 |
| Compost | Onto Storage Pile | 4.8 | 83 | 311 | 3.70E-04 | 5.60E-05 | 3.06E-02 | 4.63E-03 | 9.52 | 1.44 |
| Compost | Into Export Truck | 4.8 | 83 | 311 | 3.70E-04 | 5.60E-05 | 3.06E-02 | 4.63E-03 | 9.52 | 1.44 |
| MSW | Into MRF Facility | 4.8 | 800 | 311 | 3.70E-04 | 5.60E-05 | 2.96E-04 | 4.48E-05 | 0.09 | 0.01 |
| MSW | Into AD Facility | 4.8 | 240 | 311 | 3.70E-04 | 5.60E-05 | 8.87E-05 | 1.34E-05 | 0.03 | 0.00 |

[a] Maximum moisture content of materials used to develop emission factor equation.

[b] For digestate, 60,000 tpy / 208 op. days/yr; for windrow turning, 15,363 tons / op. day;
for compost, 25,760 tpy / 311 op. days/yr

[c] Emission factor [lb/ton] = k x 0.0032 x (wind speed [mph] / 5)$^{1.3}$ / (material moisture [%] /2 )$^{1.4}$
from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06)

k = 0.35 for PM10
0.053 for PM2.5

Wind speed = 5.47 mph, from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[d] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

[f] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

**Table 17** **On-Site Fugitive PM Emissions without CSSR**

**Screening**

| Material | Daily Amount (tons)[a] | Annual Op. (Days/year) | Emission Factors (lb/ton)[b] | | Emissions (lb/day)[c] | | Emissions (lb/year)[d] | |
|---|---|---|---|---|---|---|---|---|
| | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| Compost | 83 | 311 | 0.00074 | 0.00005 | 6.13E-02 | 4.14E-03 | 1.91E+01 | 1.29E+00 |

[a] For digestate, 60,000 tpy / 208 op. days/yr; for compost, 25,760 tpy / 311 op. days/yr

[b] From AP-42, Section 11.19, Crushed Stone Processing and Pulverized Mineral Processing (08/04), Table 11.19.2-2 for controlled screening

[c] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

**Chipper/Grinder**

| Material | Hourly Amount (tph) | Operating Time (hr/day) | Annual Op. (Days/year) | Emission Factors (lb/ton)[a] | | Emissions (lb/hr)[b] | | Emissions (lb/day)[c] | | Emissions (lb/year)[d] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| Wood | 45.5 | 1.5 | 311 | 0.0144 | 0.0144 | 0.66 | 0.66 | 0.98 | 0.98 | 305.65 | 305.65 |

[a] From Bay Area Air Quality Management District Permit Handbook, Section 11.3, http://hank.baaqmd.gov/pmt/handbook/rev02/PH_00_05_11_13.pdf. PM2.5 assumed to be equal to PM10.

[b] Emissions [lb/hr] = Emission factor [lb/ton] x Hourly amount [tph]

[c] Emissions [lb/day] = Hourly emissions [lb/hr] x Daily operating time [hr/day]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

**Table 18 On-Site Fugitive PM Emissions with CSSR**

**On-Site Motor Vehicle Fugitive PM Emissions with CSSR**

| Vehicle | Use | Route | Weight (tons)[a] | Miles/Day | Annual Op. (Days/year) | Emission Factors (lb/mi)[b] PM10 | PM2.5 | Control Efficiency (%)[c] | Emissions (lb/day)[d] PM10 | PM2.5 | Emissions (lb/year)[e] PM10 | PM2.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Freightliner Tractor | Compost Export | MRF-Compost | 13.75 | 3.61 | 311 | 1.69 | 0.17 | 86 | 0.85 | 0.09 | 265.51 | 26.55 |
| Freightliner Tractor | Compost Export | MRF-Entrance | 13.75 | 8.92 | 311 | 1.69 | 0.17 | 86 | 2.11 | 0.21 | 656.41 | 65.64 |
| Freightliner Tractor | Recycleables to POLA | MRF-Entrance | 13.75 | 40.14 | 311 | 1.69 | 0.17 | 86 | 9.50 | 0.95 | 2,953.84 | 295.38 |
| Tractor/Trailer | CSSR Import | MRF-Entrance | 13.75 | 15.61 | 311 | 1.69 | 0.17 | 86 | 3.69 | 0.37 | 1,148.72 | 114.87 |
| Ford F350 XL | Utility truck and trailer | MRF-Compost | 7 | 5.41 | 311 | 1.25 | 0.12 | 86 | 0.95 | 0.09 | 293.92 | 29.39 |
| Ford F350 XL | Utility truck and trailer | MRF-Entrance | 7 | 13.38 | 311 | 1.25 | 0.12 | 86 | 2.34 | 0.23 | 726.65 | 72.66 |

[a] Freightliner tractor + trailer and tractor/trailer = average of 40,000 lbs loaded and 15,000 lbs empty.
Ford F350 XL based on specification of 14,000 lbs gross vehicle weight rating

[b] Emission factor [lb/mi] = k x (silt content [%] / 12)$^{0.9}$ (weight [tons] / 3)$^{0.45}$
from AP-42, Section 13.2.2 (Unpaved Roads), Equation 1a (11/06)

k = 1.5 for PM10
0.15 for PM2.5

silt content = 6.4 % from AP-42, Section 13.2.2 (Unpaved Roads), Table 13.2.2-1 (11/06)

[c] Based on hourly watering at 0.18 gal/sq. yd. and 15 mph speed limit, from Appendix E.7, page 3, of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5.

[d] Emissions [lb/day] = Emission factor [lb/mi] x Miles/day x (1- control efficiency [%] / 100)

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

**Material Transfers with CSSR**

| Material | Transfer | Moisture (%)[a] | Daily Amount (tons)[b] | Annual Op. (Days/year) | Emission Factors (lb/ton)[c] PM10 | PM2.5 | Emissions (lb/day)[d, f] PM10 | PM2.5 | Emissions (lb/year)[e] PM10 | PM2.5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Digestate | Into Truck | 4.8 | 288 | 278 | 3.70E-04 | 5.60E-05 | 1.07E-04 | 1.61E-05 | 0.03 | 0.00 |
| Digestate | Onto Windrow | 4.8 | 288 | 278 | 3.70E-04 | 5.60E-05 | 1.07E-01 | 1.61E-02 | 29.63 | 4.49 |
| Windrow | Windrow turning | 4.8 | 15,363 | 52 | 3.70E-04 | 5.60E-05 | 5.68E+00 | 8.60E-01 | 295.21 | 44.70 |
| Compost | Into Screen | 4.8 | 83 | 311 | 3.70E-04 | 5.60E-05 | 3.06E-02 | 4.63E-03 | 9.52 | 1.44 |
| Compost | Out of Screen | 4.8 | 83 | 311 | 3.70E-04 | 5.60E-05 | 3.06E-02 | 4.63E-03 | 9.52 | 1.44 |
| Compost | Onto Storage Pile | 4.8 | 83 | 311 | 3.70E-04 | 5.60E-05 | 3.06E-02 | 4.63E-03 | 9.52 | 1.44 |
| Compost | Into Export Truck | 4.8 | 83 | 311 | 3.70E-04 | 5.60E-05 | 3.06E-02 | 4.63E-03 | 9.52 | 1.44 |
| MSW | Into MRF Facility | 4.8 | 800 | 311 | 3.70E-04 | 5.60E-05 | 2.96E-04 | 4.48E-05 | 0.09 | 0.01 |
| MSW | Into AD Facility | 4.8 | 240 | 311 | 3.70E-04 | 5.60E-05 | 8.87E-05 | 1.34E-05 | 0.03 | 0.00 |

[a] Maximum moisture content of materials used to develop emission factor equation.

[b] For digestate, 60,000 tpy / 208 op. days/yr; for windrow turning, 15,363 tons / op. day;
for compost, 25,760 tpy / 311 op. days/yr

[c] Emission factor [lb/ton] = k x 0.0032 x (wind speed [mph] / 5)$^{1.3}$ / (material moisture [%] /2 )$^{1.4}$
from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06)

k = 0.35 for PM10
0.053 for PM2.5

Wind speed = 5.47 mph, from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[d] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

[f] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

**Table 18** **On-Site Fugitive PM Emissions with CSSR**

**Screening**

| Material | Daily Amount (tons)[a] | Annual Op. (Days/year) | Emission Factors (lb/ton)[b] | | Emissions (lb/day)[c] | | Emissions (lb/year)[d] | |
|---|---|---|---|---|---|---|---|---|
| | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| Compost | 83 | 311 | 0.00074 | 0.00005 | 6.13E-02 | 4.14E-03 | 1.91E+01 | 1.29E+00 |

[a] For digestate, 60,000 tpy / 208 op. days/yr; for compost, 25,760 tpy / 311 op. days/yr
[b] From AP-42, Section 11.19, Crushed Stone Processing and Pulverized Mineral Processing (08/04), Table 11.19.2-2 for controlled screening
[c] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]
[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

**Chipper/Grinder**

| Material | Hourly Amount (tph) | Operating Time (hr/day) | Annual Op. (Days/year) | Emission Factors (lb/ton)[a] | | Emissions (lb/hr)[b] | | Emissions (lb/day)[c] | | Emissions (lb/year)[d] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| Wood | 45.5 | 1.5 | 311 | 0.0144 | 0.0144 | 0.66 | 0.66 | 0.98 | 0.98 | 305.65 | 305.65 |

[a] From Bay Area Air Quality Management District Permit Handbook, Section 11.3, http://hank.baaqmd.gov/pmt/handbook/rev02/PH_00_05_11_13.pdf. PM2.5 assumed to be equal to PM10.
[b] Emissions [lb/hr] = Emission factor [lb/ton] x Hourly amount [tph]
[c] Emissions [lb/day] = Hourly emissions [lb/hr] x Daily operating time [hr/day]
[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

**Table 19** **Windrow ROC Emissions**

| Item | Value | Comment |
|---|---|---|
| Digestate production (ton/yr) | 73,590 | AD design capacity |
| Digestate production (ton/day) | 201.62 | Annual / 365 days/year |
| Fraction food waste | **0.481** | Mustang estimate |
| Fraction green waste | **0.519** | Mustang estimate |
| Digestate from food waste (ton/day) | 96.98 | |
| Digestate from green waste (ton/day) | 104.64 | |
| Food waste EF (lb VOC/ton) | 37.1 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Green waste EF (lb VOC/ton) | 5.71 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| VOC from food waste (lb/day) | 3,597.87 | |
| VOC from green waste (lb/day) | 597.49 | |
| Total VOC (lb/day) | 4,195 | |
| Reduction from digestion process | 0.97 | See note b |
| VOC after reduction from digestion (lb/day) | 125.86 | |
| Reduction from Best Available Control Technologies | 0.90 | See note c |
| VOC after BMP reductions (lb/day) | 12.59 | |
| VOC after BMP reductions (lb/hour) | 0.52 | Daily / 24 hours/day |
| VOC after BMP reductions (lb/yr) | 4,594 | |

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at:
http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

[b] From Bay Area Air Quality Management District engineering evaluation for Zero Waste Energy proposed anaerobic digestion facility

[c] Best Available Control Technologies:
1. 20% inert, dry wood chip blending
2. Interactive pile management (i.e., turning)
3. 20 minutes irrigation after turning
4. Large pile size
5. Finished compost blanket pseudo biofilter

References for emission reductions include:
Advice from Bekon based on 20 facilities operating in Europe
***Comparison of Mitugation Measures for Reduction of Emissions from Greenwaste Composting*** prepared from SJVAPCD 2009:
http://valleyair.org/busind/pto/emission_factors/Criteria/Criteria/Composting/FINAL-COMPOST-STUDY-REPORT.pdf
***Greenwaste Compost Air Emissions Review*** (Modesto Compost Facility) prepared fror CIWMB June 2008:
http://www.calrecycle.ca.gov/publications/Documents/Organics%5C44207009.pd
***Greenwaste Compost Site Emissions Reductions*** Prepared for San Joaquin Valley Technology Advancement Program May 2013:
http://www.valleyair.org/grant_programs/TAP/documents/C-15636-ACP/C-15636_ACP_FinalReport.pd

**Table 20** **AD ROC Emissions**

| Item | Value | Comment |
|---|---|---|
| Digestate production (ton/yr) | 73,590 | AD design capacity |
| Digestate production (ton/day) | 201.62 | Annual / 365 days/year |
| Fraction food waste | **0.481** | Mustang estimate |
| Fraction green waste | **0.519** | Mustang estimate |
| Digestate from food waste (ton/day) | 96.98 | |
| Digestate from green waste (ton/day) | 104.64 | |
| Food waste EF (lb VOC/ton-composting cycle) | 37.1 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Green waste EF (lb VOC/ton-composting cycle) | 5.71 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Food waste EF (lb VOC/ton-day) | 0.618 | For one day of 60-day composting cycle |
| Green waste EF (lb VOC/ton-day) | 0.095 | For one day of 60-day composting cycle |
| VOC from food waste (lb/day) | 59.96 | |
| VOC from green waste (lb/day) | 9.96 | |
| Total VOC (lb/day) | 70 | |
| Reduction from biofilter | 0.95 | |
| VOC after biofilter (lb/day) | 3.50 | |
| VOC after biofilter (lb/hour) | 0.15 | Daily / 24 hours/day |
| VOC after biofilter (lb/yr) | 1,276 | |

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at:
http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

| **Biofilter** | **$m^3$/ min** | **Fract.** | **Emiss. (lb/day)** | **Emiss. (g/s)** |
|---|---|---|---|---|
| Tipping Area | 1,461 | 0.329128 | 0.04794 | 0.0060409 |
| ADF | 1,428 | 0.321694 | 0.04686 | 0.00590445 |
| Scrub | 1,550 | 0.349178 | 0.05087 | 0.00640889 |
| **Total** | **4,439** | **1** | **0.14567** | |

**Table 21** **Flare Toxic Air Contaminant Emissions from Biogas Combustion**

| Compound | CAS Number | Emission Factor (lb/MMscf) | Emission Factor Source[a] | Hourly Emission Rate (lb/hr)[b] | Annual Emission Rate (lb/yr)[c] | Reduced Annual Flow (6/6/14) |
|---|---|---|---|---|---|---|
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 5.60E-02 | CATEF | 1.51E-03 | 2.49E-01 | **FLARE** |
| Manganese | 7439-96-5 | 2.92E-03 | Source Test | 7.88E-05 | 1.30E-02 | |
| Naphthalene | 91-20-3 | 1.75E-04 | Source Test | 4.72E-06 | 7.79E-04 | |
| Nickel | 7440-02-0 | 1.43E-03 | Source Test | 3.85E-05 | 6.36E-03 | |
| Perylene | 198-55-0 | 7.48E-05 | CATEF | 2.02E-06 | 3.33E-04 | |
| Phenanthrene | 85-01-8 | 9.85E-04 | Source Test | 2.66E-05 | 4.39E-03 | |
| Pyrene | 129-00-0 | 3.04E-05 | Source Test | 8.22E-07 | 1.36E-04 | |
| Toluene | 108-88-3 | 1.09E+02 | CATEF | 2.94E+00 | 4.86E+02 | |
| Trichloroethene | 79-01-6 | 1.13E+00 | CATEF | 3.05E-02 | 5.03E+00 | |
| Vinyl Chloride | 75-01-4 | 7.64E-02 | CATEF | 2.06E-03 | 3.40E-01 | |
| Xylene (m,p) | 1330-20-7 | 4.61E-01 | CATEF | 1.24E-02 | 2.05E+00 | |
| Xylene (o) | 95-47-6 | 3.35E-01 | CATEF | 9.05E-03 | 1.49E+00 | |
| Zinc | 7440-66-6 | 4.28E+00 | CATEF | 1.16E-01 | 1.91E+01 | |
| 1,1,1-Trichloroethane | 71-55-6 | 3.37E-01 | CATEF | 9.10E-03 | 1.50E+00 | |
| 1,1-Dichloroethane | 75-34-3 | 4.37E-01 | CATEF | 1.18E-02 | 1.95E+00 | |
| 1,2-Dichloroethane | 107-06-2 | 1.35E+00 | CATEF | 3.65E-02 | 6.01E+00 | |
| 1,4-Dioxane | 123-91-1 | 4.55E-03 | Source Test | 1.23E-04 | 2.03E-02 | |
| 2-Methylnaphthalene | 91-57-6 | 9.56E-05 | Source Test | 2.58E-06 | 4.26E-04 | |
| Acenaphthene | 83-32-9 | 7.04E-06 | Source Test | 1.90E-07 | 3.14E-05 | |
| Acenaphthylene | 208-96-8 | 1.09E-04 | Source Test | 2.94E-06 | 4.85E-04 | |
| Acetaldehyde | 75-07-0 | 6.53E-01 | CATEF | 1.76E-02 | 2.91E+00 | |
| Acetonitrile | 75-05-8 | 7.96E+00 | CATEF | 2.15E-01 | 3.55E+01 | |
| Acrolein | 107-02-8 | 9.33E-02 | CATEF | 2.52E-03 | 4.16E-01 | |
| Acrylonitrile | 107-13-1 | 4.50E-03 | Source Test | 1.22E-04 | 2.01E-02 | |
| Anthracene | 120-12-7 | 1.10E-05 | Source Test | 2.98E-07 | 4.92E-05 | |
| Arsenic | 7440-38-2 | 5.91E-02 | Source Test | 1.60E-03 | 2.63E-01 | |
| Benzene | 71-43-2 | 8.59E-01 | CATEF | 2.32E-02 | 3.83E+00 | |
| Benzo(a)anthracene | 56-55-6 | 5.60E-02 | CATEF | 1.51E-03 | 2.49E-01 | |
| Benzo(a)pyrene | 50-32-8 | 5.60E-02 | CATEF | 1.51E-03 | 2.49E-01 | |
| Benzo(b)fluoranthene | 205-99-2 | 5.60E-02 | CATEF | 1.51E-03 | 2.49E-01 | |
| Benzo(e)pyrene | 192-97-2 | 7.48E-05 | CATEF | 2.02E-06 | 3.33E-04 | |
| Benzo(g,h,i)perylene | 191-24-2 | 5.60E-02 | CATEF | 1.51E-03 | 2.49E-01 | |
| Benzo(k)fluoranthene | 207-08-9 | 5.60E-02 | CATEF | 1.51E-03 | 2.49E-01 | |
| Cadmium | 7440-43-9 | 1.43E-03 | Source Test | 3.85E-05 | 6.36E-03 | |
| Carbon Tetrachloride | 56-23-5 | 3.76E-02 | CATEF | 1.02E-03 | 1.68E-01 | |
| Chlorobenzene | 108-90-7 | 8.69E-01 | CATEF | 2.35E-02 | 3.87E+00 | |
| Chloroform | 67-66-3 | 5.60E-02 | CATEF | 1.51E-03 | 2.49E-01 | |
| Chromium (Hex) | 18540-29-9 | 1.21E-05 | Source Test | 3.28E-07 | 5.41E-05 | |
| Chromium (Total) | 7440-47-3 | 4.64E-03 | Source Test | 1.25E-04 | 2.07E-02 | |
| Chrysene | 218-01-9 | 6.51E-06 | Source Test | 1.76E-07 | 2.90E-05 | |
| Copper | 7440-50-8 | 4.86E+00 | CATEF | 1.31E-01 | 2.17E+01 | |
| Dibenz(a,h)anthracene | 53-70-3 | 5.60E-02 | CATEF | 1.51E-03 | 2.49E-01 | |
| Dichloromethane | 75-09-2 | 4.29E-01 | CATEF | 1.16E-02 | 1.91E+00 | |
| Fluoranthene | 206-44-0 | 1.40E-05 | Source Test | 3.78E-07 | 6.24E-05 | |
| Fluorene | 86-73-7 | 2.84E-04 | Source Test | 7.66E-06 | 1.26E-03 | |
| Formaldehyde | 50-00-0 | 1.77E-01 | Source Test | 4.78E-03 | 7.89E-01 | |
| HCl | 7647-01-0 | 1.61E-03 | Source Test | 4.36E-05 | 7.19E-03 | |
| HF | 7664-39-3 | 2.15E-01 | Source Test | 5.80E-03 | 9.57E-01 | |

| | | |
|---|---|---|
| Hourly Biogas flow rate = | 27,000 scfh | Assumed to be biogas flow to one CHP engine |
| Annual biogas flow rate AD vessel purging = | 32,905 | Assumed to be 1/16 of biogas flow to two engines x annı |
| Annual biogas flow rate w/ CHP engines offline = | 4,422,382 | Assumed to be biogas flow to one engine x hours/year e |
| Total Annual biogas flow rate | 4,455,287 | |

[a] CATEF = Maximum emission factors from California Air Toxics Emission Factors http://www.arb.ca.gov/app/emsinv/catef_form.html
for flare fired on landfill gas based on assumption that biogas composition is similar to landfill gas
Source Test = September 9-11 2010 source tests on Santa Maria Landfill flare combusting LFG. Non-detects set to detection limit.

[b] Hourly emission rate [lb/hr] = Emission factor [lb/MMscf] x Biogas flow rate [scfh] / $10^6$ [scf/MMscf]

[b] Annual emission rate [lb/yr] = Emission factor [lb/MMscf] x Annual biogas flow rate [scf/yr] / $10^6$ [scf/MMscf]

**Table 22** **CHP Engine Toxic Air Contaminant Emissions from Biogas Combustion**

| Compound | CAS Number | Emission Factor (lb/MMscf)[a] | CHPSTK, CHP2 Hourly Emission Rate per Engine (lb/hr)[b] | CHPSTK, CHP2 Annual Emission Rate per Engine (lb/yr)[c] | RBD Hourly Emission Rate (lb/hr)[b] | RBD Annual Emission Rate (lb/yr)[c] |
|---|---|---|---|---|---|---|
| Benzene | 71-43-2 | 9.48E-03 | 1.44E-04 | 1.20E+00 | 2.87E-04 | 2.39E+00 |
| Benzo(a)anthracene | 56-55-6 | 1.60E-06 | 2.42E-08 | 2.02E-04 | 4.85E-08 | 4.03E-04 |
| Benzo(a)pyrene | 50-32-8 | 2.70E-07 | 4.09E-09 | 3.40E-05 | 8.18E-09 | 6.81E-05 |
| Benzo(b)fluoranthene | 205-99-2 | 4.88E-07 | 7.39E-09 | 6.15E-05 | 1.48E-08 | 1.23E-04 |
| Benzo(k)fluoranthene | 207-08-9 | 2.70E-07 | 4.09E-09 | 3.40E-05 | 8.18E-09 | 6.81E-05 |
| Carbon Tetrachloride | 56-23-5 | 1.14E-04 | 1.73E-06 | 1.44E-02 | 3.45E-06 | 2.87E-02 |
| Chloroform | 67-66-3 | 1.13E-04 | 1.71E-06 | 1.42E-02 | 3.42E-06 | 2.85E-02 |
| Chrysene | 218-01-9 | 5.87E-06 | 8.89E-08 | 7.40E-04 | 1.78E-07 | 1.48E-03 |
| Dibenz(a,h)anthracene | 53-70-3 | 2.70E-07 | 4.09E-09 | 3.40E-05 | 8.18E-09 | 6.81E-05 |
| Ethylene Dibromide | 106-93-4 | 1.12E-04 | 1.70E-06 | 1.41E-02 | 3.39E-06 | 2.82E-02 |
| Ethylene Dichloride | 106-93-4 | 5.08E-03 | 7.70E-05 | 6.40E-01 | 1.54E-04 | 1.28E+00 |
| Formaldehyde | 50-00-0 | 1.49E+00 | 2.26E-02 | 1.88E+02 | 4.51E-02 | 3.76E+02 |
| Hydrochloric Acid | 7647-01-0 | 2.07E+00 | 3.14E-02 | 2.61E+02 | 6.27E-02 | 5.22E+02 |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 2.70E-07 | 4.09E-09 | 3.40E-05 | 8.18E-09 | 6.81E-05 |
| Methyl Chloroform | 71-55-6 | 1.11E-04 | 1.68E-06 | 1.40E-02 | 3.36E-06 | 2.80E-02 |
| Methylene Chloride | 75-09-2 | 1.30E-04 | 1.97E-06 | 1.64E-02 | 3.94E-06 | 3.28E-02 |
| Napthtalene | 91-20-3 | 7.38E-04 | 1.12E-05 | 9.30E-02 | 2.24E-05 | 1.86E-01 |
| Perchloroethylene | 127-18-4 | 5.84E-04 | 8.85E-06 | 7.36E-02 | 1.77E-05 | 1.47E-01 |
| Trichloroethylene | 79-01-6 | 1.49E-03 | 2.26E-05 | 1.88E-01 | 4.51E-05 | 3.76E-01 |
| Vinyl Chloride | 75-01-4 | 1.63E-04 | 2.47E-06 | 2.06E-02 | 4.94E-06 | 4.11E-02 |

| | | | |
|---|---|---|---|
| Fuel flow rate = | 15,150 | scfh | Engine specificiation at 100% load |
| | 126,080,853 | scf/year | Hourly biogas [scfh] x Annual op. hours [hr/year] |

[a] Santa Barbara County Air Pollution Control District approved emission factors for landfill gas-fired IC engines with oxidation catalyst

[b] Hourly emission rate [lb/hr] = Emission factor [lb/MMscf] x biogas flow rate [scfh] / $10^6$ [scf/MMsc]
Molar volume [scf/lb-mole] x (1 - Engine destruction efficiency [%] / 100) x (1 - Oxidation catalyst efficiency [%] / 100)

[c] Annual emission rate [lb/yr] = Emission factor [lb/MMscf] x annual biogas flow rate [scf/year] / $10^6$ [scf/MMsc]

**CHP Engine Ammonia Emissions from SCR Ammonia Slip, Each Engine**

| Item | Value | Comments |
|---|---|---|
| Ammonia concentration | 5 | ppm @ 15% oxygen |
| Ammonia molecular weight | 17 | lb/lb-mole |
| Fd | 11,370 | scf/MMBtu, SCR system vendor estimate |
| Molar volume | 385.5 | scf/lb-mole |
| Engine heat input | 9.878 | MMBtu/hr, manufacturer's specification |
| Ammonia hourly emissions | 8.77E-02 | lb/hr = Ammonia concentration [ppm] x Molecular weight [lb/lb-mole] x |
| | | $10^{-6}$ / Molar volume [scf/lb-mole] x [20.9 / (20.9 - percent oxygen)] x |
| | | Fd [scf/MMBtu] x Heat input [MMBtu/hr] |
| Ammonia annual emissions | 7.30E+02 | lb/yr = Hourly emissions [lb/hr] x Annual biogas production [scf/year] / |
| | | Hourly biogas flow rate [scfh] |

## Table 23 Diesel Exhaust Particulate Matter Emissions

### Table 23-A
**MRF Facility Biofilter (7:00 a.m. - 11:00 p.m.)**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | | | | |
|---|---|---|---|---|---|---|---|---|
| Caterpillar M322D Material Handler | 311 | 16 | 2.07E-06 | 1.03E-02 | | | | |
| CAT 980 M Loader | 311 | 16 | 9.24E-06 | 4.60E-02 | | | | |
| CAT 938 K Loader | 311 | 16 | 2.02E-06 | 1.01E-02 | | | | |
| CAT 2P-6000 Forklift | 311 | 16 | 1.62E-06 | 8.07E-03 | 4.035E-03 | 4.035E-03 | **BFADF1** | **BFADF2** |
| Tennant 800 Sweeper | 311 | 16 | 1.31E-06 | 6.50E-03 | | | | |
| **Total** | | | **1.46E-05** | **7.28E-02** | **BF_TIP** | | | |

### Table 23-B
**MRF Facility Biofilter (11:00 p.m. - 7:00 a.m.)**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | | Hourly Night Factor | Annual Night Factor |
|---|---|---|---|---|---|---|---|
| Tennant 800 Sweeper | 311 | 8 | 1.31E-06 | 3.25E-03 | | | |
| **Total** | | | **1.31E-06** | **3.25E-03** | **BF_TIP** | 0.09 | 0.04 |

### Table 23-C
**AD Facility Biofilter (8:00 a.m. - 4:00 p.m.)**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | |
|---|---|---|---|---|---|
| CAT 938 M Loader | 208 | 8 | 4.04E-06 | 6.73E-03 | **BF_SCRUB** |
| **Total** | | | **4.04E-06** | **6.73E-03** | |

### Table 23-D
**Outside MRF and AD Facility Building (11:00 a.m. - 5:00 p.m.)**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | **SWEEP1** | **SWEEP2** |
|---|---|---|---|---|---|---|
| Tennant M30 Scrubber-Sweeper | 311 | 6 | 8.24E-04 | 1.54E+00 | 7.684E-01 | 7.684E-01 |
| **Total** | | | **8.24E-04** | **1.54E+00** | | |

### Table 23-E
**Composting Area (8:00 a.m. - 4:00 p.m.)**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | |
|---|---|---|---|---|---|
| CAT 938 K Loader | 311 | 8 | 2.02E-06 | 5.03E-03 | **COMPMAT** |
| Vermeer CT1010 TX Windrow Turner | 52 | 8 | 2.81E-03 | 1.17E+00 | **WINDROW** |

### Table 23-F
**Motor Vehicles (8:00 a.m. - 2:00 p.m.)**

| Segment | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | |
|---|---|---|---|---|
| MRF-Compost | 6 | 4.82E-05 | 8.99E-02 | **MRFCOMP** |
| MRF-Entrance | 6 | 7.58E-04 | 1.41E+00 | **MRFENTRY** |

### Table 23-G
**Emergency Generator**

| Segment | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | |
|---|---|---|---|---|
| 150 kW Generator | 6 | 1.1E-02 | 5.3E-01 | **EMGEN** |

**Table 24** **Diesel Exhaust Emissions of TACs with Acute Effects**

**Table 24-A**
**MRF Facility Biofilter (7:00 a.m. - 11:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 3.06E-03 | |
| Formaldehyde | 50-00-0 | 1.7261 | 2.83E-02 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 1.28E-02 | |
| Acrolein | 107-02-8 | 0.0339 | 5.56E-04 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 3.57E-03 | |
| Toluene | 108-88-3 | 0.1054 | 1.73E-03 | |
| Xylenes | 1330-20-7 | 0.0424 | 6.95E-04 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 3.06E-03 | |
| Arsenic | 7440-38-2 | 0.0016 | 2.62E-05 | |
| Copper | 7440-50-8 | 0.0041 | 6.72E-05 | |
| Mercury | 7439-97-6 | 0.0020 | 3.28E-05 | |
| Nickel | 7440-02-0 | 0.0039 | 6.40E-05 | **BF_TIP** |

Hourly fuel use = 16.4 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 24-B**
**AD Facility Biofilters (7:00 a.m. - 11:00 p.m.) - BF_ADF1 and BF_ADF2**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | BFADF1 | BFADF2 |
|---|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 8.38E-04 | 4.19E-04 | 4.19E-04 |
| Formaldehyde | 50-00-0 | 1.7261 | 7.77E-03 | 3.88E-03 | 3.88E-03 |
| Acetaldehyde | 75-07-0 | 0.7833 | 3.52E-03 | 1.76E-03 | 1.76E-03 |
| Acrolein | 107-02-8 | 0.0339 | 1.53E-04 | 7.63E-05 | 7.63E-05 |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 9.78E-04 | 4.89E-04 | 4.89E-04 |
| Toluene | 108-88-3 | 0.1054 | 4.74E-04 | 2.37E-04 | 2.37E-04 |
| Xylenes | 1330-20-7 | 0.0424 | 1.91E-04 | 9.54E-05 | 9.54E-05 |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 8.38E-04 | 4.19E-04 | 4.19E-04 |
| Arsenic | 7440-38-2 | 0.0016 | 7.20E-06 | 3.60E-06 | 3.60E-06 |
| Copper | 7440-50-8 | 0.0041 | 1.85E-05 | 9.23E-06 | 9.23E-06 |
| Mercury | 7439-97-6 | 0.0020 | 9.00E-06 | 4.50E-06 | 4.50E-06 |
| Nickel | 7440-02-0 | 0.0039 | 1.76E-05 | 8.78E-06 | 8.78E-06 |

Hourly fuel use = 4.5 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 24** **Diesel Exhaust Emissions of TACs with Acute Effects**

**Table 24-C**
**AD Facility Biofilter (8:00 a.m. - 4:00 p.m.) -BF_SCRUB**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | BF_SCRUB |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 8.38E-04 | |
| Formaldehyde | 50-00-0 | 1.7261 | 7.77E-03 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 3.52E-03 | |
| Acrolein | 107-02-8 | 0.0339 | 1.53E-04 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 9.78E-04 | |
| Toluene | 108-88-3 | 0.1054 | 4.74E-04 | |
| Xylenes | 1330-20-7 | 0.0424 | 1.91E-04 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 8.38E-04 | |
| Arsenic | 7440-38-2 | 0.0016 | 7.20E-06 | |
| Copper | 7440-50-8 | 0.0041 | 1.85E-05 | |
| Mercury | 7439-97-6 | 0.0020 | 9.00E-06 | |
| Nickel | 7440-02-0 | 0.0039 | 1.76E-05 | |

Hourly fuel use = 7 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 24-D**
**Outside MRF and AD Facility Building (11:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | SWEEP1 | SWEEP2 |
|---|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 8.38E-04 | 4.192E-04 | 4.192E-04 |
| Formaldehyde | 50-00-0 | 1.7261 | 7.77E-03 | 3.884E-03 | 3.884E-03 |
| Acetaldehyde | 75-07-0 | 0.7833 | 3.52E-03 | 1.762E-03 | 1.762E-03 |
| Acrolein | 107-02-8 | 0.0339 | 1.53E-04 | 7.628E-05 | 7.628E-05 |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 9.78E-04 | 4.892E-04 | 4.892E-04 |
| Toluene | 108-88-3 | 0.1054 | 4.74E-04 | 2.372E-04 | 2.372E-04 |
| Xylenes | 1330-20-7 | 0.0424 | 1.91E-04 | 9.540E-05 | 9.540E-05 |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 8.38E-04 | 4.192E-04 | 4.192E-04 |
| Arsenic | 7440-38-2 | 0.0016 | 7.20E-06 | 3.600E-06 | 3.600E-06 |
| Copper | 7440-50-8 | 0.0041 | 1.85E-05 | 9.225E-06 | 9.225E-06 |
| Mercury | 7439-97-6 | 0.0020 | 9.00E-06 | 4.500E-06 | 4.500E-06 |
| Nickel | 7440-02-0 | 0.0039 | 1.76E-05 | 8.775E-06 | 8.775E-06 |

Hourly fuel use = 4 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 24 Diesel Exhaust Emissions of TACs with Acute Effects**

**Table 24-E**
**Composting Area (8:00 a.m. - 4:00 p.m.)**
**Cat 938 K Loader**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) |
|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 5.03E-04 |
| Formaldehyde | 50-00-0 | 1.7261 | 4.66E-03 |
| Acetaldehyde | 75-07-0 | 0.7833 | 2.11E-03 |
| Acrolein | 107-02-8 | 0.0339 | 9.15E-05 |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 5.87E-04 |
| Toluene | 108-88-3 | 0.1054 | 2.85E-04 |
| Xylenes | 1330-20-7 | 0.0424 | 1.14E-04 |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 5.03E-04 |
| Arsenic | 7440-38-2 | 0.0016 | 4.32E-06 |
| Copper | 7440-50-8 | 0.0041 | 1.11E-05 |
| Mercury | 7439-97-6 | 0.0020 | 5.40E-06 |
| Nickel | 7440-02-0 | 0.0039 | 1.05E-05 |

**COMPMAT**

Hourly fuel use = 2.7 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 24-F**
**Composting Area (8:00 a.m. - 4:00 p.m.)**
**Vermeer CT1010 TX Windrow Turner**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) |
|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 2.24E-03 |
| Formaldehyde | 50-00-0 | 1.7261 | 2.07E-02 |
| Acetaldehyde | 75-07-0 | 0.7833 | 9.40E-03 |
| Acrolein | 107-02-8 | 0.0339 | 4.07E-04 |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 2.61E-03 |
| Toluene | 108-88-3 | 0.1054 | 1.26E-03 |
| Xylenes | 1330-20-7 | 0.0424 | 5.09E-04 |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 2.24E-03 |
| Arsenic | 7440-38-2 | 0.0016 | 1.92E-05 |
| Copper | 7440-50-8 | 0.0041 | 4.92E-05 |
| Mercury | 7439-97-6 | 0.0020 | 2.40E-05 |
| Nickel | 7440-02-0 | 0.0039 | 4.68E-05 |

**WINDROW**

| Compounds from WINDROW Organic TAC tab | Hourly Emission Rate (lb/hr) |
|---|---|
| Isopropyl alcohol | 2.22E-01 |
| Methyl alcohol | 6.71E-02 |
| Naphthalene | 2.62E-03 |
| Acetaldehyde | 7.34E-04 |
| NH3 | 1,779.46 |

Hourly fuel use = 12 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

## Table 24 Diesel Exhaust Emissions of TACs with Acute Effects

**Table 24-G**
**On-Site Motor Vehicles (8:00 a.m. - 2:00 p.m.)**
**Entrance to/from MRF**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | MRFENTRY |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 1.10E-04 | |
| Formaldehyde | 50-00-0 | 1.7261 | 1.02E-03 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 4.64E-04 | |
| Acrolein | 107-02-8 | 0.0339 | 2.01E-05 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 1.29E-04 | |
| Toluene | 108-88-3 | 0.1054 | 6.25E-05 | |
| Xylenes | 1330-20-7 | 0.0424 | 2.51E-05 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 1.10E-04 | |
| Arsenic | 7440-38-2 | 0.0016 | 9.49E-07 | |
| Copper | 7440-50-8 | 0.0041 | 2.43E-06 | |
| Mercury | 7439-97-6 | 0.0020 | 1.19E-06 | |
| Nickel | 7440-02-0 | 0.0039 | 2.31E-06 | |

Hourly fuel use = 0.59 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 24-H**
**On-Site Motor Vehicles (8:00 a.m. - 2:00 p.m.)**
**MRF to/from Compost**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | MRFCOMP |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 1.20E-05 | |
| Formaldehyde | 50-00-0 | 1.7261 | 1.11E-04 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 5.05E-05 | |
| Acrolein | 107-02-8 | 0.0339 | 2.18E-06 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 1.40E-05 | |
| Toluene | 108-88-3 | 0.1054 | 6.79E-06 | |
| Xylenes | 1330-20-7 | 0.0424 | 2.73E-06 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 1.20E-05 | |
| Arsenic | 7440-38-2 | 0.0016 | 1.03E-07 | |
| Copper | 7440-50-8 | 0.0041 | 2.64E-07 | |
| Mercury | 7439-97-6 | 0.0020 | 1.29E-07 | |
| Nickel | 7440-02-0 | 0.0039 | 2.51E-07 | |

Hourly fuel use = 0.06 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 24 Diesel Exhaust Emissions of TACs with Acute Effects**

**Table 24-I**
**Emergency Generator (0.5 hours/day, 26 hrs/year)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) |
|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 1.05E-03 |
| Formaldehyde | 50-00-0 | 1.7261 | 9.75E-03 |
| Acetaldehyde | 75-07-0 | 0.7833 | 4.43E-03 |
| Acrolein | 107-02-8 | 0.0339 | 1.92E-04 |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 1.23E-03 |
| Toluene | 108-88-3 | 0.1054 | 5.96E-04 |
| Xylenes | 1330-20-7 | 0.0424 | 2.40E-04 |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 1.05E-03 |
| Arsenic | 7440-38-2 | 0.0016 | 9.04E-06 |
| Copper | 7440-50-8 | 0.0041 | 2.32E-05 |
| Mercury | 7439-97-6 | 0.0020 | 1.13E-05 |
| Nickel | 7440-02-0 | 0.0039 | 2.20E-05 |

**EMGEN**

Hourly fuel use = 11.30 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 25** **AD NH3 Emissions**

| Item | Value | Comment |
|---|---|---|
| Digestate production (ton/yr) | 73,590 | AD design capacity |
| Digestate production (ton/day) | 201.62 | Annual / 365 days/year |
| Fraction food waste | **0.481** | Mustang estimate |
| Fraction green waste | **0.519** | Mustang estimate |
| Digestate from food waste (ton/day) | 96.98 | |
| Digestate from green waste (ton/day) | 104.64 | |
| Food waste EF (lb NH3/ton) | 14.20 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Green waste EF (lb NH3/ton) | 2.37 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Food waste EF (lb VOC/ton-day) | 0.237 | For one day of 60-day composting cycle |
| Green waste EF (lb VOC/ton-day) | 0.040 | For one day of 60-day composting cycle |
| NH3 from food waste (lb/day) | 22.95 | |
| NH3 from green waste (lb/day) | 4.13 | |
| Total NH3 (lb/day) | 27 | |
| Reduction from biofilter | 0.95 | |
| NH3 after biofilter (lb/day) | 1.35 | |
| VOC after biofilter (lb/hour) | 0.06 | Daily / 24 hours/day |
| VOC after biofilter (lb/yr) | 494 | |

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at:
http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

**Table 26** **TOTAL AD Biofilter Organic Toxic Air Contaminant Emissions**

| | | | | | BF_TIP | | BF_ADF 1, 2 | | BF_SCRUB | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **CAS Number** | **ROC Mass Fraction[a]** | **Hourly Emission Rate (lb/hr)[b]** | **Annual Emission Rate (lb/yr)[c]** | **Hourly Emission Rate (lb/hr)[b]** | **Annual Emission Rate (lb/yr)[c]** | **Hourly Emission Rate (lb/hr)[b]** | **Annual Emission Rate (lb/yr)[c]** | **Hourly Emission Rate (lb/hr)[b]** | **Annual Emission Rate (lb/yr)[c]** |
| Isopropyl alcohol | 67-63-0 | 0.423 | 6.16E-02 | 5.40E+02 | 2.03E-02 | 1.78E+02 | 9.91E-03 | 8.68E+01 | 2.15E-02 | 1.89E+02 |
| Methyl alcohol | 67-56-1 | 0.128 | 1.86E-02 | 1.63E+02 | 6.13E-03 | 5.37E+01 | 3.00E-03 | 2.63E+01 | 6.51E-03 | 5.70E+01 |
| Naphthalene | 91-20-3 | 0.005 | 7.28E-04 | 6.38E+00 | 2.40E-04 | 2.10E+00 | 1.17E-04 | 1.03E+00 | 2.54E-04 | 2.23E+00 |
| Acetaldehyde | 75-07-0 | 0.001 | 2.04E-04 | 1.79E+00 | 6.71E-05 | 5.88E-01 | 3.28E-05 | 2.87E-01 | 7.12E-05 | 6.24E-01 |
| H2S | 7783064 | 0.300 | 4.37E-02 | 3.83E+02 | 1.44E-02 | 1.26E+02 | 7.03E-03 | 6.16E+01 | 1.53E-02 | 1.34E+02 |
| Ammonia | NH3 | | 5.64E-02 | 4.94E+02 | 1.86E-02 | 1.63E+02 | 9.08E-03 | 7.95E+01 | 1.97E-02 | 1.73E+02 |

Hourly ROC Emissions = 0.15 lb/hr

Annual ROC Emissions = 1,276.09 lb/yr

[a] From Anuj Kumer, et. al, Volatile organic compound emissions from green waste composting: Characterization and ozone formation, Atmos. Environ., 45 (2011) 1841-1848.

[b] Hourly emission rate [lb/hr] = Hourly ROC emission rate [lb/hr] x Mass Fraction

[c] Annual emission rate [lb/yr] = Annual ROC emission rate [lb/yr] x Mass Fraction

| **Biofilter** | **$m^3$/ min** | **Fract.** |
|---|---|---|
| Tipping Area | 1,461 | 0.329 |
| ADF | 1,428 | 0.322 |
| Scrub | 1,550 | 0.349 |
| **Total** | **4,439** | **1.000** |

**Table 27**
**Windrow NH3 Emissions**

| Item | Value | Comment |
|---|---|---|
| Digestate production (ton/yr) | 73,590 | AD design capacity |
| Digestate production (ton/day) | 201.62 | Annual / 365 days/year |
| Fraction food waste | **0.481** | Mustang estimate |
| Fraction green waste | **0.519** | Mustang estimate |
| Digestate from food waste (ton/day) | 96.98 | |
| Digestate from green waste (ton/day) | 104.64 | |
| Food waste EF (lb NH3/ton) | 14.20 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Green waste EF (lb NH3/ton) | 2.37 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| NH3 from food waste (lb/day) | 1,377.08 | |
| NH3 from green waste (lb/day) | 247.99 | |
| Total NH3 (lb/day) | 1,625 | |
| Reduction from digestion process | 0.97 | See note b |
| NH3 after reduction from digestion (lb/day) | 48.75 | |
| Reduction from Best Available Control Technologies | 0.90 | See note c |
| NH3 after BMP reductions (lb/day) | 4.88 | |
| NH3 after BMP reductions (lb/hour) | 0.20 | Daily / 24 hours/day |
| NH3 after BMP reductions (lb/yr) | 1,779 | |

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at:
http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

[b] From Bay Area Air Quality Management District engineering evaluation for Zero Waste Energy proposed anaerobic digestion facility

[c] Best Available Control Technologies:
1. 20% inert, dry wood chip blending
2. Interactive pile management (i.e., turning)
3. 20 minutes irrigation after turning
4. Large pile size
5. Finished compost blanket pseudo biofilter

References for emission reductions include:
Advice from Bekon based on 20 facilities operating in Europe
***Comparison of Mitugation Measures for Reduction of Emissions from Greenwaste Composting*** prepared from SJVAPCD 2009:
http://valleyair.org/busind/pto/emission_factors/Criteria/Criteria/Composting/FINAL-COMPOST-STUDY-REPORT.pdf
***Greenwaste Compost Air Emissions Review*** (Modesto Compost Facility) prepared fror CIWMB June 2008:
http://www.calrecycle.ca.gov/publications/Documents/Organics%5C44207009.pd
***Greenwaste Compost Site Emissions Reductions*** Prepared for San Joaquin Valley Technology Advancement Program May 2013:
http://www.valleyair.org/grant_programs/TAP/documents/C-15636-ACP/C-15636_ACP_FinalReport.pd

**Table 28**
**Composting Windrow Fugitive Organic Toxic Air Contaminant Emissions**

| Compound | CAS Number | ROC Mass Fraction[a] | Hourly Emission Rate (lb/hr)[b] | Annual Emission Rate (lb/yr)[c] |
|---|---|---|---|---|
| Isopropyl alcohol | 67-63-0 | 0.423 | 2.22E-01 | 1.94E+03 |
| Methyl alcohol | 67-56-1 | 0.128 | 6.71E-02 | 5.88E+02 |
| Naphthalene | 91-20-3 | 0.005 | 2.62E-03 | 2.30E+01 |
| Acetaldehyde | 75-07-0 | 0.001 | 7.34E-04 | 6.43E+00 |

Hourly ROC Emissions = 0.52 lb/hr
Annual ROC Emissions = 4,593.91 lb/yr

[a] From Anuj Kumer, et. al, Volatile organic compound emissions from green waste composting: Characterization and ozone formation, Atmos. Environ., 45 (2011) 1841-1848.

[b] Hourly emission rate [lb/hr] = Hourly ROC emission rate [lb/hr] x Mass Fraction

[c] Annual emission rate [lb/yr] = Annual ROC emission rate [lb/yr] x Mass Fraction

$NH_3$ after BMP reductions (lb/hour) 0.386886 Daily / 24 hours/day
$NH_3$ after BMP reductions (lb/yr) 3389.12

**Table 29-A** **MRF Criteria Pollutant Daily Emissions Summary with CSSR**

| Source | Emissions (lb/day) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| **Onsite** | | | | | | |
| MRF Facility Equipment | 53.35 | 2.49 | 13.79 | 0.08 | 0.00 | 0.00 |
| Diesel Fuel Storage Tank | | 0.02 | | | | |
| Material Handling Fugitive PM | | | | | 0.00 | 0.00 |
| **Onsite Total** | **53.35** | **2.51** | **13.79** | **0.08** | **0.00** | **0.00** |
| | | | | | | |
| **Offsite** | | | | | | |
| Motor Vehicle Exhaust | 28.03 | 5.17 | 2.84 | 0.08 | 0.44 | 0.34 |
| Motor Vehicle Fugitive PM | | | | | 4.39 | 1.08 |
| **Offsite Total** | **28.03** | **5.17** | **2.84** | **0.08** | **4.83** | **1.42** |
| | | | | | | |
| **Total** | **81.38** | **7.68** | **16.63** | **0.16** | **4.83** | **1.42** |

**Table 29-B** **MRF Criteria Pollutant Annual Emissions Summary with CSSR**

| Source | Emissions (ton/year) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| **Onsite** | | | | | | |
| MRF Facility Equipment | 8.30 | 0.39 | 2.14 | 0.01 | 0.00 | 0.00 |
| Diesel Fuel Storage Tank | | 0.01 | | | | |
| Material Handling Fugitive PM | | | | | 0.00 | 0.00 |
| **Onsite Total**[a] | **8.30** | **0.39** | **2.14** | **0.01** | **0.00** | **0.00** |
| | | | | | | |
| **Offsite** | | | | | | |
| Motor Vehicle Exhaust | 4.36 | 0.80 | 0.44 | 0.01 | 0.07 | 0.05 |
| Motor Vehicle Fugitive PM | | | | | 0.68 | 0.17 |
| **Offsite Total** | **4.36** | **0.80** | **0.44** | **0.01** | **0.75** | **0.22** |
| | | | | | | |
| **Total** | **12.65** | **1.20** | **2.59** | **0.02** | **0.75** | **0.22** |

**Table 30**
**MRF Greenhouse Gas Annual Emissions Summary with CSSR**

| Source | Emissions (MT/year)[a] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[b] |
| **Onsite** | | | | |
| MRF Facility Equipment | 1,163.43 | 0.07 | 0.03 | 1,173.91 |
| **Onsite Total** | **1,163.43** | **0.07** | **0.03** | **1,173.91** |
| | | | | |
| **Offsite** | | | | |
| Motor Vehicle Exhaust | 1,747.41 | 2.90 | 0.26 | 1,898.09 |
| **Offsite Total** | **1,747.41** | **2.90** | **0.26** | **1,898.09** |
| | | | | |
| **Total** | **2,910.84** | **2.97** | **0.29** | **3,072.00** |

[a] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT
[b] $CO_2e$ = CO2-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

**Table 31** **MRF Equipment Exhaust Emissions**

| Equipment | Horsepower | Number | Hours/Day | Fuel Use (gal/hr) | Emission Stds. | Emission Factors (g/bhp-hr)[a] | | | | | Emission Factor [g/gal] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | CO | ROC[b] | NOx[b] | PM10[c] | PM2.5[c] | $CO_2$[d] | $CH_4$[e] | $N_2O$[e] |
| **Materials Recovery Facility Building** | | | | | | | | | | | | | |
| Caterpillar M322D Material Handler | 173 | 1 | 16 | 2.7 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| CAT 980 M Loader | 386 | 2 | 16 | 3.5 | Tier 4 | 2.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| CAT 938 K Loader | 169 | 1 | 16 | 2.7 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| CAT 2P-6000 Forklift | 61 | 3 | 16 | 1.5 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |
| Tennant 800 Sweeper | 65 | 1 | 24 | 4 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |

[a] Emission factors assumed the same as emission standards.

[b] Where standard is for NMHC+NOx (Volvo L20F, Toyota forklifts and Tennant sweeper), emissions assumed to be 5 percent ROC and 95 percent NOx, from Table D-25 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[c] PM10 and PM2.5 assumed to be same as PM emission standards.

[d] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.

[e] $CH_4$ and $N_2O$ from Table 13.7 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

| Equipment | Load Factor[c] | Emission Rates Each Unit (lb/hr) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO[a] | ROC[a] | NOx[a] | SOx[b] | PM10[a, d] | PM2.5[a, d] | $CO_2$[e] | $CH_4$[e] | $N_2O$[e] |
| **Materials Recovery Facility Building** | | | | | | | | | | |
| Caterpillar M322D Material Handler | 0.3618 | 0.511 | 0.019 | 0.041 | 0.00056 | 2.07E-06 | 2.07E-06 | 60.77 | 3.45E-03 | 1.55E-03 |
| CAT 980 M Loader | 0.3618 | 0.831 | 0.043 | 0.092 | 0.00073 | 4.62E-06 | 4.62E-06 | 78.78 | 4.48E-03 | 2.01E-03 |
| CAT 938 K Loader | 0.3618 | 0.499 | 0.019 | 0.040 | 0.00056 | 2.02E-06 | 2.02E-06 | 60.77 | 3.45E-03 | 1.55E-03 |
| CAT 2P-6000 Forklift | 0.201 | 0.100 | 0.005 | 0.090 | 0.00031 | 5.41E-07 | 5.41E-07 | 33.76 | 1.92E-03 | 8.60E-04 |
| Tennant 800 Sweeper | 0.4556 | 0.242 | 0.011 | 0.217 | 0.00083 | 1.31E-06 | 1.31E-06 | 90.04 | 5.11E-03 | 2.29E-03 |

Diesel Fuel Density = 6.943 lb/gal

Diesel Fuel Sulfur = 15 ppmw

[a] Emission Rate [lb/hr] = Emission Factor [g/bhp-hr] x Engine Horsepower [hp] x Load Factor [unitless] / 453.6 [g/lb]

[b] Emission Rate [lb/hr] = Fuel Use [gal/hr] x Fuel Density [lb/gal] x Fuel Sulfur [ppmw] x $10^{-6}$ x 2 [lb $SO_2$/lb S]

[c] From OFFROAD 2011 model

[d] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

[e] Emission rate [lb/hr] = Fuel use [gal/hr] x Emission factor [g/gal] / 453.6 [lb/gal]

**Table 31** **MRF Equipment Exhaust Emissions**

| Equipment | Daily Emissions (lb/day)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|---|---|---|---|---|
| **Materials Recovery Facility Building** | | | | | | | | | |
| Caterpillar M322D Material Handler | 8.17 | 0.31 | 0.66 | 0.01 | 3.31E-05 | 3.31E-05 | 972.38 | 0.06 | 0.02 |
| CAT 980 M Loader | 26.60 | 1.38 | 2.96 | 0.02 | 1.48E-04 | 1.48E-04 | 2,520.99 | 0.14 | 0.06 |
| CAT 938 K Loader | 7.98 | 0.30 | 0.65 | 0.01 | 3.24E-05 | 3.24E-05 | 972.38 | 0.06 | 0.02 |
| CAT 2P-6000 Forklift | 4.80 | 0.23 | 4.31 | 0.01 | 2.59E-05 | 2.59E-05 | 1,620.63 | 0.09 | 0.04 |
| Tennant 800 Sweeper | 5.80 | 0.27 | 5.21 | 0.02 | 3.13E-05 | 3.13E-05 | 2,160.85 | 0.12 | 0.06 |
| **Total** | **53.35** | **2.49** | **13.79** | **0.08** | **0.00** | **0.00** | **8,247.23** | **0.47** | **0.21** |

[a] Daily Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Number Units x Operating Time [hr/day]

| Equipment | Days/Year | Annual Emissions (lb/year)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|
| **Materials Recovery Facility Building** | | | | | | | | | | |
| Caterpillar M322D Material Handler | 311 | 2,540.53 | 96.13 | 205.99 | 2.80 | 0.01 | 0.01 | 3.02E+05 | 17.18 | 7.70 |
| CAT 980 M Loader | 311 | 8,272.88 | 428.96 | 919.21 | 7.26 | 0.05 | 0.05 | 7.84E+05 | 44.54 | 19.97 |
| CAT 938 K Loader | 311 | 2,481.79 | 93.91 | 201.23 | 2.80 | 0.01 | 0.01 | 3.02E+05 | 17.18 | 7.70 |
| CAT 2P-6000 Forklift | 311 | 1,492.99 | 70.61 | 1,341.67 | 4.66 | 0.01 | 0.01 | 5.04E+05 | 28.63 | 12.83 |
| Tennant 800 Sweeper | 311 | 1,803.01 | 85.28 | 1,620.27 | 6.22 | 0.01 | 0.01 | 6.72E+05 | 38.18 | 17.11 |
| **Total** | | **16,591.19** | **774.89** | **4,288.36** | **23.73** | **0.08** | **0.08** | **2.56E+06** | **145.70** | **65.32** |

[a] Annual Emissions [lb/year] = Daily Emissions [lb/day] x Operating Days [days/year]

**Table 32** **MRF Off-Site Motor Vehicle Exhaust Emissions with CSSR**

| Vehicle | Use | Fuel | One-Way Trips/Day | Mileage (mpg)[b] | One-Way Trip Dist. (mi) | Miles/ Day |
|---|---|---|---|---|---|---|
| Freightliner Tractors | Recycleables to POLA[a] | CNG | 36 | 6 | 131 | 4,716 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast[c] | Diesel | 14 | 6 | -17 | -238 |
| Worker Commuting | From the North[d] | Gasoline | 56 | 22 | 37 | 2,072 |
| Worker Commuting | From the South[d] | Gasoline | 6 | 22 | 15 | 90 |

[a] Round trips/day = 126,000 tons/yr / 311 op. days/yr / 22 tons/trip = 18.4 one-way trips/day x 2 = 36.8 one-way trips/day rounded to 36

[b] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2017 by total miles in Santa Barbara County
Mileage for Freightliner Tractor is diesel-equivalent, Mustang estimate

[c] Round trips are from Project Traffic Study. Mileage is difference between SCRTS to Tajiguas (22 mi.) and SCRTS to Gold Coast (39 mi.)

[d] Trips/day are from Project Traffic Study

| Vehicle | Use | EMFAC Vehicle Class | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $CO^{a,b}$ | $ROC^{a,c}$ | $NOx^{a,c}$ | $SOx^{a,d}$ | $PM10^{a,c}$ | $PM2.5^{a,c}$ | $CO_2^{a,e}$ | $CH_4^{a,f}$ | $N_2O^{f,g}$ |
| Freightliner Tractors | Recycleables to POLA | N/A | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast | T7 tractor | 1.16E+00 | 2.53E-01 | 6.95E+00 | 1.69E-02 | 1.80E-01 | 1.11E-01 | 1.68E+03 | 1.38E-02 | 5.81E-02 |
| Worker Commuting | From the North | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |
| Worker Commuting | From the South | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |

Diesel Fuel HV = 128,450 Btu/gal
Natural Gas HV = 1,020 Btu/scf
Natural Gas S = 0.5 grains/100 scf
Diesel Fuel Density = 6.943 lb/gal
Diesel Fuel Sulfur = 15 ppmw
Natural Gas $CO_2$ EF = 0.054 Kg/scf from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2017 by total miles in Santa Barbara County

[b] Freightliner tractor calculated by dividing EMFAC2011 calculated total daily CO emissions from 2017 model year T7 tractors in Santa Barbara County in 2017 by total miles in Santa Barbara County

[c] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g $SO_2$/g S)

[e] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (kg/scf) x 1,000 (g/kg)

[f] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[g] Emission factor for gasoline calculated from 0.0416 x NOx emission factor; emission factor for diesel calculated as 0.3316 [g/gal] / mileage [mpg]; see:
http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 32** **MRF Off-Site Motor Vehicle Exhaust Emissions with CSSR**

| Vehicle | Use | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractors | Recycleables to POLA | 12.13 | 3.85 | 4.78 | 0.07 | 0.30 | 0.30 | 11,783.58 | 20.44 | 1.82 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast | -0.61 | -0.13 | -3.65 | -0.01 | -0.09 | -0.06 | -880.47 | -0.01 | -0.03 |
| Worker Commuting | From the North | 15.83 | 1.40 | 1.64 | 0.02 | 0.22 | 0.10 | 1,421.98 | 0.12 | 0.07 |
| Worker Commuting | From the South | 0.69 | 0.06 | 0.07 | 0.00 | 0.01 | 0.00 | 61.77 | 0.01 | 0.00 |
| **Total** | | **28.03** | **5.17** | **2.84** | **0.08** | **0.44** | **0.34** | **12,386.86** | **20.55** | **1.86** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Op. Days/yr | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractors | Recycleables to POLA | 311 | 3,771.65 | 1,196.36 | 1,487.37 | 21.99 | 93.77 | 93.77 | 3,664,692.89 | 6,356.89 | 565.85 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast | 311 | -189.68 | -41.25 | -1,134.46 | -2.75 | -29.39 | -18.15 | -273,825.41 | -2.25 | -9.48 |
| Worker Commuting | From the North | 311 | 4,922.35 | 434.92 | 509.53 | 5.41 | 68.65 | 29.84 | 442,237.03 | 35.80 | 21.20 |
| Worker Commuting | From the South | 311 | 213.81 | 18.89 | 22.13 | 0.24 | 2.98 | 1.30 | 19,209.14 | 1.56 | 0.92 |
| **Total** | | | **8,718.13** | **1,608.92** | **884.57** | **24.89** | **136.02** | **106.75** | **3,852,313.65** | **6,391.99** | **578.48** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Off-Site Motor Vehicle Fugitive PM Emissions**

**Emission Factors for Vehicles on Off-Site Paved Roads**

| Parameter | Value | Comments |
|---|---|---|
| Road silt loading ($g/m^2$) | 0.1 | CalEEMod default |
| Onroad vehicles average weight (tons) | 2.4 | CalEEMod Default for Santa Barbara County |
| PM10 emission factor (lb/mile) | 6.61E-04 | 0.0022 x (silt loading $[g/m^2]$)$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |
| PM2.5 emission factor (lb/mile) | 1.62E-04 | 0.00054 x (silt loading $[g/m^2]$)$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |

| Vehicle | Use | Miles/ Day | Op. Days/yr | Daily Emissions (lb/day)[a] | | Annual Emissions (lb/year)[b] | |
|---|---|---|---|---|---|---|---|
| | | | | PM10 | PM2.5 | PM10 | PM2.5 |
| Freightliner Tractors | Recycleables to POLA | 4,716 | 311 | 3.12 | 0.77 | 969.55 | 237.98 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast | -238 | 311 | -0.16 | -0.04 | -48.93 | -12.01 |
| Worker Commuting | From the North | 2,072 | 311 | 1.37 | 0.34 | 425.98 | 104.56 |
| Worker Commuting | From the South | 90 | 311 | 0.06 | 0.01 | 18.50 | 4.54 |
| **Total** | | | | **4.39** | **1.08** | **1,365.11** | **335.07** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]

[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 33** **MRF On-Site Fugitive PM Emissions with CSSR**

**Material Transfers with CSSR**

| Material | Transfer | Moisture (%)[a] | Daily Amount (tons) | Annual Op. (Days/year) | Emission Factors (lb/ton)[b] | | Emissions (lb/day)[c,e] | | Emissions (lb/year)[d] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| MSW | Into MRF Facility | 28 | 930 | 311 | 3.84E-04 | 5.82E-05 | 3.57E-04 | 5.41E-05 | 0.11 | 0.02 |

[a] From Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[b] Emission factor [lb/ton] = k x 0.0032 x (wind speed [mph] / 5)$^{1.3}$ / (material moisture [%] /2 )$^{1.4}$
from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06)

| | | |
|---|---|---|
| k = | 0.35 | for PM10 |
| | 0.053 | for PM2.5 |
| Wind speed = | 5.47 | mph, from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5 |

[c] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

[e] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

**Table 34** **Motor Vehicle Emission Factors in Santa Barbara County for 2017**

| | | | Emission Factors (g/mi)[a] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Vehicle Class** | **Fuel** | | **CO** | **ROG** | **NOx** | **SOx** | **PM10** | **PM2.5** | **$CO_2$** | **TOG** | **$CH_4$** | **$N_2O$** | **Mileage (mpg)** |
| LDA | GAS | LDAGAS | 1.48E+00 | 1.31E-01 | 1.48E-01 | 3.26E-03 | 4.68E-02 | 1.97E-02 | 2.51E+02 | 1.45E-01 | 1.31E-02 | 6.14E-03 | 26.09 |
| LDA | DSL | LDADSL | 1.55E-01 | 2.65E-02 | 4.71E-01 | 3.31E-03 | 6.34E-02 | 3.49E-02 | 2.71E+02 | 3.01E-02 | 1.45E-03 | 1.14E-02 | 29.10 |
| LDT1 | GAS | LDT1GAS | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 3.33E-01 | 2.52E-02 | 1.49E-02 | 22.32 |
| LDT1 | DSL | LDT1DSL | 2.53E-01 | 5.47E-02 | 6.14E-01 | 3.38E-03 | 8.97E-02 | 5.91E-02 | 2.78E+02 | 6.23E-02 | 2.99E-03 | 1.16E-02 | 28.49 |
| LDT2 | GAS | LDT2GAS | 2.46E+00 | 2.27E-01 | 3.47E-01 | 4.46E-03 | 4.73E-02 | 2.01E-02 | 3.69E+02 | 2.49E-01 | 2.11E-02 | 1.44E-02 | 19.08 |
| LDT2 | DSL | LDT2DSL | 1.81E-01 | 3.17E-02 | 5.51E-01 | 3.32E-03 | 6.82E-02 | 3.94E-02 | 2.82E+02 | 3.60E-02 | 1.73E-03 | 1.14E-02 | 28.99 |
| LHD1 | GAS | LHD1GAS | 5.86E+00 | 7.03E-01 | 1.13E+00 | 1.00E-02 | 4.85E-02 | 2.12E-02 | 9.44E+02 | 7.56E-01 | 4.55E-02 | 4.70E-02 | 8.48 |
| LHD1 | DSL | LHD1DSL | 1.22E+00 | 2.23E-01 | 3.57E+00 | 5.02E-03 | 1.38E-01 | 8.12E-02 | 4.99E+02 | 2.54E-01 | 1.22E-02 | 1.73E-02 | 19.17 |
| LHD2 | GAS | LHD2GAS | 3.94E+00 | 5.03E-01 | 9.78E-01 | 9.99E-03 | 4.73E-02 | 2.01E-02 | 9.44E+02 | 5.43E-01 | 4.03E-02 | 4.07E-02 | 8.51 |
| LHD2 | DSL | LHD2DSL | 1.16E+00 | 2.07E-01 | 3.36E+00 | 5.02E-03 | 1.47E-01 | 8.38E-02 | 4.99E+02 | 2.36E-01 | 1.13E-02 | 1.73E-02 | 19.19 |
| MCY | GAS | MCYGAS | 2.85E+01 | 3.62E+00 | 1.35E+00 | 2.17E-03 | 4.55E-02 | 1.84E-02 | 1.55E+02 | 3.90E+00 | 2.41E-01 | 5.61E-02 | 39.15 |
| MDV | GAS | MDVGAS | 3.37E+00 | 2.87E-01 | 5.08E-01 | 5.66E-03 | 4.73E-02 | 2.01E-02 | 4.85E+02 | 3.20E-01 | 3.14E-02 | 2.11E-02 | 15.03 |
| MDV | DSL | MDVDSL | 1.47E-01 | 2.63E-02 | 4.04E-01 | 3.32E-03 | 6.53E-02 | 3.66E-02 | 2.94E+02 | 2.99E-02 | 1.43E-03 | 1.14E-02 | 29.00 |
| MH | GAS | MHGAS | 5.38E+00 | 2.11E-01 | 8.76E-01 | 6.86E-03 | 4.71E-02 | 1.99E-02 | 6.44E+02 | 2.48E-01 | 2.33E-02 | 3.64E-02 | 12.41 |
| MH | DSL | MHDSL | 7.31E-01 | 2.32E-01 | 7.05E+00 | 1.15E-02 | 3.36E-01 | 2.37E-01 | 1.14E+03 | 2.64E-01 | 1.27E-02 | 3.95E-02 | 8.40 |
| Motor Coach | DSL | Motor CoachDSL | 1.31E+00 | 2.74E-01 | 6.55E+00 | 1.74E-02 | 2.16E-01 | 1.27E-01 | 1.73E+03 | 3.12E-01 | 1.50E-02 | 6.00E-02 | 5.52 |
| OBUS | GAS | OBUSGAS | 1.62E+01 | 1.21E+00 | 2.87E+00 | 7.40E-03 | 4.65E-02 | 1.93E-02 | 6.77E+02 | 1.29E+00 | 8.25E-02 | 1.19E-01 | 11.49 |
| PTO | DSL | PTODSL | 7.94E-01 | 2.26E-01 | 9.79E+00 | 2.05E-02 | 6.43E-02 | 5.92E-02 | 2.05E+03 | 2.58E-01 | 1.24E-02 | 7.08E-02 | 4.68 |
| SBUS | GAS | SBUSGAS | 7.34E+00 | 6.16E-01 | 1.05E+00 | 7.64E-03 | 4.68E-02 | 1.96E-02 | 7.14E+02 | 6.70E-01 | 1.01E-01 | 4.37E-02 | 11.14 |
| SBUS | DSL | SBUSDSL | 8.65E-01 | 2.48E-01 | 1.18E+01 | 1.34E-02 | 8.77E-01 | 4.33E-01 | 1.33E+03 | 2.82E-01 | 1.35E-02 | 4.61E-02 | 7.20 |
| T6 Ag | DSL | T6 AgDSL | 1.07E+00 | 3.24E-01 | 4.79E+00 | 1.15E-02 | 3.11E-01 | 2.14E-01 | 1.15E+03 | 3.69E-01 | 1.77E-02 | 3.97E-02 | 8.36 |
| T6 Public | DSL | T6 PublicDSL | 3.34E-01 | 8.46E-02 | 6.51E+00 | 1.18E-02 | 1.81E-01 | 9.45E-02 | 1.18E+03 | 9.63E-02 | 4.62E-03 | 4.07E-02 | 8.15 |
| T6 CAIRP heavy | DSL | T6 CAIRP heavyDSL | 4.46E-01 | 1.22E-01 | 3.30E+00 | 1.14E-02 | 1.85E-01 | 9.85E-02 | 1.13E+03 | 1.39E-01 | 6.69E-03 | 3.92E-02 | 8.45 |
| T6 CAIRP small | DSL | T6 CAIRP smallDSL | 5.60E-01 | 1.54E-01 | 1.93E+00 | 1.13E-02 | 2.10E-01 | 1.22E-01 | 1.13E+03 | 1.76E-01 | 8.43E-03 | 3.90E-02 | 8.51 |
| T6 OOS heavy | DSL | T6 OOS heavyDSL | 4.46E-01 | 1.22E-01 | 3.30E+00 | 1.14E-02 | 1.85E-01 | 9.85E-02 | 1.13E+03 | 1.39E-01 | 6.69E-03 | 3.92E-02 | 8.45 |
| T6 OOS small | DSL | T6 OOS smallDSL | 5.60E-01 | 1.54E-01 | 1.93E+00 | 1.13E-02 | 2.10E-01 | 1.22E-01 | 1.13E+03 | 1.76E-01 | 8.43E-03 | 3.90E-02 | 8.51 |
| T6 instate construction heavy | DSL | T6 instate construction heavyDSL | 4.61E-01 | 1.31E-01 | 6.42E+00 | 1.15E-02 | 1.96E-01 | 1.09E-01 | 1.15E+03 | 1.49E-01 | 7.17E-03 | 3.97E-02 | 8.35 |
| T6 instate construction small | DSL | T6 instate construction smallDSL | 8.12E-01 | 2.31E-01 | 3.47E+00 | 1.14E-02 | 2.70E-01 | 1.76E-01 | 1.13E+03 | 2.63E-01 | 1.26E-02 | 3.92E-02 | 8.47 |
| T6 instate heavy | DSL | T6 instate heavyDSL | 4.62E-01 | 1.30E-01 | 5.77E+00 | 1.15E-02 | 1.95E-01 | 1.07E-01 | 1.14E+03 | 1.48E-01 | 7.12E-03 | 3.96E-02 | 8.37 |
| T6 instate small | DSL | T6 instate smallDSL | 7.62E-01 | 2.16E-01 | 3.16E+00 | 1.13E-02 | 2.59E-01 | 1.66E-01 | 1.13E+03 | 2.46E-01 | 1.18E-02 | 3.91E-02 | 8.48 |
| T6 utility | DSL | T6 utilityDSL | 3.86E-01 | 9.17E-02 | 3.53E+00 | 1.17E-02 | 1.74E-01 | 8.79E-02 | 1.16E+03 | 1.04E-01 | 5.01E-03 | 4.03E-02 | 8.24 |
| T6TS | GAS | T6TSGAS | 1.29E+01 | 1.02E+00 | 1.95E+00 | 7.24E-03 | 4.70E-02 | 1.98E-02 | 6.67E+02 | 1.09E+00 | 5.04E-02 | 8.10E-02 | 11.76 |
| T7 Ag | DSL | T7 AgDSL | 1.86E+00 | 4.07E-01 | 8.81E+00 | 1.71E-02 | 2.86E-01 | 2.08E-01 | 1.71E+03 | 4.63E-01 | 2.22E-02 | 5.91E-02 | 5.61 |
| T7 CAIRP | DSL | T7 CAIRPDSL | 1.74E+00 | 3.60E-01 | 4.50E+00 | 1.76E-02 | 1.81E-01 | 1.12E-01 | 1.75E+03 | 4.10E-01 | 1.97E-02 | 6.06E-02 | 5.47 |
| T7 CAIRP construction | DSL | T7 CAIRP constructionDSL | 1.74E+00 | 3.60E-01 | 4.65E+00 | 1.76E-02 | 1.81E-01 | 1.12E-01 | 1.75E+03 | 4.10E-01 | 1.97E-02 | 6.06E-02 | 5.47 |
| T7 NNOOS | DSL | T7 NNOOSDSL | 1.68E+00 | 3.39E-01 | 2.95E+00 | 1.77E-02 | 1.63E-01 | 9.53E-02 | 1.76E+03 | 3.86E-01 | 1.85E-02 | 6.10E-02 | 5.44 |
| T7 NOOS | DSL | T7 NOOSDSL | 1.89E+00 | 3.87E-01 | 4.66E+00 | 1.78E-02 | 1.82E-01 | 1.13E-01 | 1.78E+03 | 4.41E-01 | 2.12E-02 | 6.15E-02 | 5.39 |
| T7 other port | DSL | T7 other portDSL | 2.45E+00 | 5.29E-01 | 7.87E+00 | 1.73E-02 | 2.09E-01 | 1.38E-01 | 1.72E+03 | 6.02E-01 | 2.89E-02 | 5.96E-02 | 5.56 |
| T7 POLA | DSL | T7 POLADSL | 2.62E+00 | 5.58E-01 | 7.87E+00 | 1.76E-02 | 2.09E-01 | 1.38E-01 | 1.75E+03 | 6.36E-01 | 3.05E-02 | 6.07E-02 | 5.46 |
| T7 Public | DSL | T7 PublicDSL | 1.38E+00 | 2.76E-01 | 1.54E+01 | 2.01E-02 | 1.67E-01 | 9.92E-02 | 2.00E+03 | 3.14E-01 | 1.51E-02 | 6.93E-02 | 4.79 |
| T7 Single | DSL | T7 SingleDSL | 8.53E-01 | 1.83E-01 | 8.92E+00 | 1.71E-02 | 1.59E-01 | 9.17E-02 | 1.70E+03 | 2.08E-01 | 1.00E-02 | 5.90E-02 | 5.62 |
| T7 single construction | DSL | T7 single constructionDSL | 8.46E-01 | 1.82E-01 | 9.18E+00 | 1.71E-02 | 1.59E-01 | 9.21E-02 | 1.70E+03 | 2.07E-01 | 9.93E-03 | 5.90E-02 | 5.62 |
| T7 SWCV | DSL | T7 SWCVDSL | 1.05E+00 | 2.13E-01 | 1.23E+01 | 1.84E-02 | 1.61E-01 | 9.40E-02 | 1.83E+03 | 2.43E-01 | 1.17E-02 | 6.33E-02 | 5.24 |
| T7 tractor | DSL | T7 tractorDSL | 1.16E+00 | 2.53E-01 | 6.95E+00 | 1.69E-02 | 1.80E-01 | 1.11E-01 | 1.68E+03 | 2.88E-01 | 1.38E-02 | 5.81E-02 | 5.71 |
| T7 tractor construction | DSL | T7 tractor constructionDSL | 1.25E+00 | 2.69E-01 | 7.90E+00 | 1.71E-02 | 1.81E-01 | 1.12E-01 | 1.70E+03 | 3.06E-01 | 1.47E-02 | 5.90E-02 | 5.62 |
| T7 utility | DSL | T7 utilityDSL | 1.90E+00 | 3.60E-01 | 9.58E+00 | 1.99E-02 | 1.48E-01 | 8.14E-02 | 1.98E+03 | 4.10E-01 | 1.97E-02 | 6.86E-02 | 4.83 |
| T7IS | GAS | T7ISGAS | 4.33E+01 | 1.28E+00 | 5.91E+00 | 6.63E-03 | 4.58E-02 | 1.87E-02 | 5.63E+02 | 1.45E+00 | 1.01E-01 | 2.46E-01 | 12.82 |
| UBUS | GAS | UBUSGAS | 1.85E+01 | 3.27E+00 | 4.52E+00 | 7.86E-03 | 4.83E-02 | 2.11E-02 | 7.11E+02 | 3.48E+00 | 1.30E-01 | 1.88E-01 | 10.83 |
| UBUS | DSL | UBUSDSL | 2.17E+00 | 4.67E-01 | 1.26E+01 | 2.36E-02 | 1.08E+00 | 5.78E-01 | 2.35E+03 | 5.32E-01 | 2.55E-02 | 8.14E-02 | 4.07 |
| All Other Buses | DSL | All Other BusesDSL | 5.08E-01 | 1.42E-01 | 5.35E+00 | 1.15E-02 | 1.98E-01 | 1.10E-01 | 1.14E+03 | 1.62E-01 | 7.78E-03 | 3.95E-02 | 8.39 |

[a] CO, ROC NOx, $SO_2$, PM10, PM2.5, TOG and $CO_2$ calculated by dividing total daily emissions in Santa Barbara County for 2017 by total miles, and mileage calculated by dividing total daily fuel use by total miles from EMFAC2011 online data (http://www.arb.ca.gov/emfac/). $CH_4$ for gasoline-fueled vehicles calculated by dividing total daily emissions in Santa Barbara County for 2017 by total miles calculated with EMFAC2011-LDV (http://www.arb.ca.gov/msei/emfac2011_ldv.htm). $CH_4$ for diesel-fueled vehciles calculated as 0.048 x TOG (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07). $N_2O$ for gasoline-fueled vehicles calculated as 0.046 x NOx, and $N_2O$ for diesel-fueled vehicles calculated as 0.3316 grams/gallon (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07)

# Attachment C.2

# Existing Landfill Sources Emissions Calculations

**Table 1**
**Gasoline Dispensing Emissions**
http://www.sbcapcd.org/eng/dl/appforms/apcd-25T.pdf

**SBCAPCD Approved Emission Factors**

| Phase | lb/1000 gal | lb/yr | lb/hr |
|---|---|---|---|
| Loading | 0.15 | 0.557 | 6.354E-05 |
| Breathing | 0.25 | 0.928 | 1.059E-04 |
| Refueling | 0.42 | 1.559 | 1.779E-04 |
| Spillage | 0.42 | 1.559 | 1.779E-04 |
| Total | 1.24 | 4.602 | 5.253E-04 |

**Modeling Parameters**

| Process | Release Height (ft) | Stack Temp (deg F) | Stack Vel (ft/min) | Stack Dia (ft) | σZint (ft) | σYint (ft) |
|---|---|---|---|---|---|---|
| Loading | 12 | 65 | 0.000463 | 0.167 | -- | -- |
| Breathing | 12 | 60 | 0.000771 | 0.167 | -- | -- |
| Refueling | 3.28 | -- | -- | -- | 6.1 | 9.16 |
| Spillage | 0 | -- | -- | -- | 6.1 | 9.16 |

| | | |
|---|---|---|
| Annual Throughput: | 3711 | gal/yr |
| % Benzene | 0.3 | 0.1 |
| | 0.003 | 0.01 |

**Benzene Emissions for Modeling**

| Phase | lb/yr | lb/hr |
|---|---|---|
| Loading | 1.670E-03 | 1.906E-07 |
| Breathing | 2.783E-03 | 3.177E-07 |
| Refueling | 4.676E-03 | 5.338E-07 |
| Spillage | 1.559E-02 | 1.779E-06 |

**Modeling Parameters**

| Process | Release Height (m) | Stack Temp (deg K) | Stack Vel (m/s) | Stack Dia (m) | σZint (m) | σYint (m) | Source ID |
|---|---|---|---|---|---|---|---|
| Loading | 3.658 | 291.483 | 2.350E-06 | 0.051 | -- | -- | GASLOAD |
| Breathing | 3.658 | 288.706 | 3.917E-06 | 0.051 | -- | -- | GASBREAT |
| Refueling | 1.000 | -- | -- | -- | 1.859 | 2.792 | GASREFU |
| Spillage | 0.000 | -- | -- | -- | 1.859 | 2.792 | GASSPILL |

**Table 2**
**LFG Fugitive Emissions**

| Item | Units | Value | Comments |
|---|---|---|---|
| $CH_4$ Production | MT/yr | 8,565 | From GHG Analysis[a] |
| $CH_4$ Production | cu. ft./yr | 4.55E+08 | cu. ft. = MT x $10^6$ g/MT / 453.6 g/lb / 16 lb/lb-mole x 385.5 cf/lb-mole |
| LFG Production | cu. ft./yr | 909,889,632.94 | Default 50% $CH_4$ from LandGEM Model |
| NMOC Concentration | ppmv as hexane | 4,000 | Default from LandGEM Model |
| NMOC Production | cu. ft./yr | 3,639,558.53 | cu. ft NMOC = cu. ft. LFG x ppmv NMOC x $10^{-6}$ |
| NMOC Production | lb/yr | 811,937.83 | lb/yr = ppmv x 10-6 x 86 lb/lb-mole / 385.5 cu. ft./lb-mole |
| LFG Collection Efficiency | unitless | 0.68 | From GHG Analysis[b] |
| LFG Fugitive Emissions | cu. ft./yr | 291,164,683 | LFG fugitive emissions = LFG production x (1 - Collection efficiency) |
| LFG Fugitive NMOC Emissions | lb/yr | 2.60E+05 | Controlled = Uncontrolled x (1 - Collection efficiency) |
| LFG Fugitive NMOC Emissions | cu. ft./yr | 1,164,658.73 | Controlled = Uncontrolled x (1 - Collection efficiency) |

[a] Modeled using Equation HH-1 from 40 CFR 98, Subpart HH

[a] Calculated using Equation HH-3 from 40 CFR 98, Subpart HH

| | | |
|---|---|---|
| 103,869 | SCFHr | Estimated total LFG Production |
| 86,236 | SCFHr | Estimated Max LFG Flow rate to the engine & flare |
| 83.0% | Potential landfill gas collection efficiency | |

**Table 3**
**Landfill Gas TAC Concentrations**

| Compound | CAS Number | Molecular Weight | LFG Concentration (ppm)[a] | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | AP-42, Table 2.4-1 | 2009 Tajiguas Sample | 2011 Tajiguas Sample | 2012 Tajiguas Sample | 2013 Tajiguas Sample | Selected Value[b] |
| 1,1,1-Trichloroethane | 71556 | 133.4 | 2.43E-01 | 2.00E-02 | 2.00E-02 | 4.00E-02 | 4.00E-02 | 4.00E-02 |
| 1,1,2,2-Tetrachloroethane | 79345 | 167.86 | 5.35E-01 | 3.00E-02 | 3.00E-02 | 6.00E-02 | 6.00E-02 | 6.00E-02 |
| 1,1,2-Trichloroethane | 79005 | 133.4 | 1.58E-01 | | | 6.00E-02 | 6.00E-02 | 6.00E-02 |
| 1,1-Dichloroethane | 75343 | 98.96 | 2.08E+00 | 3.40E-02 | 3.00E-02 | 6.00E-02 | 6.00E-02 | 6.00E-02 |
| 1,1-Dichloroethene (1,1-Dichloroethylene) | 75354 | 97 | 1.60E-01 | 4.00E-02 | 4.00E-02 | 6.00E-02 | 6.00E-02 | 6.00E-02 |
| 1,2-Dibromoethane (Ethylene dibromide) | 106934 | 187.88 | 4.80E-03 | | | | | 4.80E-03 |
| 1,2-Dichloroethane (Ethylene dichloride) | 107062 | 98.96 | 1.59E-01 | 3.00E-02 | 3.00E-02 | 6.00E-02 | 6.00E-02 | 6.00E-02 |
| 1,3-Butadiene (Vinyl ethylene) | 106990 | 54.1 | 1.66E-01 | | | | | 1.66E-01 |
| 1,4-Dioxane (1,4-Diethylene dioxide) | 123911 | 88.12 | 8.29E-03 | | | | | 8.29E-03 |
| 2-Butanone (Methyl ethyl ketone) | 78933 | 72.11 | 4.01E+00 | 4.39E+00 | 4.72E+00 | 5.44E+00 | 3.86E+00 | 5.44E+00 |
| 2-Propanol (Isopropyl alcohol) | 67630 | 60.1 | 1.80E+00 | 4.40E+00 | 1.00E+00 | 2.00E-01 | 2.00E-01 | 4.40E+00 |
| Acetaldehyde | 75070 | 44.06 | 7.74E-02 | | | | | 7.74E-02 |
| Acrylonitrile | 107131 | 53.06 | | 1.50E-01 | 2.00E-01 | 3.00E-01 | 3.00E-01 | 3.00E-01 |
| Benzene | 71432 | 78.12 | 2.40E+00 | | | 5.09E-01 | 4.60E-01 | 5.09E-01 |
| Benzyl chloride | 100447 | 126.58 | 1.81E-02 | | | | | 1.81E-02 |
| Bromomethane (Methyl bromide) | 74839 | 94.95 | 2.10E-02 | | | | | 2.10E-02 |
| Carbon disulfide | 75150 | 76.13 | 1.47E-01 | 2.00E-01 | 2.00E-01 | 2.00E-01 | 2.00E-01 | 2.00E-01 |
| Carbon tetrachloride | 56235 | 153.81 | 7.98E-03 | 3.00E-02 | 3.00E-02 | 4.00E-02 | 4.00E-02 | 4.00E-02 |
| Chlorobenzene | 108907 | 112.56 | 4.84E-01 | 3.20E-02 | 4.40E-02 | 6.00E-02 | 7.20E-02 | 7.20E-02 |
| Chloroethane (Ethyl chloride) | 75003 | 64.52 | 3.95E+00 | 9.10E-02 | 4.00E-02 | 4.30E-02 | 6.00E-02 | 9.10E-02 |
| Chloroform | 67663 | 119.38 | | 2.00E-02 | 2.00E-02 | 4.00E-02 | 4.00E-02 | 4.00E-02 |
| Dichlorobenzene | 106467 | 147.01 | 9.40E-01 | 1.68E-01 | 4.38E-01 | 5.00E-01 | 6.47E-01 | 6.47E-01 |
| Dichloromethane (Methylene chloride) | 75092 | 84.94 | 6.15E+00 | 5.70E-02 | 4.20E-02 | 6.00E-02 | 6.00E-02 | 6.00E-02 |
| Ethylbenzene | 100414 | 106.17 | 4.86E+00 | 3.26E+00 | 4.88E+00 | 5.28E+00 | 5.26E+00 | 5.28E+00 |
| Formaldehyde | 50000 | 30.03 | 1.17E-02 | | | | | 1.17E-02 |
| Hydrogen sulfide | 7783064 | 34.08 | 2.00E+01 | 7.39E+01 | 6.72E+01 | 9.40E+01 | 8.80E+01 | 9.40E+01 |
| Methyl tert-butyl ether (MTBE) | 1634044 | 88.15 | 1.18E-01 | | | | | 1.18E-01 |
| Naphthalene | 91203 | 128.18 | 1.07E-01 | | | | | 1.07E-01 |
| Styrene (Vinylbenzene) | 100425 | 104.16 | 4.11E-01 | | | | | 4.11E-01 |
| Tetrachloroethylene (Perchloroethylene) | 127184 | 165.82 | 2.03E+00 | 1.57E-01 | 1.14E-01 | 1.16E-01 | 1.02E-01 | 1.57E-01 |
| Toluene (Methyl benzene) | 108883 | 92.13 | 2.95E+01 | | | 3.80E+00 | 3.90E+00 | 3.90E+00 |
| Trichloroethylene (Trichloroethene) | 79016 | 131.38 | 8.28E-01 | 8.50E-02 | 5.50E-02 | 4.00E-02 | 6.10E-02 | 8.50E-02 |
| Trichloromethane (Chloroform) | 67663 | 119.37 | 7.08E-02 | 2.00E-02 | 2.00E-02 | 4.00E-02 | 4.00E-02 | 4.00E-02 |
| Vinyl acetate | 108054 | 86.09 | 2.48E-01 | | | | | 2.48E-01 |
| Vinyl chloride (Chloroethene) | 75014 | 62.5 | 1.42E+00 | 1.27E-01 | 7.50E-02 | 1.33E-01 | 8.60E-02 | 1.33E-01 |
| Xylenes (o-, m-, p-, mixtures) | 1330207 | 106.16 | 9.23E+00 | 8.52E+00 | 1.30E+01 | 1.40E+01 | 1.47E+01 | 1.47E+01 |

[a] Values for Tajiguas samples are results from analysis of Tajiguas L    92.35    131.63

[b] Selected value is maximum value measured in Tajiguas samples or value from AP-42 if compound was not measured in Tajiguas samples.

**Table 4**
**Landfill Gas Fugitive TAC Emissions**

| Compound | CAS Number | Molecular Weight | LFG Concentration (ppm)[a] | Hourly Emission Rate (lb/hr)[b] | Annual Emission Rate (lb/yr)[c] | |
|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 71556 | 133.40 | 4.00E-02 | 4.60E-04 | 4.03E+00 | **LFGFUG** |
| 1,1,2,2-Tetrachloroethane | 79345 | 167.86 | 6.00E-02 | 8.68E-04 | 7.61E+00 | |
| 1,1,2-Trichloroethane | 79005 | 133.40 | 6.00E-02 | 6.90E-04 | 6.05E+00 | |
| 1,1-Dichloroethane | 75343 | 98.96 | 6.00E-02 | 5.12E-04 | 4.48E+00 | |
| 1,1-Dichloroethene (1,1-Dichloroethylene) | 75354 | 97.00 | 6.00E-02 | 5.02E-04 | 4.40E+00 | |
| 1,2-Dibromoethane (Ethylene dibromide) | 106934 | 187.88 | 4.80E-03 | 7.78E-05 | 6.81E-01 | |
| 1,2-Dichloroethane (Ethylene dichloride) | 107062 | 98.96 | 6.00E-02 | 5.12E-04 | 4.48E+00 | |
| 1,3-Butadiene (Vinyl ethylene) | 106990 | 54.10 | 1.66E-01 | 7.74E-04 | 6.78E+00 | |
| 1,4-Dioxane (1,4-Diethylene dioxide) | 123911 | 88.12 | 8.29E-03 | 6.30E-05 | 5.52E-01 | |
| 2-Butanone (Methyl ethyl ketone) | 78933 | 72.11 | 5.44E+00 | 3.38E-02 | 2.96E+02 | |
| 2-Propanol (Isopropyl alcohol) | 67630 | 60.10 | 4.40E+00 | 2.28E-02 | 2.00E+02 | |
| Acetaldehyde | 75070 | 44.06 | 7.74E-02 | 2.94E-04 | 2.58E+00 | |
| Acrylonitrile | 107131 | 53.06 | 3.00E-01 | 1.37E-03 | 1.20E+01 | |
| Benzene | 71432 | 78.12 | 5.09E-01 | 3.43E-03 | 3.00E+01 | |
| Benzyl chloride | 100447 | 126.58 | 1.81E-02 | 1.98E-04 | 1.73E+00 | |
| Bromomethane (Methyl bromide) | 74839 | 94.95 | 2.10E-02 | 1.72E-04 | 1.51E+00 | |
| Carbon disulfide | 75150 | 76.13 | 2.00E-01 | 1.31E-03 | 1.15E+01 | |
| Carbon tetrachloride | 56235 | 153.81 | 4.00E-02 | 5.30E-04 | 4.65E+00 | |
| Chlorobenzene | 108907 | 112.56 | 7.20E-02 | 6.99E-04 | 6.12E+00 | |
| Chloroethane (Ethyl chloride) | 75003 | 64.52 | 9.10E-02 | 5.06E-04 | 4.43E+00 | |
| Chloroform | 67663 | 119.38 | 4.00E-02 | 4.12E-04 | 3.61E+00 | |
| Dichlorobenzene | 106467 | 147.01 | 6.47E-01 | 8.20E-03 | 7.18E+01 | |
| Dichloromethane (Methylene chloride) | 75092 | 84.94 | 6.00E-02 | 4.39E-04 | 3.85E+00 | |
| Ethylbenzene | 100414 | 106.17 | 5.28E+00 | 4.83E-02 | 4.23E+02 | |
| Formaldehyde | 50000 | 30.03 | 1.17E-02 | 3.03E-05 | 2.65E-01 | |
| Hydrogen sulfide | 7783064 | 34.08 | 9.40E+01 | 2.76E-01 | 2.42E+03 | |
| Methyl tert-butyl ether (MTBE) | 1634044 | 88.15 | 1.18E-01 | 8.97E-04 | 7.86E+00 | |
| Naphthalene | 91203 | 128.18 | 1.07E-01 | 1.18E-03 | 1.04E+01 | |
| Styrene (Vinylbenzene) | 100425 | 104.16 | 4.11E-01 | 3.69E-03 | 3.23E+01 | |
| Tetrachloroethylene (Perchloroethylene) | 127184 | 165.82 | 1.57E-01 | 2.24E-03 | 1.97E+01 | |
| Toluene (Methyl benzene) | 108883 | 92.13 | 3.90E+00 | 3.10E-02 | 2.71E+02 | |
| Trichloroethylene (Trichloroethene) | 79016 | 131.38 | 8.50E-02 | 9.63E-04 | 8.43E+00 | |
| Trichloromethane (Chloroform) | 67663 | 119.37 | 4.00E-02 | 4.12E-04 | 3.61E+00 | |
| Vinyl acetate | 108054 | 86.09 | 2.48E-01 | 1.84E-03 | 1.61E+01 | |
| Vinyl chloride (Chloroethene) | 75014 | 62.50 | 1.33E-01 | 7.17E-04 | 6.28E+00 | |
| Xylenes (o-, m-, p-, mixtures) | 1330207 | 106.16 | 1.47E+01 | 1.35E-01 | 1.18E+03 | |

LFG fugitive emission rate = 291,164,682.54 cu. ft./year
Molar volume = 385.5 scf/lb-mole

[a] See Table 2

[b] Hourly emission rate [lb/hr] = Concentration [ppm] x $10^6$ x Molecular weight [lb/lb-mole] x Fugitive LFG emission rate [scf/yr] / Molar volume [scf/lb-mole] / 8,760 [hr/year]

[b] Annual emission rate [lb/yr] = Concentration [ppm] x $10^6$ x Molecular weight [lb/lb-mole] x Fugitive LFG emission rate [scf/yr] / Molar volume [scf/lb-mole]

**Table 5**
**Tajiguas Landfill Operation's Equipment Fuel+Hours & Vehicle Mileage For average working day in 2013 and assumed average working day post preferred TRRP project**

| TYPE | MAKE | MODEL | YEAR | MAX HORSE-POWER (HP) | FUEL TYPE | EQUIPMENT NUMBERS (INTERNAL COUNTY NUMBER) | EQUIPMENT HOUR/ MILEAGE TOTAL FOR 2013 | FUEL USED TOTAL FOR 2013 | EQUIPMENT HOUR/MILLAGE PER WORKING DAY (2013) 5 FUEL DAYS + 1/2 DAY PER WEEK IS 307 WORKING DAYS IN ONE YEAR | EQUIPMENT HOUR/MILLAGE PER WORKING DAY WITH PREFERRED TRRP PROJECT (ASSUME 35% REDUCTION) | HOURS/ MILEAGE | FUEL USED TOTAL FOR 2013 (GAL) | FUEL USED PER WORKING DAY (GAL) | ESTI-MATED DAILY FUEL USE WITH TRRP (GAL) | WORKING LOCATION (SEE MAP) | PM Emission Factor (g/bhp-hr or g/mi)[a] | Tier[b] | Load Factor[c] | Hourly PM Emissions (lb/hr)[d] | Annual PM Emissions (lb/yr)[e] | Hourly Fuel Use (gal/hr)[f] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Motor Grader | CAT | 163H | 1999 | 220 | RED | 163H | 316 | 1040 | 1.03 | 0.67 | HOURS | 1,040 | 3.39 | 2.20 | 5 | 0.4 | 1 | 0.41 | 7.95E-02 | 1.63E+01 | 3.29 |
| Motor Grader | CAT | 160M | 2013 | 213 | RED | 160M | 463 | 1532.5 | 1.51 | 0.98 | HOURS | 1,533 | 4.99 | 3.24 | 5 | 0.015 | 4i | 0.41 | 2.89E-03 | 8.69E-01 | 3.31 |
| Backhoe Loader | CAT | 430F | 2012 | 117 | RED | 430F | 91 | 173 | 0.30 | 0.19 | HOURS | 173 | 0.56 | 0.37 | 5 | 0.015 | 4i | 0.37 | 1.43E-03 | 8.47E-02 | 1.90 |
| Wheel Tractor Scraper | CAT | 637G | 2007 | 515 | RED | 6371 | 676 | 6788 | 2.20 | 1.43 | HOURS | 6,788 | 22.11 | 14.37 | 3 | 0.15 | 3 | 0.48 | 8.17E-02 | 3.59E+01 | 10.04 |
| Wheel Tractor Scraper | CAT | 637E | 1999 | 450 | RED | 6377 | 60 | 842 | 0.20 | 0.13 | HOURS | 842 | 2.74 | 1.78 | 3 | 0.4 | 1 | 0.48 | 1.90E-01 | 7.43E+00 | 14.03 |
| Wheel Tractor Scraper | CAT | 637G | 2004 | 515 | RED | 6378 | 714 | 8023.5 | 2.33 | 1.51 | HOURS | 8,024 | 26.14 | 16.99 | 3 | 0.15 | 2 | 0.48 | 8.17E-02 | 3.79E+01 | 11.24 |
| Wheel Tractor Scraper | CAT | 637G | 2005 | 515 | RED | 6379 | 527 | 5691 | 1.72 | 1.12 | HOURS | 5,691 | 18.54 | 12.05 | 3 | 0.15 | 2 | 0.48 | 8.17E-02 | 2.80E+01 | 10.80 |
| Trash Compactor | CAT | 826H | 2005 | 401 | RED | 8268 | 295 | 3534 | 0.96 | 0.62 | HOURS | 3,534 | 11.51 | 7.48 | 2 | 0.15 | 2 | 0.4 | 5.30E-02 | 1.02E+01 | 11.98 |
| Trash Compactor | CAT | 836H | 2010 | 555 | RED | 8361 | 1512 | 21878.4 | 4.93 | 3.20 | HOURS | 21,878 | 71.27 | 46.32 | 2 | 0.15 | 3 | 0.4 | 7.34E-02 | 7.22E+01 | 14.47 |
| Bulldozer | CAT | D9T | 2005 | 464 | RED | D9T6 | 534 | 4711.7 | 1.74 | 1.13 | HOURS | 4,712 | 15.35 | 9.98 | 2 | 0.15 | 2 | 0.43 | 6.60E-02 | 2.29E+01 | 8.82 |
| Bulldozer | CAT | D9T | 2012 | 464 | RED | D9T7 | 1605 | 10945.7 | 5.23 | 3.40 | HOURS | 10,946 | 35.65 | 23.17 | 2 | 0.015 | 4i | 0.43 | 6.60E-03 | 6.88E+00 | 6.82 |
| Bulldozer | CAT | D9R | 2001 | 410 | RED | D9C3 | 115 | 1390.5 | 0.37 | 0.24 | HOURS | 1,391 | 4.53 | 2.94 | 6+7[g] | 0.15 | 2 | 0.43 | 5.83E-02 | 4.36E+00 | 12.09 |
| Bulldozer | CAT | D9R | 2001 | 410 | RED | D9C3 | 57.5 | 695.25 | 0.19 | 0.12 | HOURS | 695 | 2.26 | 1.47 | 6 | 0.15 | 2 | 0.43 | 2.92E-02 | 1.09E+00 | 6.05 |
| Bulldozer | CAT | D9R | 2001 | 410 | RED | D9C3 | 57.5 | 695.25 | 0.19 | 0.12 | HOURS | 695 | 2.26 | 1.47 | 7 | 0.15 | 2 | 0.43 | 2.92E-02 | 1.09E+00 | 6.05 |
| Bulldozer | CAT | D6N | 2009 | 145 | RED | D6N1 | 936 | 3487.6 | 3.05 | 1.98 | HOURS | 3,488 | 11.36 | 7.38 | 2 | 0.22 | 3 | 0.43 | 3.02E-02 | 1.84E+01 | 3.73 |
| Bulldozer | CAT | D6M | 1997 | 153 | RED | D6XL | 93 | 319.7 | 0.30 | 0.20 | HOURS | 320 | 1.04 | 0.68 | 2 | 0.274 | N/A | 0.43 | 3.97E-02 | 2.40E+00 | 3.44 |
| Bulldozer | CAT | D6T | 2013 | 228 | RED | D6T1 | 33 | 103 | 0.11 | 0.07 | HOURS | 103 | 0.34 | 0.22 | 2 | 0.015 | 4i | 0.43 | 3.24E-03 | 6.95E-02 | 3.12 |
| Bulldozer | CAT | D10T | 2008 | 646 | RED | D10T | 484 | 8329 | 1.58 | 1.02 | HOURS | 8,329 | 27.13 | 17.63 | 6+7[g] | 0.15 | 3 | 0.43 | 9.19E-02 | 2.89E+01 | 17.21 |
| Bulldozer | CAT | D10T | 2008 | 646 | RED | D10T | 242 | 4164.5 | 0.79 | 0.51 | HOURS | 4,165 | 13.57 | 8.82 | 6 | 0.15 | 2 | 0.43 | 4.59E-02 | 7.22E+00 | 8.60 |
| Bulldozer | CAT | D10T | 2008 | 646 | RED | D10T | 242 | 4164.5 | 0.79 | 0.51 | HOURS | 4,165 | 13.57 | 8.82 | 7 | 0.15 | 2 | 0.43 | 4.59E-02 | 7.22E+00 | 8.60 |
| Hydraulic Excavator | CAT | 330D | 2006 | 270 | RED | 330D | 69 | 520.7 | 0.22 | 0.15 | HOURS | 521 | 1.70 | 1.10 | 5 | 0.15 | 3 | 0.38 | 3.39E-02 | 1.52E+00 | 7.55 |
| Wheel Tractor Mower | CAT | MT525D | 2013 | 130 | RED | MOW1 | 86 | 86 | 0.28 | 0.18 | HOURS | 86 | 0.28 | 0.18 | 5 | 0.015 | 4i | 0.44 | 1.89E-03 | 1.06E-01 | 1.00 |
| Wheel Loader | CAT | 966H | 2008 | 286 | RED | LD51 | 207 | 931 | 0.67 | 0.44 | HOURS | 931 | 3.03 | 1.97 | 5 | 0.15 | 3 | 0.36 | 3.40E-02 | 4.58E+00 | 4.50 |
| Wheel Loader | CAT | IT28F | 1995 | 128 | RED | IT28 | 175 | 507 | 0.57 | 0.37 | HOURS | 507 | 1.65 | 1.07 | 5 | 0.274 | N/A | 0.36 | 2.78E-02 | 3.17E+00 | 2.90 |
| Tarp Machine | Tarpomatic | NA | NA | NA | RED | TOM1 | 20 | 0 | 0.07 | 0.04 | HOURS | 0 | 0.00 | 0.00 | 2 | | | | | | |
| Tarp Machine | Tarpomatic | NA | NA | NA | RED | TOM3 | 114 | 0 | 0.37 | 0.24 | HOURS | 0 | 0.00 | 0.00 | 2 | | | | | | |
| Generator | Ingersoll Rand | G60 | 2007 | 72 | RED | GEN#6 | 149 | 284 | 0.49 | 0.32 | HOURS | 284 | 0.93 | 0.60 | 8 | 0.3 | 2 | 0.74 | 3.52E-02 | 3.41E+00 | 1.91 |
| Small off road | KUBOTA | RTV900 | 2005 | 22 | CLEAR | KUB1 | 45 | 12.8 | 0.15 | 0.10 | HOURS | 13 | 0.04 | 0.03 | 5 | 0.6 | 2 | 0.34 | 9.89E-03 | 2.89E-01 | 0.28 |
| Small off road | JOHN DEERE | GATOR | 2011 | 19 | CLEAR | GAT2 | 59 | 24.7 | 0.19 | 0.12 | HOURS | 25 | 0.08 | 0.05 | 5 | 0.3 | 4 | 0.34 | 4.27E-03 | 1.64E-01 | 0.42 |
| Water truck | INTERNATIONAL | 7400W/S | 2011 | NA | CLEAR | WT11 | 170 | 614.9 | 0.55 | 0.36 | HOURS | 615 | 2.00 | 1.30 | 5 | 5.36E-02 | On-Road | N/A | 1.77E-03 | 1.96E-01 | 3.62 |
| Water truck | INTERNATIONAL | 7400/WS | 2012 | NA | CLEAR | WT12 | 529 | 2370.5 | 1.72 | 1.12 | HOURS | 2,371 | 7.72 | 5.02 | 5 | 5.11E-02 | On-Road | N/A | 1.69E-03 | 5.81E-01 | 4.48 |
| Fuel Truck | FREIGHTLINER | M2106 | 2010 | NA | CLEAR | TJF2 | 168 | 176 | 0.55 | 0.36 | HOURS | 176 | 0.57 | 0.37 | 5 | 5.59E-02 | On-Road | N/A | 1.85E-03 | 2.02E-01 | 1.05 |
| Green waste Grinder | MORBARK | 6600 | 2008 | 1125 | RED | HOG1 | 649 | 20681.3 | 2.11 | 1.37 | HOURS | 20,681 | 67.37 | 43.79 | 4/Portable | 0.15 | 2 | 0.42 | 1.56E-01 | 1.01E+02 | 31.87 |
| Wheel Loader | CAT | 938G | 2000 | 180 | RED | LD43 | 605 | 2033.9 | 1.97 | 1.28 | HOURS | 2,034 | 6.63 | 4.31 | 4 | 0.4 | 1 | 0.36 | 5.71E-02 | 2.25E+01 | 3.36 |
| Wheel Loader | CAT | 938G | 1998 | 180 | RED | LD40 | 280 | 998.2 | 0.91 | 0.59 | HOURS | 998 | 3.25 | 2.11 | 4 | 0.4 | 1 | 0.36 | 5.71E-02 | 1.04E+01 | 3.57 |
| Wheel Loader | CAT | 938H | 2008 | 197 | RED | LD52 | 1306 | 2921 | 4.25 | 2.77 | HOURS | 2,921 | 9.51 | 6.18 | 4 | 0.15 | 3 | 0.36 | 2.35E-02 | 1.99E+01 | 2.24 |

[a] Emission factors for off-road equipment are Tier emission limits for engine horsepower. Emission factors for on-road vehicles are model-year specific emission factors for calendar year 2017 at 15 mph from EMFAC2011.

[b] Tier is based on engine model year and horsepower rating.

[c] Default load factors from Table 3.3, Appendix D of California Emissions Estimation Model (CalEEMod)

[d] Hourly Off-road Equipment PM emissions [lb/hr] = Emission factor [g/bph-hr] x Load factor [unitless] x Engine horsepower [bhp] / 453.6 [g/lb]. Hourly On-Road Vehicle PM emissions [lb/hr] = Emission factor [g/mi] x 15 [mph] / 453.6 [g/lb]

[e] Annual PM emissions [lb/year] = Hourly PM emissions [lb/hr] x 2013 Annual operating hours [hours/yr] x 0.65 [Post-project activity / 2013 activity]

[f] Hourly fuel use [gal/hr] = Annual fuel fuse [gal/yr] / Annual operating hours [hours/yr]

[g] Emissions divided equally between Area 6 and Area 7

**Table 6**
**Landfill Mobile Equipment DPM Emissions by Area**

| Area | Hourly DPM Emissions (lb/hr) | Annual DPM Emissions (lb/yr) | | | |
|---|---|---|---|---|---|
| 2 | 2.72E-01 | 1.33E+02 | **TRSHFILL** | | |
| 3 | 4.36E-01 | 1.09E+02 | **SCRAPPER** | | |
| 4 | 1.38E-01 | 5.28E+01 | **GRNWASTE** | | |
| 5 | 2.01E-01 | 2.81E+01 | **LFMAINOP** | | |
| 6 | 7.51E-02 | 8.31E+00 | | 1.66E+01 | **AREA6N7** |
| 7 | 7.51E-02 | 8.31E+00 | | | |

**Table 7**
**Landfill Green Waste Grinder DPM Emissions**
(Area 4)

| | | |
|---|---|---|
| Hourly Emissions (lb/hr) | 1.56E-01 | |
| Annual Emissions (lb/yr) | 1.01E+02 | **GWGRIND** |

**Table 8**
**Diesel Equipment Exhaust Emissions of TACs with Acute Effects**

**Table 8-A**
**Area 2 (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 9.76E-03 | TRSHFILL |
| Formaldehyde | 50-00-0 | 1.7261 | 9.04E-02 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 4.10E-02 | |
| Acrolein | 107-02-8 | 0.0339 | 1.78E-03 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 1.14E-02 | |
| Toluene | 108-88-3 | 0.1054 | 5.52E-03 | |
| Xylenes | 1330-20-7 | 0.0424 | 2.22E-03 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 9.76E-03 | |
| Arsenic | 7440-38-2 | 0.0016 | 8.38E-05 | |
| Copper | 7440-50-8 | 0.0041 | 2.15E-04 | |
| Mercury | 7439-97-6 | 0.0020 | 1.05E-04 | |
| Nickel | 7440-02-0 | 0.0039 | 2.04E-04 | |

Hourly fuel use = 52.38 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 8-B**
**Area 3 (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 8.59E-03 | SCRAPPER |
| Formaldehyde | 50-00-0 | 1.7261 | 7.96E-02 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 3.61E-02 | |
| Acrolein | 107-02-8 | 0.0339 | 1.56E-03 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 1.00E-02 | |
| Toluene | 108-88-3 | 0.1054 | 4.86E-03 | |
| Xylenes | 1330-20-7 | 0.0424 | 1.96E-03 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 8.59E-03 | |
| Arsenic | 7440-38-2 | 0.0016 | 7.38E-05 | |
| Copper | 7440-50-8 | 0.0041 | 1.89E-04 | |
| Mercury | 7439-97-6 | 0.0020 | 9.22E-05 | |
| Nickel | 7440-02-0 | 0.0039 | 1.80E-04 | |

Hourly fuel use = 46.11 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 8-C**
**Area 4 (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 1.71E-03 | **GRNWASTE** |
| Formaldehyde | 50-00-0 | 1.7261 | 1.58E-02 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 7.18E-03 | |
| Acrolein | 107-02-8 | 0.0339 | 3.11E-04 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 1.99E-03 | |
| Toluene | 108-88-3 | 0.1054 | 9.66E-04 | |
| Xylenes | 1330-20-7 | 0.0424 | 3.89E-04 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 1.71E-03 | |
| Arsenic | 7440-38-2 | 0.0016 | 1.47E-05 | |
| Copper | 7440-50-8 | 0.0041 | 3.76E-05 | |
| Mercury | 7439-97-6 | 0.0020 | 1.83E-05 | |
| Nickel | 7440-02-0 | 0.0039 | 3.57E-05 | |

Hourly fuel use = 9.16 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 8-D**
**Area 5 (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 6.65E-03 | **LFMAINOP** |
| Formaldehyde | 50-00-0 | 1.7261 | 6.16E-02 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 2.79E-02 | |
| Acrolein | 107-02-8 | 0.0339 | 1.21E-03 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 7.76E-03 | |
| Toluene | 108-88-3 | 0.1054 | 3.76E-03 | |
| Xylenes | 1330-20-7 | 0.0424 | 1.51E-03 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 6.65E-03 | |
| Arsenic | 7440-38-2 | 0.0016 | 5.71E-05 | |
| Copper | 7440-50-8 | 0.0041 | 1.46E-04 | |
| Mercury | 7439-97-6 | 0.0020 | 7.14E-05 | |
| Nickel | 7440-02-0 | 0.0039 | 1.39E-04 | |

Hourly fuel use = 35.68 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 8-E**
**Area 6 (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) |
|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 2.73E-03 |
| Formaldehyde | 50-00-0 | 1.7261 | 2.53E-02 |
| Acetaldehyde | 75-07-0 | 0.7833 | 1.15E-02 |
| Acrolein | 107-02-8 | 0.0339 | 4.97E-04 |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 3.18E-03 |
| Toluene | 108-88-3 | 0.1054 | 1.54E-03 |
| Xylenes | 1330-20-7 | 0.0424 | 6.21E-04 |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 2.73E-03 |
| Arsenic | 7440-38-2 | 0.0016 | 2.34E-05 |
| Copper | 7440-50-8 | 0.0041 | 6.01E-05 |
| Mercury | 7439-97-6 | 0.0020 | 2.93E-05 |
| Nickel | 7440-02-0 | 0.0039 | 5.71E-05 |

| SUM Emissions (lb/hour) | AREA6N7 |
|---|---|
| 5.46E-03 | |
| 5.06E-02 | |
| 2.30E-02 | |
| 9.93E-04 | |
| 6.37E-03 | |
| 3.09E-03 | |
| 1.24E-03 | |
| 5.46E-03 | |
| 4.69E-05 | |
| 1.20E-04 | |
| 5.86E-05 | |
| 1.14E-04 | |

Hourly fuel use = 14.65 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 8-F**
**Area 7 (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) |
|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 2.73E-03 |
| Formaldehyde | 50-00-0 | 1.7261 | 2.53E-02 |
| Acetaldehyde | 75-07-0 | 0.7833 | 1.15E-02 |
| Acrolein | 107-02-8 | 0.0339 | 4.97E-04 |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 3.18E-03 |
| Toluene | 108-88-3 | 0.1054 | 1.54E-03 |
| Xylenes | 1330-20-7 | 0.0424 | 6.21E-04 |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 2.73E-03 |
| Arsenic | 7440-38-2 | 0.0016 | 2.34E-05 |
| Copper | 7440-50-8 | 0.0041 | 6.01E-05 |
| Mercury | 7439-97-6 | 0.0020 | 2.93E-05 |
| Nickel | 7440-02-0 | 0.0039 | 5.71E-05 |

Hourly fuel use = 14.65 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 8-G**
**Green Waste Grinder (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 5.94E-03 | **GWGRIND** |
| Formaldehyde | 50-00-0 | 1.7261 | 5.50E-02 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 2.50E-02 | |
| Acrolein | 107-02-8 | 0.0339 | 1.08E-03 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 6.93E-03 | |
| Toluene | 108-88-3 | 0.1054 | 3.36E-03 | |
| Xylenes | 1330-20-7 | 0.0424 | 1.35E-03 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 5.94E-03 | |
| Arsenic | 7440-38-2 | 0.0016 | 5.10E-05 | |
| Copper | 7440-50-8 | 0.0041 | 1.31E-04 | |
| Mercury | 7439-97-6 | 0.0020 | 6.37E-05 | |
| Nickel | 7440-02-0 | 0.0039 | 1.24E-04 | |

Hourly fuel use = 31.87 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

Table 9

**Table 9-A**
**On-Site Motor Vehicle DPM Emissions**

| Vehicle | Use | Operating Hours/Day | Days/ Year | Segment | Mileage (mpg) | Round-Trip Dist. (mi) | Average Round-Trips/Day | Maximum Round Trips/Day[a] | Average Miles/ Day | Maximum Miles/ Day | Maximum Hourly Fuel Use (gal/hr)[b] | PM10 Emission Factor (g/mi)[c] | Hourly DPM Emissions (lb/hr)[d] | Annual DPM Emissions (lb/yr)[e] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tractor/Trailer | CSSR Import[f] | 6 | 311 | MRF-Entrance | 6 | 2.23 | 7 | 7 | 15.61 | 15.61 | 0.43 | 3.68E-02 | 2.11E-04 | 3.94E-01 |
| MSW Haul | MSW Haul[g] | 9 | 309 | MRF-Entrance | 6 | 2.23 | 60.3 | 159.2 | 134.47 | 355.00 | 6.57 | 3.68E-02 | 3.20E-03 | 3.37E+00 |
| MSW Haul | MSW Haul[g] | 9 | 309 | MRF-Trash Fill | 6 | 0.90 | 60.3 | 159.2 | 54.39 | 143.59 | 2.66 | 3.68E-02 | 1.29E-03 | 1.36E+00 |
| Ford F350 XL | Utility truck and trailer | 6 | 311 | MRF-Compost | 14 | 0.90 | 6 | 6 | 5.41 | 5.41 | 0.06 | 4.90E-03 | 9.75E-06 | 1.82E-02 |
| Ford F350 XL | Utility truck and trailer | 6 | 311 | MRF-Entrance | 14 | 2.23 | 6 | 6 | 13.38 | 13.38 | 0.16 | 4.90E-03 | 2.41E-05 | 4.50E-02 |

[a] Maximum round trips/day for MSW Haul = Average Round Trips/day x 2.64

[b] Maximum hourly fuel use [gal/hr] = Maximum daily mileage [miles/day] / Mileage [mpg] / Operating hours/day

[c] Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County
at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County
at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[d] Hourly DPM emissions [lb/hr] = Maximum miles/day x PM10 emission factor [g/mi] / 453.6 [g/lb] / Operating hours/day

[e] Annual DPM emissions [lb/yr] = Average miles/day x PM10 emission factor [g/mi] / 453.6 [g/lb] x Days/year

[f] Trips/day are from Project Traffic Study.

[g] Average trips/day are 2013 totals / 309 working days.

**Table 9-B**
**On-Site Motor Vehicle DPM Emissions by Segment**

| Segment | Hourly DPM Emissions (lb/hr)[d] | Annual DPM ER (lb/yr)[e] | Project DPM ER (8a-2p) (lb/yr) | Total DPM Emissions (lb/yr) | |
|---|---|---|---|---|---|
| MRF-Entrance | 3.44E-03 | 3.81E+00 | 1.41E+00 | 5.23E+00 | **MRFENTRY** |
| MRF-Trash Fill | 1.29E-03 | 1.36E+00 | 0 | 1.36E+00 | **HAUL** |
| MRF-Compost | 9.75E-06 | 1.82E-02 | 8.99E-02 | 1.08E-01 | **MRFCOMP** |

**Table 10**
**Diesel Motor Vehicle Exhaust Emissions of TACs with Acute Effects**

**Table 10-A**
**Entrance to/from MRF (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Existing Emissions (lb/hour) | Project Emissions (lb/hr) | Total Emissions (lb/hr) | |
|---|---|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 1.34E-03 | 1.10E-04 | 1.45E-03 | **MRFENTRY** |
| Formaldehyde | 50-00-0 | 1.7261 | 1.24E-02 | 1.02E-03 | 1.34E-02 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 5.61E-03 | 4.64E-04 | 6.08E-03 | |
| Acrolein | 107-02-8 | 0.0339 | 2.43E-04 | 2.01E-05 | 2.63E-04 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 1.56E-03 | 1.29E-04 | 1.69E-03 | |
| Toluene | 108-88-3 | 0.1054 | 7.55E-04 | 6.25E-05 | 8.18E-04 | |
| Xylenes | 1330-20-7 | 0.0424 | 3.04E-04 | 2.51E-05 | 3.29E-04 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 1.34E-03 | 1.10E-04 | 1.45E-03 | |
| Arsenic | 7440-38-2 | 0.0016 | 1.15E-05 | 9.49E-07 | 1.24E-05 | |
| Copper | 7440-50-8 | 0.0041 | 2.94E-05 | 2.43E-06 | 3.18E-05 | |
| Mercury | 7439-97-6 | 0.0020 | 1.43E-05 | 1.19E-06 | 1.55E-05 | |
| Nickel | 7440-02-0 | 0.0039 | 2.80E-05 | 2.31E-06 | 3.03E-05 | |

Hourly fuel use = 7.17 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 10-B**
**MRF to/from Trash Fill (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 4.95E-04 | **HAUL** |
| Formaldehyde | 50-00-0 | 1.7261 | 4.59E-03 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 2.08E-03 | |
| Acrolein | 107-02-8 | 0.0339 | 9.01E-05 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 5.78E-04 | |
| Toluene | 108-88-3 | 0.1054 | 2.80E-04 | |
| Xylenes | 1330-20-7 | 0.0424 | 1.13E-04 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 4.95E-04 | |
| Arsenic | 7440-38-2 | 0.0016 | 4.25E-06 | |
| Copper | 7440-50-8 | 0.0041 | 1.09E-05 | |
| Mercury | 7439-97-6 | 0.0020 | 5.32E-06 | |
| Nickel | 7440-02-0 | 0.0039 | 1.04E-05 | |

Hourly fuel use = 2.66 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 10-C**
**MRF to/from Compost Area (8:00 a.m. - 2:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Existing Emissions (lb/hour) | Project Emissions (lb/hr) | Total Emissions (lb/hr) | |
|---|---|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 1.20E-05 | 1.20E-05 | 2.40E-05 | MRFCOMP |
| Formaldehyde | 50-00-0 | 1.7261 | 1.11E-04 | 1.11E-04 | 2.22E-04 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 5.05E-05 | 5.05E-05 | 1.01E-04 | |
| Acrolein | 107-02-8 | 0.0339 | 2.18E-06 | 2.18E-06 | 4.37E-06 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 1.40E-05 | 1.40E-05 | 2.80E-05 | |
| Toluene | 108-88-3 | 0.1054 | 6.79E-06 | 6.79E-06 | 1.36E-05 | |
| Xylenes | 1330-20-7 | 0.0424 | 2.73E-06 | 2.73E-06 | 5.46E-06 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 1.20E-05 | 1.20E-05 | 2.40E-05 | |
| Arsenic | 7440-38-2 | 0.0016 | 1.03E-07 | 1.03E-07 | 2.06E-07 | |
| Copper | 7440-50-8 | 0.0041 | 2.64E-07 | 2.64E-07 | 5.28E-07 | |
| Mercury | 7439-97-6 | 0.0020 | 1.29E-07 | 1.29E-07 | 2.58E-07 | |
| Nickel | 7440-02-0 | 0.0039 | 2.51E-07 | 2.51E-07 | 5.03E-07 | |

Hourly fuel use = 0.06 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 11**
**IC Engine and Flare 2013 Annual LFG Combustion**

| Quarter | IC Engine LFG Heat Input (MMBtu)[a] | LFG Heat Value (Btu/scf)[a] | IC Engine LFG Input (scf)[b] | Flare LFG Heat Input (MMBtu)[a] | LFG Heat Value (Btu/scf)[a] | Flare LFG Input (scf)[b] |
|---|---|---|---|---|---|---|
| First | 68,570.76 | 569 | 120,511,002 | 8,584.20 | 582 | 14,749,485 |
| Second | 69,161.52 | 524 | 131,987,634 | 335.23 | 524 | 639,752 |
| Third | 65,180.18 | 524 | 124,389,656 | 5,169.71 | 524 | 9,865,859 |
| Fourth | 74,705.11 | 524 | 142,567,004 | 516.03 | 524 | 984,790 |
| **Total** | **277,617.57** | | **519,455,296** | **14,605.17** | | **26,239,885** |

[a] From quarterly emissions reports

[b] LFG input [scf] = LFG heat input [MMBtu] x $10^6$ [Btu/MMBtu] / LFG heat value [Btu/scf]

**Table 12**
**IC Engine Toxic Air Contaminant Emissions from LFG Combustion**

| Compound | CAS Number | Emission Factor (lb/MMscf)[a] | Hourly Emission Rate (lb/hr)[b] | Annual Emission Rate (lb/yr)[c] | |
|---|---|---|---|---|---|
| Acenaphthene | 83-32-9 | 3.01E-04 | 2.07E-05 | 1.56E-01 | **EXISTENG** |
| Acenaphthylene | 208-96-8 | 1.23E-03 | 8.48E-05 | 6.39E-01 | |
| Anthracene | 120-12-7 | 3.71E-04 | 2.56E-05 | 1.93E-01 | |
| Benzene | 71-43-2 | 2.09E-01 | 1.44E-02 | 1.09E+02 | |
| Benzo(a)anthracene | 56-55-6 | 2.88E-04 | 1.98E-05 | 1.50E-01 | |
| Benzo(a)pyrene | 50-32-8 | 6.77E-04 | 4.67E-05 | 3.52E-01 | |
| Benzo(b)fluoranthene | 205-99-2 | 8.00E-04 | 5.51E-05 | 4.16E-01 | |
| Benzo(g,h,i)perylene | 191-24-2 | 8.54E-04 | 5.89E-05 | 4.44E-01 | |
| Benzo(k)fluoranthene | 207-08-9 | 6.77E-04 | 4.67E-05 | 3.52E-01 | |
| Carbon Tetrachloride | 56-23-5 | 7.89E-03 | 5.44E-04 | 4.10E+00 | |
| Chloroform | 67-66-3 | 6.11E-03 | 4.21E-04 | 3.17E+00 | |
| Chrysene | 218-01-9 | 3.42E-04 | 2.36E-05 | 1.78E-01 | |
| Dibenz(a,h)anthracene | 53-70-3 | 2.37E-05 | 1.63E-06 | 1.23E-02 | |
| Ethylene Dibromide | 106-93-4 | 9.64E-03 | 6.64E-04 | 5.01E+00 | |
| Ethylene Dichloride | 106-93-4 | 5.08E-03 | 3.50E-04 | 2.64E+00 | |
| Fluoranthene | 206-44-0 | 2.48E-03 | 1.71E-04 | 1.29E+00 | |
| Fluorene | 86-73-7 | 6.99E-04 | 4.82E-05 | 3.63E-01 | |
| Formaldehyde | 50-00-0 | 4.47E+00 | 3.08E-01 | 2.32E+03 | |
| HCl | 7647-01-0 | 2.07E+00 | 1.43E-01 | 1.08E+03 | |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 3.14E-04 | 2.16E-05 | 1.63E-01 | |
| Methyl Chloroform | 71-55-6 | 2.64E-02 | 1.82E-03 | 1.37E+01 | |
| Methylene Chloride | 75-09-2 | 4.66E-01 | 3.21E-02 | 2.42E+02 | |
| Naphthalene | 91-20-3 | 5.05E-02 | 3.48E-03 | 2.62E+01 | |
| Perchloroethylene | 127-18-4 | 1.28E-02 | 8.82E-04 | 6.65E+00 | |
| Phenanthrene | 85-01-8 | 5.82E-03 | 4.01E-04 | 3.02E+00 | |
| Pyrene | 129-00-0 | 4.66E-03 | 3.21E-04 | 2.42E+00 | |
| Trichloroethylene | 79-01-6 | 8.43E-03 | 5.81E-04 | 4.38E+00 | |
| Vinyl Chloride | 75-01-4 | 4.01E-03 | 2.76E-04 | 2.08E+00 | |

Hourly LFG flow rate = 68,922 scfh — Maximum rated capacity from facility Title V permit
Annual LFG flow rate 519,455,296 scf — 2013 reported annual total

[a] Maximum emission factors from California Air Toxics Emission Factors http://www.arb.ca.gov/app/emsinv/catef_form.html for flare fired on landfill gas

[b] Hourly emission rate [lb/hr] = Emission factor [lb/MMscf] x Hourly LFG flow rate [scfh] / $10^6$ [scf/MMscf]

[c] Annual emission rate [lb/hr] = Emission factor [lb/MMscf] x Annual LFG flow rate [scfh] / $10^6$ [scf/MMscf]

**Table 13**
**Flare Toxic Air Contaminant Emissions from LFG Combustion**

| Compound | CAS Number | Emission Factor (lb/MMscf) | Emission Factor Source[a] | Hourly Emission Rate (lb/hr)[b] | Annual Emission Rate (lb/yr)[c] | |
|---|---|---|---|---|---|---|
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 5.60E-02 | CATEF | 4.83E-03 | 1.47E+00 | **EXISTFLR** |
| Manganese | 7439-96-5 | 2.92E-03 | Source Test | 2.52E-04 | 7.66E-02 | |
| Naphthalene | 91-20-3 | 1.75E-04 | Source Test | 1.51E-05 | 4.59E-03 | |
| Nickel | 7440-02-0 | 1.43E-03 | Source Test | 1.23E-04 | 3.75E-02 | |
| Perylene | 198-55-0 | 7.48E-05 | CATEF | 6.45E-06 | 1.96E-03 | |
| Phenanthrene | 85-01-8 | 9.85E-04 | Source Test | 8.50E-05 | 2.59E-02 | |
| Pyrene | 129-00-0 | 3.04E-05 | Source Test | 2.63E-06 | 7.99E-04 | |
| Toluene | 108-88-3 | 1.09E+02 | CATEF | 9.40E+00 | 2.86E+03 | |
| Trichloroethene | 79-01-6 | 1.13E+00 | CATEF | 9.74E-02 | 2.97E+01 | |
| Vinyl Chloride | 75-01-4 | 7.64E-02 | CATEF | 6.59E-03 | 2.00E+00 | |
| Xylene (m,p) | 1330-20-7 | 4.61E-01 | CATEF | 3.98E-02 | 1.21E+01 | |
| Xylene (o) | 95-47-6 | 3.35E-01 | CATEF | 2.89E-02 | 8.79E+00 | |
| Zinc | 7440-66-6 | 4.28E+00 | CATEF | 3.69E-01 | 1.12E+02 | |
| 1,1,1-Trichloroethane | 71-55-6 | 3.37E-01 | CATEF | 2.91E-02 | 8.84E+00 | |
| 1,1-Dichloroethane | 75-34-3 | 4.37E-01 | CATEF | 3.77E-02 | 1.15E+01 | |
| 1,2-Dichloroethane | 107-06-2 | 1.35E+00 | CATEF | 1.16E-01 | 3.54E+01 | |
| 1,4-Dioxane | 123-91-1 | 4.55E-03 | Source Test | 3.93E-04 | 1.19E-01 | |
| 2-Methylnaphthalene | 91-57-6 | 9.56E-05 | Source Test | 8.24E-06 | 2.51E-03 | |
| Acenaphthene | 83-32-9 | 7.04E-06 | Source Test | 6.07E-07 | 1.85E-04 | |
| Acenaphthylene | 208-96-8 | 1.09E-04 | Source Test | 9.39E-06 | 2.86E-03 | |
| Acetaldehyde | 75-07-0 | 6.53E-01 | CATEF | 5.63E-02 | 1.71E+01 | |
| Acetonitrile | 75-05-8 | 7.96E+00 | CATEF | 6.86E-01 | 2.09E+02 | |
| Acrolein | 107-02-8 | 9.33E-02 | CATEF | 8.05E-03 | 2.45E+00 | |
| Acrylonitrile | 107-13-1 | 4.50E-03 | Source Test | 3.88E-04 | 1.18E-01 | |
| Anthracene | 120-12-7 | 1.10E-05 | Source Test | 9.52E-07 | 2.90E-04 | |
| Arsenic | 7440-38-2 | 5.91E-02 | Source Test | 5.10E-03 | 1.55E+00 | |
| Benzene | 71-43-2 | 8.59E-01 | CATEF | 7.41E-02 | 2.25E+01 | |
| Benzo(a)anthracene | 56-55-6 | 5.60E-02 | CATEF | 4.83E-03 | 1.47E+00 | |
| Benzo(a)pyrene | 50-32-8 | 5.60E-02 | CATEF | 4.83E-03 | 1.47E+00 | |
| Benzo(b)fluoranthene | 205-99-2 | 5.60E-02 | CATEF | 4.83E-03 | 1.47E+00 | |
| Benzo(e)pyrene | 192-97-2 | 7.48E-05 | CATEF | 6.45E-06 | 1.96E-03 | |
| Benzo(g,h,i)perylene | 191-24-2 | 5.60E-02 | CATEF | 4.83E-03 | 1.47E+00 | |
| Benzo(k)fluoranthene | 207-08-9 | 5.60E-02 | CATEF | 4.83E-03 | 1.47E+00 | |
| Cadmium | 7440-43-9 | 1.43E-03 | Source Test | 1.23E-04 | 3.75E-02 | |
| Carbon Tetrachloride | 56-23-5 | 3.76E-02 | CATEF | 3.24E-03 | 9.87E-01 | |
| Chlorobenzene | 108-90-7 | 8.69E-01 | CATEF | 7.49E-02 | 2.28E+01 | |
| Chloroform | 67-66-3 | 5.60E-02 | CATEF | 4.83E-03 | 1.47E+00 | |
| Chromium (Hex) | 18540-29-9 | 1.21E-05 | Source Test | 1.05E-06 | 3.19E-04 | |
| Chromium (Total) | 7440-47-3 | 4.64E-03 | Source Test | 4.00E-04 | 1.22E-01 | |
| Chrysene | 218-01-9 | 6.51E-06 | Source Test | 5.61E-07 | 1.71E-04 | |
| Copper | 7440-50-8 | 4.86E+00 | CATEF | 4.19E-01 | 1.28E+02 | |
| Dibenz(a,h)anthracene | 53-70-3 | 5.60E-02 | CATEF | 4.83E-03 | 1.47E+00 | |
| Dichloromethane | 75-09-2 | 4.29E-01 | CATEF | 3.70E-02 | 1.13E+01 | |
| Fluoranthene | 206-44-0 | 1.40E-05 | Source Test | 1.21E-06 | 3.67E-04 | |
| Fluorene | 86-73-7 | 2.84E-04 | Source Test | 2.45E-05 | 7.44E-03 | |
| Formaldehyde | 50-00-0 | 1.77E-01 | Source Test | 1.53E-02 | 4.65E+00 | |
| HCl | 7647-01-0 | 1.61E-03 | Source Test | 1.39E-04 | 4.24E-02 | |
| HF | 7664-39-3 | 2.15E-01 | Source Test | 1.85E-02 | 5.64E+00 | |

Hourly LFG flow rate = 86,236 scfh    Maximum one minute flow rate provided by SBCAPCD
Annual LFG flow rate 26,239,885 scf    2013 reported annual total

[a] CATEF = Maximum emission factors from California Air Toxics Emission Factors http://www.arb.ca.gov/app/emsinv/catef_form.html
for flare fired on landfill gas based on assumption that biogas composition is similar to landfill gas
Source Test = September 9-11 2010 source tests on Santa Maria Landfill flare combusting LFG. Non-detects set to detection limit.

[b] Hourly emission rate [lb/hr] = Emission factor [lb/MMscf] x Hourly LFG flow rate [scfh] / $10^6$ [scf/MMscf]

[c] Annual emission rate [lb/hr] = Emission factor [lb/MMscf] x Annual LFG flow rate [scfh] / $10^6$ [scf/MMscf]

# Attachment D

# Air Dispersion Modeling Archive (On DVD)

# Attachment E

# GHG Analysis

**Table 1**
**Baseline**

## Subpart HH - Municipal Solid Waste Landfills - Calculating Annual Modeled Methane Generation Using Equation HH-1

**OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES**

Version e-GGRT RY2010.R.02
Today's date 10/8/2015

**This spreadsheet is protected and contains locked cells to ensure that you do not inadvertently alter any of the included formulas and/or calculations. To remove this protection and alter this spreadsheet, right-click the "worksheet" tab near the bottom of the screen and select "Unprotect Sheet." When prompted for the password, type "GHG" and click "OK." Please note that making changes to an unprotected sheet could result in incorrect calculations and that you are responsible for the accuracy of the data you report to EPA. For additional help, visit the Microsoft Excel Support website (http://office.microsoft.com/en-us/excel-help).**

### Equation HH-1:

$$G_{CH4} = \left[ \sum_{x=S}^{T-1} \left\{ W_x \times MCF \times DOC \times DOC_F \times F \times \frac{16}{12} \times \left( e^{-k(T-x-1)} - e^{-k(T-x)} \right) \right\} \right]$$

| | |
|---|---|
| Facility Name: | Tajiguas Landfill |
| Reporter Name: | Nina Danza |
| Unit Name/ ID: | |
| Reporting Period: | |
| Comments: | |
| Unit Type: | Municipal Solid Waste Landfill |

### Input Data

| | |
|---|---|
| **[S]** = Start year of calculation. Use the year 1960 or the opening year of the landfill, whichever is more recent. | 1967 |
| **[T]** = Reporting year for which emissions are calculated. | 2016 |
| **[MCF]** = Methane correction factor (fraction). Use the default value of 1 unless there is active aeration of waste within the landfill during the reporting year. If there is active aeration of waste within the landfill during the reporting year, use either the default value of 1 or select an alternative value no less than 0.5 based on site-specific aeration parameters. | 1. |

**Table 1**
**Baseline**

## Subpart HH - Municipal Solid Waste Landfills - Calculating Annual Modeled Methane Generation Using Equation HH-1

| | |
|---|---|
| **[DOC]** = Degradable organic carbon from Table HH-1 of this subpart or measurement data, if available [fraction (metric tons C/metric ton waste)]. | 0.2 |
| **[$DOC_F$]** = Fraction of DOC dissimilated (fraction). Use the default value of 0.5. | 0.5 |
| **[F]** = Fraction by volume of CH4 in landfill gas from measurement data on a dry basis, if available (fraction); default is 0.5. | 0.5 |
| **[16/12]** = Constant | 16/12 |
| **[k]** = Rate constant from Table HH-1 of this subpart (yr-1). Select the most applicable k value for the majority of the past 10 years (or operating life, whichever is shorter). | 0.02 |

| **[x]** = Year in which waste was disposed. | **[$W_x$]** = Quantity of waste disposed in the landfill in year x from measurement data, tipping fee receipts, or other company records (metric tons, as received (wet weight)). | **[$G_{CH4}$] in year T from waste disposed in year x** (metric tons CH4). Value is calculated for years between S and T-1, inclusive. |
|---|---|---|
| 1960 | | 0.0 |
| 1961 | | 0.0 |
| 1962 | | 0.0 |
| 1963 | | 0.0 |
| 1964 | | 0.0 |
| 1965 | | 0.0 |
| 1966 | | 0.0 |
| 1967 | 159,043. | 80.4 |
| 1968 | 163,961. | 84.5 |
| 1969 | 169,032. | 88.9 |
| 1970 | 174,260. | 93.5 |
| 1971 | 179,650. | 98.4 |
| 1972 | 185,206. | 103.5 |

**Table 1**
**Baseline**

## Subpart HH - Municipal Solid Waste Landfills - Calculating Annual Modeled Methane Generation Using Equation HH-1

| | | |
|---|---|---|
| 1973 | 190,934. | 108.8 |
| 1974 | 196,839. | 114.4 |
| 1975 | 202,927. | 120.4 |
| 1976 | 209,203. | 126.6 |
| 1977 | 215,673. | 133.1 |
| 1978 | 222,343. | 140.0 |
| 1979 | 229,220. | 147.3 |
| 1980 | 236,309. | 154.9 |
| 1981 | 243,618. | 162.9 |
| 1982 | 251,152. | 171.4 |
| 1983 | 258,920. | 180.2 |
| 1984 | 266,928. | 189.6 |
| 1985 | 275,183. | 199.4 |
| 1986 | 283,694. | 209.7 |
| 1987 | 291,745. | 220.0 |
| 1988 | 316,560. | 243.5 |
| 1989 | 275,245. | 216.0 |
| 1990 | 260,932. | 208.9 |
| 1991 | 223,337. | 182.4 |
| 1992 | 218,089. | 181.7 |
| 1993 | 220,363. | 187.3 |
| 1994 | 196,874. | 170.8 |
| 1995 | 202,735. | 179.4 |
| 1996 | 212,643. | 192.0 |
| 1997 | 207,809. | 191.4 |
| 1998 | 231,210. | 217.2 |
| 1999 | 187,486. | 179.7 |
| 2000 | 171,607. | 167.8 |
| 2001 | 161,108. | 160.7 |
| 2002 | 180,259. | 183.5 |
| 2003 | 200,031. | 207.7 |
| 2004 | 218,804. | 231.8 |
| 2005 | 227,655. | 246.0 |
| 2006 | 201,625. | 222.3 |
| 2007 | 198,670. | 223.5 |
| 2008 | 195,618. | 224.5 |
| 2009 | 174,381. | 204.2 |
| 2010 | 162,212. | 193.8 |
| 2011 | 157,084. | 191.4 |
| 2012 | 150,456. | 187.0 |

**Table 1**
**Baseline**

## Subpart HH - Municipal Solid Waste Landfills - Calculating Annual Modeled Methane Generation Using Equation HH-1

| | | |
|---|---|---|
| 2013 | 188,653.6 | 239.3 |
| 2014 | 188,653.6 | 244.1 |
| 2015 | 188,653.6 | 249.0 |
| 2016 | 188,653.6 | 0.0 |
| 2017 | 188,653.6 | 0.0 |
| 2018 | 188,653.6 | 0.0 |
| 2019 | 188,653.6 | 0.0 |
| 2020 | 188,653.6 | 0.0 |
| 2021 | 188,653.6 | 0.0 |
| 2022 | 188,653.6 | 0.0 |
| 2023 | 188,653.6 | 0.0 |
| 2024 | 188,653.6 | 0.0 |
| 2025 | 188,653.6 | 0.0 |
| 2026 | 188,653.6 | 0.0 |
| 2027 | 188,653.6 | 0.0 |
| 2028 | 188,653.6 | 0.0 |
| 2029 | 188,653.6 | 0.0 |
| 2030 | 188,653.6 | 0.0 |
| 2031 | 188,653.6 | 0.0 |
| 2032 | 188,653.6 | 0.0 |
| 2033 | 188,653.6 | 0.0 |
| 2034 | 188,653.6 | 0.0 |
| 2035 | 188,653.6 | 0.0 |
| 2036 | 188,653.6 | 0.0 |
| 2037 | | 0.0 |
| 2038 | | 0.0 |
| 2039 | | 0.0 |
| 2040 | | 0.0 |
| 2041 | | 0.0 |
| 2042 | | 0.0 |
| 2043 | | 0.0 |
| 2044 | | 0.0 |
| 2045 | | 0.0 |
| 2046 | | 0.0 |
| 2047 | | 0.0 |
| 2048 | | 0.0 |
| 2049 | | 0.0 |
| 2050 | | 0.0 |

**Table 1**
**Baseline**

## Subpart HH - Municipal Solid Waste Landfills - Calculating Annual Modeled Methane Generation Using Equation HH-1

| | | |
|---|---|---|
| 2051 | | 0.0 |
| 2052 | | 0.0 |
| 2053 | | 0.0 |
| 2054 | | 0.0 |
| 2055 | | 0.0 |
| 2056 | | 0.0 |
| 2057 | | 0.0 |
| 2058 | | 0.0 |
| 2059 | | 0.0 |
| 2060 | | 0.0 |
| 2061 | | 0.0 |
| 2062 | | 0.0 |
| 2063 | | 0.0 |
| 2064 | | 0.0 |
| 2065 | | 0.0 |
| 2066 | | 0.0 |

## Annual Modeled $CH_4$ Generation (metric tons) from Equation HH-1

| | |
|---|---|
| **[$G_{CH4}$]** = Modeled methane generation rate in reporting year T (metric tons CH4). | **8,655.11** |

**Use this value in Equation HH-5**

**Table 2**
**TRRP**

## Subpart HH - Municipal Solid Waste Landfills - Calculating Annual Modeled Methane Generation Usi

**OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES**

Version e-GGRT RY2010.R.02
Today's date 10/8/2015

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## Equation HH-1:

$$G_{CH_4} = \left[ \sum_{x=S}^{T-1} \left\{ W_x \times MCF \times DOC \times DOC_F \times F \times \frac{16}{12} \times \left( e^{-k(T-x-1)} - e^{-k(T-x)} \right) \right\} \right]$$

| | |
|---|---|
| Facility Name: | Tajiguas Landfill |
| Reporter Name: | Nina Danza |
| Unit Name/ ID: | |
| Reporting Period: | |
| Comments: | |
| Unit Type: | Municipal Solid Waste Landfill |

## Input Data

| | |
|---|---|
| **[S]** = Start year of calculation. Use the year 1960 or the opening year of the landfill, whichever is more recent. | 1967 |
| **[T]** = Reporting year for which emissions are calculated. | 2016 |

**Table 2**
**TRRP**

## Subpart HH - Municipal Solid Waste Landfills - Calculating Annual Modeled Methane Generation Usi

| | |
|---|---|
| **[MCF]** = Methane correction factor (fraction). Use the default value of 1 unless there is active aeration of waste within the landfill during the reporting year. If there is active aeration of waste within the landfill during the reporting year, use either the default value of 1 or select an alternative value no less than 0.5 based on site-specific aeration parameters. | 1. |
| **[DOC]** = Degradable organic carbon from Table HH-1 of this subpart or measurement data, if available [fraction (metric tons C/metric ton waste)]. | 0.2 |
| **[$DOC_F$]** = Fraction of DOC dissimilated (fraction). Use the default value of 0.5. | 0.5 |
| **[F]** = Fraction by volume of CH4 in landfill gas from measurement data on a dry basis, if available (fraction); default is 0.5. | 0.5 |
| **[16/12]** = Constant | 16/12 |
| **[k]** = Rate constant from Table HH-1 of this subpart (yr-1). Select the most applicable k value for the majority of the past 10 years (or operating life, whichever is shorter). | 0.02 |

Table 3

## Subpart HH - Municipal Solid Waste Landfills - Calculating Collection Efficiency for Use in Equations HH-7 and HH-8

**OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES**

Version e-GGRT RY2010.R.02
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Table HH-3 - Landfill Gas Collection Efficiencies

| Description | Landfill gas collection efficiency |
|---|---|
| A1: Area with no waste in-place | Not applicable; do not use this area in the calculation |
| A2: Area without active gas collection, regardless of cover type | CE2: 0% |
| A3: Area with daily soil cover and active gas collection | CE3: 60% |
| A4: Area with an intermediate soil cover, or a final soil cover not meeting the criteria for A5 below, and active gas collection | CE4: 75% |
| A5: Area with a final soil cover of 3 feet or thicker of clay and/or geomembrane cover system and active gas collection | CE5: 95% |
| Area weighted average collection efficiency for landfills | CEave1 = (A2*CE2 + A3*CE3 + A4*CE4 + A5*CE5)/ (A2+A3+A4+A5) |

| | |
|---|---|
| Facility Name: | |
| Reporter Name: | |
| Unit Name/ ID: | |
| Reporting Period: | |
| Comments: | |
| Unit Type: | Municipal Solid Waste Landfill |

## Input Data for Calculating Weighted Average for CE (if multiple cover systems are present)

If area by soil cover type information is not available, use default value of 0.75 (CE4 in table HH-3 of this subpart) for all areas under active influence of the collection system by entering the total area under active influence of the collection system in the input area for [A4]

Table 3

## Subpart HH - Municipal Solid Waste Landfills - Calculating Collection Efficiency for Use in Equations HH-7 and HH-8

| Surface Area, square meters | | Landfill gas collection efficiency (Value from Table HH-3) | |
|---|---|---|---|
| **[A1]** = Area with no waste in-place | | Not applicable; do not use this area in the calculation | Not applicable; do not use this area in the calculation |
| **[A2]** = Area without active gas collection, regardless of cover type | 9,000. | CE2: 0% | 0% |
| **[A3]** = Area with daily soil cover and active gas collection | 155,000. | CE3: 60% | 60% |
| **[A4]** = Area with an intermediate soil cover, or a final soil cover not meeting the criteria for A5 below, and active gas collection | 223,000. | CE4: 75% | 75% |
| **[A5]** = Area with a final soil cover of 3 feet or thicker of clay and/or geomembrane cover system and active gas collection | 6,500. | CE5: 95% | 95% |

| | |
|---|---|
| Area weighted average collection efficiency for landfills | **0.68** |

**Use this value as CE for Eqns HH-7 and HH-8**

**Table 4-A**

**TRRP Construction CO2 Emissions**

CO2 Monthly Emissions Summary

| Source | Emissions (mt/month)a | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 20.18 | 265.20 | 269.32 | 59.53 | 77.56 | 108.13 | 65.24 | 65.24 | 65.24 | 65.24 | 74.35 | 74.35 | 70.22 | 42.69 | 65.04 | 86.14 | 70.62 | 24.14 | 24.14 |
| Motor Vehicle Exhaust | 2.97 | 5.57 | 5.70 | 6.21 | 6.21 | 8.77 | 8.90 | 8.90 | 7.68 | 5.96 | 6.09 | 4.87 | 4.87 | 6.09 | 10.30 | 9.98 | 7.43 | 3.65 | 3.05 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 4.42 | 10.68 | 12.67 | 17.39 | 21.01 | 28.11 | 29.74 | 29.74 | 27.10 | 27.08 | 27.80 | 25.16 | 25.71 | 28.17 | 34.19 | 33.47 | 26.55 | 15.37 | 11.88 |
| **Total** | 27.57 | 281.44 | 287.69 | 83.13 | 104.78 | 145.00 | 103.88 | 103.88 | 100.02 | 98.28 | 108.24 | 104.39 | 100.80 | 76.94 | 109.54 | 129.59 | 104.60 | 43.16 | 39.06 |
| **Construction Total** | 2,151.99 | | | | | | | | | | | | | | | | | | |

a Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 4-B**

**TRRP Construction CH4 Emissions**

CH4 Monthly Emissions Summary

| Source | Emissions (mt/month)a | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 0.0015 | 0.0204 | 0.0209 | 0.0045 | 0.0066 | 0.0082 | 0.0054 | 0.0054 | 0.0054 | 0.0054 | 0.0064 | 0.0064 | 0.0060 | 0.0048 | 0.0065 | 0.0083 | 0.0066 | 0.0027 | 0.0027 |
| Motor Vehicle Exhaust | 0.0008 | 0.0013 | 0.0014 | 0.0015 | 0.0015 | 0.0022 | 0.0022 | 0.0022 | 0.0020 | 0.0017 | 0.0018 | 0.0015 | 0.0015 | 0.0018 | 0.0026 | 0.0024 | 0.0018 | 0.0009 | 0.0008 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 0.0043 | 0.0106 | 0.0134 | 0.0150 | 0.0200 | 0.0244 | 0.0266 | 0.0266 | 0.0256 | 0.0261 | 0.0271 | 0.0261 | 0.0268 | 0.0275 | 0.0301 | 0.0291 | 0.0249 | 0.0175 | 0.0140 |
| **Total** | 0.0066 | 0.0324 | 0.0357 | 0.0211 | 0.0281 | 0.0348 | 0.0342 | 0.0342 | 0.0330 | 0.0332 | 0.0352 | 0.0340 | 0.0343 | 0.0341 | 0.0392 | 0.0397 | 0.0333 | 0.0211 | 0.0176 |
| **Construction Total** | 0.5818 | | | | | | | | | | | | | | | | | | |

a Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 4-C**

**TRRP Construction N2O Emissions**

N2O Monthly Emissions Summary

| Source | Emissions (mt/month)a | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 0.0005 | 0.0069 | 0.0070 | 0.0015 | 0.0020 | 0.0028 | 0.0017 | 0.0017 | 0.0017 | 0.0017 | 0.0019 | 0.0019 | 0.0018 | 0.0011 | 0.0017 | 0.0023 | 0.0018 | 0.0006 | 0.0006 |
| Motor Vehicle Exhaust | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0000 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 0.0003 | 0.0007 | 0.0009 | 0.0010 | 0.0013 | 0.0016 | 0.0018 | 0.0018 | 0.0017 | 0.0017 | 0.0018 | 0.0018 | 0.0018 | 0.0019 | 0.0020 | 0.0019 | 0.0017 | 0.0012 | 0.0010 |
| **Total** | 0.0009 | 0.0077 | 0.0080 | 0.0026 | 0.0034 | 0.0045 | 0.0036 | 0.0036 | 0.0035 | 0.0035 | 0.0038 | 0.0038 | 0.0037 | 0.0031 | 0.0038 | 0.0043 | 0.0036 | 0.0019 | 0.0016 |
| **Construction Total** | 0.0710 | | | | | | | | | | | | | | | | | | |

a Monthly emissions calculated from daily emissions assuming 22 working days/month

lbs to mt conversation 0.0004536

**Table 4-D**

**TRRP Construction CO2 Emissions**

CO2 Monthly Emissions Summary

| Source | Emissions (lb/month)a | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 44,478.67 | 584,661.69 | 593,757.65 | 131,244.15 | 170,979.70 | 238,375.79 | 143,830.79 | 143,830.79 | 143,830.79 | 143,830.79 | 163,914.65 | 163,914.65 | 154,818.70 | 94,117.23 | 143,398.57 | 189,899.30 | 155,687.49 | 53,210.79 | 53,210.79 |
| Motor Vehicle Exhaust | 6,547.86 | 12,277.00 | 12,558.83 | 13,693.30 | 13,693.30 | 19,330.93 | 19,613.35 | 19,613.35 | 16,935.45 | 13,136.86 | 13,419.28 | 10,741.38 | 10,741.38 | 13,419.28 | 22,713.99 | 22,009.42 | 16,371.20 | 8,055.66 | 6,716.71 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 9,749.70 | 23,541.11 | 27,937.60 | 38,334.51 | 46,328.13 | 61,965.80 | 65,562.93 | 65,562.93 | 59,742.50 | 59,697.60 | 61,296.32 | 55,475.90 | 56,674.94 | 62,095.69 | 75,380.17 | 73,781.44 | 58,543.46 | 33,887.92 | 26,181.53 |
| **Total** | 60,776.22 | 620,479.80 | 634,254.08 | 183,271.96 | 231,001.14 | 319,672.52 | 229,007.07 | 229,007.07 | 220,508.74 | 216,665.25 | 238,630.25 | 230,131.92 | 222,235.01 | 169,632.19 | 241,492.73 | 285,690.17 | 230,602.15 | 95,154.37 | 86,109.03 |
| **Construction Total** | 4,744,321.67 | | | | | | | | | | | | | | | | | | |

a Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 4-E**

**TRRP Construction CO2 Emissions**

CH4 Monthly Emissions Summary

| Source | Emissions (lb/month)a | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 3.39 | 45.07 | 45.98 | 9.94 | 14.59 | 18.10 | 11.89 | 11.89 | 11.89 | 11.89 | 14.16 | 14.16 | 13.25 | 10.49 | 14.34 | 18.28 | 14.55 | 6.00 | 6.00 |
| Motor Vehicle Exhaust | 1.71 | 2.93 | 3.18 | 3.41 | 3.41 | 4.80 | 4.88 | 4.88 | 4.31 | 3.79 | 3.87 | 3.30 | 3.30 | 3.87 | 5.82 | 5.19 | 3.98 | 2.03 | 1.75 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 9.46 | 23.47 | 29.48 | 33.06 | 44.00 | 53.78 | 58.70 | 58.70 | 56.54 | 57.45 | 59.64 | 57.48 | 59.12 | 60.73 | 66.32 | 64.13 | 54.90 | 38.59 | 30.96 |
| **Total** | 14.56 | 71.46 | 78.64 | 46.42 | 62.00 | 76.68 | 75.46 | 75.46 | 72.73 | 73.13 | 77.67 | 74.94 | 75.67 | 75.09 | 86.47 | 87.60 | 73.43 | 46.62 | 38.70 |
| **Construction Total** | 1,282.70 | | | | | | | | | | | | | | | | | | |

a Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 4-F**

**TRRP Construction CO2 Emissions**

N2O Monthly Emissions Summary

| Source | Emissions (lb/month)a | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16 | Oct-16 | Nov-16 | Dec-16 | Jan-17 |
| **Onsite** | | | | | | | | | | | | | | | | | | | |
| Construction Equipment Exhaust | 1.16 | 15.22 | 15.46 | 3.42 | 4.46 | 6.21 | 3.75 | 3.75 | 3.75 | 3.75 | 4.28 | 4.28 | 4.04 | 2.47 | 3.75 | 4.96 | 4.07 | 1.39 | 1.39 |
| Motor Vehicle Exhaust | 0.09 | 0.15 | 0.16 | 0.17 | 0.17 | 0.24 | 0.25 | 0.25 | 0.22 | 0.20 | 0.20 | 0.18 | 0.18 | 0.20 | 0.30 | 0.26 | 0.20 | 0.10 | 0.09 |
| **Off-Site** | | | | | | | | | | | | | | | | | | | |
| Motor Vehicle Exhaust | 0.63 | 1.58 | 1.99 | 2.20 | 2.95 | 3.58 | 3.91 | 3.91 | 3.79 | 3.86 | 4.01 | 3.88 | 3.99 | 4.08 | 4.42 | 4.27 | 3.68 | 2.62 | 2.11 |
| **Total** | 1.88 | 16.94 | 17.61 | 5.79 | 7.58 | 10.03 | 7.91 | 7.91 | 7.76 | 7.81 | 8.49 | 8.33 | 8.21 | 6.75 | 8.46 | 9.48 | 7.94 | 4.12 | 3.59 |
| **Construction Total** | 156.59 | | | | | | | | | | | | | | | | | | |

a Monthly emissions calculated from daily emissions assuming 22 working days/month

**Table 5**

**Operational Greenhouse Gas Annual Emissions Summary without CSSR**

| Source | Emissions (MT/year)[a] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[b] |
| **Onsite** | | | | |
| CHP Engines Combustion | *8,900* | 0.21 | 0.03 | 1,215 |
| CHP Engines Pass-through $CO_2$ | *4,655* | | | 628 |
| Flare Combustion | *477* | 0.03 | 0.01 | 67 |
| Flare Pass-through $CO_2$ | *293* | | | 40 |
| Emergency Generator | 1,163 | 0.07 | 0.03 | 1,174 |
| MRF Facility Equipment | 119 | 0.01 | 0.00 | 120 |
| AD Facility Equipment | 76 | 0.00 | 0.00 | 77 |
| Composting Equipment Exhaust | 51 | 0.00 | 0.00 | 51 |
| Motor Vehicle Exhaust | 18 | 0.03 | 0.00 | 19 |
| **Onsite Total** | **3,614.19** | **0.34** | **0.07** | **3,390.49** |
| | | | | |
| **Offsite** | | | | |
| Motor Vehicle Exhaust | 1,561 | 2.4 | 0.2 | 1,686 |
| **Offsite Total** | **1,561** | **2.4** | **0.2** | **1,686** |
| | | | | |
| **Total** | **5,175** | **2.7** | **0.3** | **5,076** |

[a] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[b] $CO_2e$ = CO2-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

*Italic* = biogenic emissions of which 86.5% were excluded from CO2e and totals

**Table 6**
**Operational Greenhouse Gas Annual Emissions Summary with CSSR**

| Source | Emissions (MT/year)a | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[b] |
| **Onsite** | | | | |
| CHP Engines Combustion | *8,900* | 0.21 | 0.03 | 1,215 |
| CHP Engines Pass-through CO2 | *4,655* | | | 628 |
| Flare Combustion | *477* | 0.03 | 0.01 | 67 |
| Flare Pass-through CO2 | *293* | | | 40 |
| Emergency Generator | 1,163 | 0.07 | 0.03 | 1,174 |
| MRF Facility Equipment | 119 | 0.01 | 0.00 | 120 |
| AD Facility Equipment | 76 | 0.00 | 0.00 | 77 |
| Composting Equipment Exhaust | 51 | 0.00 | 0.00 | 51 |
| Motor Vehicle Exhaust | 34 | 0.03 | 0.00 | 36 |
| **Onsite Total** | **3,377** | **0.35** | **0.07** | **3,407** |
| | | | | |
| **Offsite** | | | | |
| Motor Vehicle Exhaust | 1,951 | 3.2 | 0.3 | 2,117 |
| **Offsite Total** | **1,951** | **3.2** | **0.3** | 2,117 |
| | | | | |
| **Total** | **5,329** | **3.5** | **0.4** | **5,524** |

a Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT
[b] $CO_2e$ = CO2-equivalent = $CO_2 + 25 \times CH_4 + 298 \times N_2O$
*Italic* = biogenic emissions of which 86.5% were excluded from CO2e and totals

**Table 7**

**Electricity Demand**

| Mwh | Electricty Source Type |
|---|---|
| 1,174 | AD Electrical Consumption |
| 5,062 | MRF Electrical Consumption |
| 359 | Other Site Needs |
| **6,595** | Total Annual Consumption |
| 14,032 | Estimated Annual AD Generation (Gross) |
| 873 | Estimated Annual Solar Generation (Gross) |
| **14,905** | Total Annual Generation (Gross) |
| **8,310** | **Net Export to the Grid Annually** |

**Table 8**

**Estimated GHGs Avoided from Energy Generation**

| | |
|---|---|
| 631 | Southern California Edison (lbs CO2/Mwh)[a] |
| **2,378** | **mtCO2 Avoided Annually from Project** |
| [a] estimate from the Climate Registry 2007 | |

**Table 9**
**Compost CH4 Emissions**

| Item | Value | Comment |
|---|---|---|
| Windrow volume (cu. ft.) | 757,332 | Mustang estimate |
| Windrow cross section shape | Triangular | Approximation |
| Windrow width (ft.) | 55 | Mustang |
| Windrow height (ft.) | 9 | Vermeer CT1010 TX windrow turner maximum |
| Windrow cross-section area (sq. ft.) | 247.5 | Area = 1/2 x width x height |
| Windrow total length (ft.) | 3,060 | Length = Volume / Area |
| Windrow surface area (sq. ft.) | 177,080 | Area = 2 x $((\text{width}/2)^2 + \text{height}^2)^{1/2}$ x length |
| Reduction from digestion process | 0.97 | See Notes a,b |
| CH4 emission factor (lb/1,000 sq.ft.-hr.) | 0.0369 | (lb/1,000 sq.ft.-hr.) = SCAQMD emission factor x (1 - reduction ) |
| CH4 hourly emissions (lb/hr) | 6.53 | lb/hr = Emission factor (lb/hr-sq.ft.) x surface area (sq. ft.) / 1,000 |
| CH4 daily emissions (lb/day) | 156.82 | lb/day = lb/hr x 24 hr/day |
| CH4 annual emissions (lb/yr) | 57,239.94 | lb/yr = lb/day x 365 days/yr |
| CH4 annual emissions (mt/yr) | 25.96 | mt/yr = lb/yr / 2,204.62 |
| CO2e annual emissions (mt/yr) | 649.09 | CH4 = 25 CO2e |

[a] Emission factor for composting anaerobic digestate mixed with wood chips is not available. An emission factor from source tests conducted by the South Coast Air Quality Management District at San Joaquin Composting, Inc. in Lost Hills, CA in February and March 1996 is 1.23 lb/1,000 sq. ft.-hr. The facility composted 50% digested sewage sludge and 50% green waste by weight. The source test report is online at: http://www.aqmd.gov/rules/doc/r1133/sanjoaquin_source.pdf.
The CH4 emission factor for composting digestate was estimated by Mustang & Bekon to be 5% of the source test report emissions due to estimated 95% capture of feedstock's biomethane potential and related ROC emissions during the two 28-day in-vessel anaerobic digestion/composting phases.

b From Bay Area Air Quality Management District engineering evaluation for Zero Waste Energy proposed anaerobic digestion facility

# Attachment F

# Emission Calculations for Alternative B

**Table 1**
**Criteria Pollutant Daily Emissions Summary - Alternative B, MRF at MarBorg**

| Source | Emissions (lb/day) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| **Onsite** | | | | | | |
| **MRF at MarBorg** | | | | | | |
| MRF Facility Equipment | 43.35 | 1.41 | 8.02 | 0.24 | 0.03 | 0.03 |
| On-Site Motor Vehicles | 0.92 | 0.48 | 0.99 | 0.00 | 0.01 | 0.01 |
| Emergency Generator | 1.55 | 0.08 | 1.55 | 0.00 | 0.02 | 0.02 |
| Material Handling Fugitive PM | | | | | 0.00 | 0.00 |
| **Total** | **45.82** | **1.97** | **10.56** | **0.24** | **0.05** | **0.05** |
| **Tajiguas Landfill** | | | | | | |
| CHP Engines | 0.00 | 20.51 | 0.00 | 0.00 | 0.00 | 0.00 |
| Flare | 95.08 | 0.00 | 28.52 | 26.89 | 19.97 | 19.97 |
| AD Facility Equipment | 3.65 | 0.23 | 0.50 | 0.01 | 0.00 | 0.00 |
| Composting Equipment Exhaust | 9.26 | 0.44 | 0.93 | 0.03 | 0.03 | 0.03 |
| Diesel Fuel Storage Tanks | | 0.03 | | | | |
| Material Handling Fugitive PM | | | | | 3.71 | 0.56 |
| AD Digestate Screening Fugitive PM | | | | | 0.00 | 0.00 |
| Compost Screening Fugitive PM | | | | | 0.06 | 0.00 |
| Chipper/Grinder Fugitive PM | | | | | 0.98 | 0.98 |
| Motor Vehicle Fugitive PM | | | | | 7.71 | 0.77 |
| AD Fugitive ROC | | 4.47 | | | | |
| Windrow ROC | | 16.11 | | | | |
| Motor Vehicle Exhaust | 0.03 | 0.01 | 0.04 | 0.00 | 0.00 | 0.00 |
| **Total** | **108.01** | **41.80** | **30.00** | **26.93** | **32.46** | **22.32** |
| **Onsite Total** | **153.83** | **43.77** | **40.55** | **27.17** | **32.51** | **22.37** |
| | | | | | | |
| **Offsite** | | | | | | |
| **MRF at MarBorg** | | | | | | |
| Export Motor Vehicle Exhaust | 61.32 | 8.61 | 61.88 | 0.19 | 2.13 | 1.32 |
| Export Motor Vehicle Fugitive PM | | | | | 6.47 | 1.59 |
| Reduction from MSW to MarBorg instead of Tajiguas Landfill[a] | -10.19 | -2.07 | -119.99 | -0.18 | -4.48 | -1.63 |
| **Total** | **51.13** | **6.54** | **-58.11** | **0.01** | **4.12** | **1.27** |
| **Tajiguas Landfill** | | | | | | |
| Motor Vehicle Exhaust | 2.67 | 0.56 | 2.14 | 0.01 | 0.10 | 0.07 |
| Motor Vehicle Fugitive PM | | | | | 0.52 | 0.13 |
| **Total** | **2.67** | **0.56** | **2.14** | **0.01** | **0.62** | **0.20** |
| **Offsite Total** | **53.80** | **7.10** | **-55.98** | **0.02** | **4.74** | **1.47** |
| | | | | | | |
| **Total** | **207.64** | **50.87** | **-15.42** | **27.20** | **37.25** | **23.84** |

[a] The one-way travel distance for delivering MSW to the MarBorg facility is 19 miles less than to Tajiguas Landfill

**Table 2**
**Criteria Pollutant Annual Emissions Summary - Alternative B, MRF at MarBorg**

| Source | Emissions (ton/year) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| **Onsite** | | | | | | |
| **MRF at MarBorg** | | | | | | |
| MRF Facility Equipment | 6.74 | 0.22 | 1.25 | 0.04 | 0.00 | 0.00 |
| On-Site Motor Vehicles | 0.14 | 0.07 | 0.15 | 0.00 | 0.00 | 0.00 |
| Emergency Generator | 0.04 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 |
| Material Handling Fugitive PM | | | | | 0.00 | 0.00 |
| **Total** | **6.93** | **0.30** | **1.44** | **0.04** | **0.01** | **0.01** |
| **Tajiguas Landfill** | | | | | | |
| CHP Engines | 8.74 | 3.47 | 3.58 | 0.46 | 3.41 | 3.41 |
| Flare | 1.76 | 0.02 | 0.53 | 0.50 | 0.37 | 0.37 |
| AD Facility Equipment | 0.38 | 0.02 | 0.05 | 0.00 | 0.00 | 0.00 |
| Composting Equipment Exhaust | 0.38 | 0.02 | 0.04 | 0.00 | 0.00 | 0.00 |
| Diesel Fuel Storage Tanks | | 0.01 | | | | |
| Material Handling Fugitive PM | | | | | 0.00 | 0.00 |
| AD Digestate Screening Fugitive PM | | | | | 0.00 | 0.00 |
| Compost Screening Fugitive PM | | | | | 0.01 | 0.00 |
| Chipper/Grinder Fugitive PM | | | | | 0.15 | 0.15 |
| Motor Vehicle Fugitive PM | | | | | 1.20 | 0.12 |
| AD Fugitive ROC | | 0.82 | | | | |
| Windrow ROC | | 2.94 | | | | |
| Motor Vehicle Exhaust | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| **Total** | **11.27** | **7.30** | **4.20** | **0.97** | **5.14** | **4.05** |
| **Onsite Total** | **18.19** | **7.60** | **5.64** | **1.00** | **5.15** | **4.06** |
| | | | | | | |
| **Offsite** | | | | | | |
| **MRF at MarBorg** | | | | | | |
| Motor Vehicle Exhaust | 9.53 | 1.34 | 9.62 | 0.03 | 0.33 | 0.20 |
| Motor Vehicle Fugitive PM | | | | | 1.01 | 0.25 |
| Reduction from MSW to MarBorg instead of Tajiguas Landfill[a] | -1.58 | -0.32 | -18.66 | -0.03 | -0.70 | -0.25 |
| **Total** | **7.95** | **1.02** | **-9.04** | **0.00** | **0.64** | **0.20** |
| **Tajiguas Landfill** | | | | | | |
| Motor Vehicle Exhaust | 0.42 | 0.09 | 0.33 | 0.00 | 0.02 | 0.01 |
| Motor Vehicle Fugitive PM | | | | | 0.08 | 0.02 |
| **Total** | **0.42** | **0.09** | **0.33** | **0.00** | **0.10** | **0.03** |
| **Offsite Total** | **8.37** | **1.10** | **-8.70** | **0.00** | **0.74** | **0.23** |
| | | | | | | |
| **Total** | **26.56** | **8.70** | **-3.06** | **1.01** | **5.88** | **4.29** |

[a] The one-way travel distance for delivering MSW to the MatBorg facility is 19 miles less than to Tajiguas Landfill

**Table 3**
**Greenhouse Gas Annual Emissions Summary - Alternative B, MRF at MarBorg**

| Source | Emissions (MT/year)[a] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[b] |
| **Onsite** | | | | |
| **MRF at MarBorg** | | | | |
| MRF Facility Equipment | 2,452.12 | 0.14 | 0.06 | 2,473.72 |
| On-Site Motor Vehicles | 173.27 | 0.00 | 0.00 | 174.04 |
| Emergency Generator | 9.82 | 0.00 | 0.00 | 9.86 |
| **Total** | **2,635.21** | **0.14** | **0.06** | **2,657.62** |
| **Tajiguas Landfill** | | | | |
| CHP Engines Combustion | 8,716.99 | 0.16 | 0.02 | 8,726.00 |
| CHP Engines Pass-through $CO_2$ | 5,945.30 | | | 5,945.30 |
| Flare Combustion | 935.78 | 0.06 | 0.01 | 940.50 |
| Flare Pass-through $CO_2$ | 638.23 | | | 638.23 |
| AD Facility Equipment | 59.46 | 0.00 | 0.00 | 60.00 |
| Composting Equipment Exhaust | 177.98 | 0.01 | 0.00 | 179.58 |
| Motor Vehicle Exhaust | 7.64 | 0.00 | 0.00 | 7.90 |
| **Total** | **16,481.38** | **0.24** | **0.03** | **16,497.52** |
| **Onsite Total** | **19,116.58** | **0.38** | **0.10** | **19,155.14** |
| | | | | |
| **Offsite** | | | | |
| **MRF at MarBorg** | | | | |
| Export Motor Vehicle Exhaust | 2,776.14 | 0.96 | 0.16 | 2,849.08 |
| Reduction from MSW and CSSR to MarBorg instead of Tajiguas Landfill[c] | -2,506.90 | -0.02 | -0.09 | -2,533.17 |
| **Total** | **269.24** | **0.94** | **0.08** | **315.90** |
| **Tajiguas Landfill** | | | | |
| Motor Vehicle Exhaust | 203.99 | 0.28 | 0.03 | 218.90 |
| **Total** | **203.99** | **0.28** | **0.03** | **218.90** |
| **Offsite Total** | **473.23** | **1.23** | **0.10** | **534.80** |
| | | | | |
| | | | | |
| **Total** | **19,589.81** | **1.61** | **0.20** | **19,689.94** |

[a] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[b] $CO_2e$ = CO2-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

[c] The one-way travel distance for delivering MSW and CSSR to the MatBorg facility is 19 miles less than to Tajiguas Landfill

**Table 4**
**Emission Rates at MarBorg for Dispersion Modeling - Alternative B, MRF at MarBorg**

**Table 4-A**
**Daily Emissions from MRF Facility Exhaust - 5:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 5:00 a.m. - 11:00 p.m. | 2.42E+00 | 8.64E-02 | 4.64E-01 | 1.32E-02 | 4.04E-05 | 1.68E-05 |

**Table 4-B**
**Annual Average Hourly Emissions from MRF Facility Exhaust - 5:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 5:00 a.m. - 11:00 p.m. | 2.07E+00 | 7.36E-02 | 3.96E-01 | 1.12E-02 | 3.44E-05 | 1.43E-05 |

**Table 4-C**
**Daily Emissions from MRF Facility Outdoor Roll-off-Truck - 5:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 5:00 a.m. - 11:00 p.m. | 3.87E-03 | 2.18E-03 | 5.22E-03 | 3.25E-05 | 7.24E-05 | 6.66E-05 |

**Table 4-D**
**Annual Average Hourly Emissions from MRF Facility Outdoor Roll-off-Truck - 5:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 5:00 a.m. - 11:00 p.m. | 3.29E-03 | 1.86E-03 | 4.45E-03 | 2.77E-05 | 6.17E-05 | 5.67E-05 |

**Table 4-E**
**Daily Emissions from MRF Facility Outdoor Street Sweeper - 5:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 5:00 a.m. - 11:00 p.m. | 2.40E-01 | 2.61E-02 | 2.18E-01 | 3.25E-04 | 1.53E-03 | 1.50E-03 |

**Table 4-F**
**Annual Average Hourly Emissions from MRF Facility Outdoor Street Sweeper - 5:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 5:00 a.m. - 11:00 p.m. | 2.05E-01 | 2.22E-02 | 1.86E-01 | 2.77E-04 | 1.31E-03 | 1.28E-03 |

**Table 4**
**Emission Rates at MarBorg for Dispersion Modeling - Alternative B, MRF at MarBorg**
**Table 4-G**
**Daily Emissions from MRF Facility Outdoor Forklifts - 5:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 5:00 a.m. - 11:00 p.m. | 1.02E+00 | 1.33E-03 | 2.13E-02 | 4.50E-03 | 3.99E-03 | 3.99E-03 |

**Table 4-H**
**Annual Average Hourly Emissions from MRF Facility Outdoor Forklifts - 5:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 5:00 a.m. - 11:00 p.m. | 8.72E-01 | 1.13E-03 | 1.81E-02 | 3.83E-03 | 3.40E-03 | 3.40E-03 |

**Table 4-I**
**Daily Emissions from MRF Facility Emergency Generator Testing**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| 1/2 hour, daytime | 3.10E+00 | 1.67E-01 | 3.10E+00 | 7.71E-03 | 3.57E-02 | 3.57E-02 |

**Table 4-J**
**Annual Average Hourly Emissions from MRF Facility Emergency Generator Testing**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| **Time Period** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| Daytime | 4.41E-01 | 2.37E-02 | 4.41E-01 | 1.10E-03 | 5.09E-03 | 5.09E-03 |

**Table 5**
**Equipment Exhaust Emissions at MarBorg - Alternative B, MRF at MarBorg**

| Equipment | Horsepower | Number | Hours/Day | Fuel Use (gal/hr) | Emission Stds. | Emission Factors (g/bhp-hr)[a,f] CO | ROC[b] | NOx[b] | PM10[c] | PM2.5[c] | Emission Factor [g/gal][f] $CO_2$[d] | $CH_4$[e] | $N_2O$[e] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Materials Recovery Facility** | | | | | | | | | | | | | |
| **Indoors** | | | | | | | | | | | | | |
| Cat 966 Loader | 235 | 2 | 18 | 18 | Tier 4 | 2.2 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Forklift | 50 | 3 | 16.2 | 1 | 2010+ | 15.4 | 0.02 | 0.32 | 0.06 | 0.06 | 5,794 | 0.276 | 0.0552 |
| Skid Steer | 78 | 1 | 18 | 3.2 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Street Sweeper Aux. Engine | 56 | 1 | 1.8 | 1 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |
| Boom Lift | 50 | 1 | 18 | 1 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |
| **Outdoors** | | | | | | | | | | | | | |
| Forklift | 50 | 3 | 1.8 | 1 | 2010+ | 15.4 | 0.02 | 0.32 | 0.06 | 0.06 | 5,794 | 0.276 | 0.0552 |
| Street Sweeper Aux. Engine | 56 | 1 | 16.2 | 1 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |

[a] Emission factors assumed the same as emission standards.
[b] Where standard is for NMHC+NOx (forklifts, street sweeper aux. engine and boom lift), emissions assumed to be 5 percent ROC and 95 percent NOx, from Table D-25 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
[c] PM10 and PM2.5 assumed to be same as PM emission standards.
[d] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.
[e] $CH_4$ and $N_2O$ from Table 13.7 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
[f] Forklifts are propane fueled. ROC, NOx and PM10 emission factors are from 2011 Carl Moyer Program Guidelines, Table D-14. CO emission factor is emission standard for 2010+ model year large spark ignition engines. $CO_2$ emission factor is from Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for liquified petroleum gas (LPG), calculated from 62,980 g/MMBtu x 0.092 MMBtu/gal. $CH_4$ and $N_2O$ from Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for petroleum fuels, calculated from 3 g/MMBtu x 0.092 MMBtu/gal for $CH_4$ and 0.6 g/MMBtu x 0.092 MMBtu/gal for $N_2O$.

| Equipment | Load Factor[c] | Emission Rates Each Unit (lb/hr) CO[a] | ROC[a] | NOx[a] | SOx[b] | PM10[a, d] | PM2.5[a, d] | $CO_2$[e] | $CH_4$[e] | $N_2O$[e] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Indoors** | | | | | | | | | | |
| Cat 966 Loader | 0.3618 | 0.412 | 0.026 | 0.056 | 0.00375 | 2.81E-06 | 2.81E-06 | 405.159 | 2.30E-02 | 1.03E-02 |
| Forklift | 0.201 | 0.341 | 0.000 | 0.007 | 0.00150 | 1.33E-06 | 1.33E-06 | 12.774 | 6.08E-04 | 1.22E-04 |
| Skid Steer | 0.3685 | 0.234 | 0.009 | 0.019 | 0.00067 | 9.50E-07 | 9.50E-07 | 72.028 | 4.09E-03 | 1.83E-03 |
| Street Sweeper Aux. Engine | 0.4556 | 0.208 | 0.010 | 0.187 | 0.00021 | 1.12E-06 | 1.12E-06 | 22.509 | 1.28E-03 | 5.73E-04 |
| Boom Lift | 0.2881 | 0.118 | 0.006 | 0.106 | 0.00021 | 6.35E-07 | 6.35E-07 | 22.509 | 1.28E-03 | 5.73E-04 |
| **Outdoors** | | | | | | | | | | |
| Forklift | 0.201 | 0.341 | 0.000 | 0.007 | 0.00150 | 1.33E-03 | 1.33E-03 | 12.774 | 6.08E-04 | 1.22E-04 |
| Street Sweeper Aux. Engine | 0.4556 | 0.208 | 0.010 | 0.187 | 0.00021 | 1.12E-03 | 1.12E-03 | 22.509 | 1.28E-03 | 5.73E-04 |

Diesel Fuel Density = 6.943 lb/gal
Diesel Fuel Sulfur = 15 ppmw

[a] Emission Rate [lb/hr] = Emission Factor [g/bhp-hr] x Engine Horsepower [hp] x Load Factor [unitless] / 453.6 [g/lb]
[b] Except for forklifts, Emission Rate [lb/hr] = Fuel Use [gal/hr] x Fuel Density [lb/gal] x Fuel Sulfur [ppmw] x $10^{-6}$ x 2 [lb $SO_2$/lb S]
For forklifts, Emission Rate [lb/hr] = Fuel Use [1,000 gal/hr] x 0.10 x Propane Sulfur Content [grains/100 scf] from AP-42, Section 1.5, Liquified Petroleum Gas Combustion (07/08), Table 1.5-1. Propane sulfur content = 15 grains/100 scf, from http://www.sbcapcd.org/eng/tech/sulfur01.htm.
[c] From OFFROAD 2011 model
[d] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency
[e] Emission rate [lb/hr] = Fuel use [gal/hr] x Emission factor [g/gal] / 453.6 [lb/gal]

**Table 5**
**Equipment Exhaust Emissions at MarBorg - Alternative B, MRF at MarBorg**

| Equipment | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| **Indoors** | | | | | | | | | |
| Cat 966 Loader | 14.85 | 0.94 | 2.02 | 0.13 | 1.01E-04 | 1.01E-04 | 14585.71 | 0.83 | 0.37 |
| Forklift | 16.58 | 0.02 | 0.34 | 0.07 | 6.46E-05 | 6.46E-05 | 620.80 | 0.03 | 0.01 |
| Skid Steer | 4.22 | 0.16 | 0.34 | 0.01 | 1.71E-05 | 1.71E-05 | 1296.51 | 0.07 | 0.03 |
| Street Sweeper Aux. Engine | 0.37 | 0.02 | 0.34 | 0.00 | 2.02E-06 | 2.02E-06 | 40.52 | 0.00 | 0.00 |
| Boom Lift | 2.12 | 0.10 | 1.90 | 0.00 | 1.14E-05 | 1.14E-05 | 405.16 | 0.02 | 0.01 |
| **Outdoors** | | | | | | | | | |
| Forklift | 1.84 | 0.00 | 0.04 | 0.01 | 7.18E-03 | 7.18E-03 | 68.98 | 0.00 | 0.00 |
| Street Sweeper Aux. Engine | 3.37 | 0.16 | 3.03 | 0.00 | 1.82E-02 | 1.82E-02 | 364.64 | 0.02 | 0.01 |
| **Total** | **43.35** | **1.41** | **8.02** | **0.24** | **0.03** | **0.03** | **17,382.32** | **0.98** | **0.43** |

[a] Daily Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Number Units x Operating Time [hr/day]

| Equipment | Days/Year | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| **Indoors** | | | | | | | | | | |
| Cat 966 Loader | 311 | 4,616.88 | 293.80 | 629.58 | 41.98 | 0.03 | 0.03 | 4.54E+06 | 257.69 | 115.51 |
| Forklift | 311 | 5,157.16 | 6.70 | 107.16 | 22.67 | 0.02 | 0.02 | 1.93E+05 | 9.20 | 1.84 |
| Skid Steer | 311 | 1,312.48 | 49.66 | 106.42 | 3.73 | 0.01 | 0.01 | 4.03E+05 | 22.91 | 10.27 |
| Street Sweeper Aux. Engine | 311 | 116.50 | 5.51 | 104.69 | 0.12 | 0.00 | 0.00 | 1.26E+04 | 0.72 | 0.32 |
| Boom Lift | 311 | 657.77 | 31.11 | 591.11 | 1.17 | 0.00 | 0.00 | 1.26E+05 | 7.16 | 3.21 |
| **Outdoors** | | | | | | | | | | |
| Forklift | 311 | 573.02 | 0.74 | 11.91 | 2.52 | 2.23 | 2.23 | 2.15E+04 | 1.02 | 0.20 |
| Street Sweeper Aux. Engine | 311 | 1,048.52 | 49.59 | 942.25 | 1.05 | 5.67 | 5.67 | 1.13E+05 | 6.44 | 2.89 |
| **Total** | | **13,482.33** | **437.12** | **2,493.11** | **73.23** | **7.96** | **7.96** | **5.41E+06** | **305.13** | **134.24** |

[a] Annual Emissions [lb/year] = Daily Emissions [lb/day] x Operating Days [days/year]

**Table 6**
**On-Site Motor Vehicle Exhaust Emissions at MarBorg - Alternative B, MRF at MarBorg**

| Vehicle | Fuel | Number | Mileage (mpg) | Miles/ Day[a] |
|---|---|---|---|---|
| **Indoors** | | | | |
| Roll-off Truck | Diesel | 1 | 8 | 67.5 |
| Street Sweeper | Diesel | 1 | 8 | 9 |
| **Outdoors** | | | | |
| Roll-off Truck | Diesel | 1 | 8 | 22.5 |
| Street Sweeper | Diesel | 1 | 8 | 81 |

[a] Miles/day based on 18 hr/day at 5 mi/hr, 75% indoors for Roll-off Truck, 10% indoors for Street Sweeper

| Vehicle | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | CO[a] | ROC[a] | NOx[a] | SOx[b] | PM10[a,c] | PM2.5[a,c] | $CO_2$[a] | $CH_4$[a] | $N_2O$[d] |
| **Indoors** | | | | | | | | | |
| Roll-off Truck | 1.40E+00 | 7.91E-01 | 1.89E+00 | 1.18E-02 | 2.63E-05 | 2.42E-05 | 2.43E+03 | 3.67E-02 | 4.15E-02 |
| Street Sweeper | 3.25E+00 | 1.63E+00 | 3.10E+00 | 1.18E-02 | 4.12E-05 | 3.79E-05 | 3.76E+03 | 7.59E-02 | 4.15E-02 |
| **Outdoors** | | | | | | | | | |
| Roll-off Truck | 1.40E+00 | 7.91E-01 | 1.89E+00 | 1.18E-02 | 2.63E-02 | 2.42E-02 | 2.43E+03 | 3.67E-02 | 4.15E-02 |
| Street Sweeper | 3.25E+00 | 1.63E+00 | 3.10E+00 | 1.18E-02 | 4.12E-02 | 3.79E-02 | 3.76E+03 | 7.59E-02 | 4.15E-02 |

Diesel Fuel Density = 6.943 lb/gal
Diesel Fuel Sulfur = 15 ppmw

[a] Roll-off truck is from EMFAC2011 emission rates for 2017 model year T6 Instate Small Truck in Santa Barbara County at 5 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Street sweeper is from EMFAC2011 emission rates for 2017 model year T7 Single Truck in Santa Barbara County at 5 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[b] Calculated from (1/diesel mpg) x diesel fuel density (lb/gal) x diesel fuel sulfur (ppmw) x $10^{-6}$ x 453.6 (g/lb) x 2 (g $SO_2$/g S)

[c] Indoor PM10 and PM2.5 emissions controlled by dust collectors with 99.9 percent control efficiency

[d] Calculated as 0.3316 [g/gal] / mileage [mpg]; see: http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 6**
**On-Site Motor Vehicle Exhaust Emissions at MarBorg - Alternative B, MRF at MarBorg**

| Vehicle | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| **Indoors** | | | | | | | | | |
| Roll-off Truck | 2.09E-01 | 1.18E-01 | 2.82E-01 | 1.76E-03 | 3.91E-06 | 3.59E-06 | 3.62E+02 | 5.46E-03 | 6.17E-03 |
| Street Sweeper | 6.45E-02 | 3.24E-02 | 6.16E-02 | 2.34E-04 | 8.18E-07 | 7.53E-07 | 7.46E+01 | 1.51E-03 | 8.22E-04 |
| **Outdoors** | | | | | | | | | |
| Roll-off Truck | 6.96E-02 | 3.92E-02 | 9.40E-02 | 5.86E-04 | 1.30E-03 | 1.20E-03 | 1.21E+02 | 1.82E-03 | 2.06E-03 |
| Street Sweeper | 5.81E-01 | 2.92E-01 | 5.54E-01 | 2.11E-03 | 7.36E-03 | 6.77E-03 | 6.71E+02 | 1.36E-02 | 7.40E-03 |
| **Total** | **0.92** | **0.48** | **0.99** | **0.00** | **0.01** | **0.01** | **1228.23** | **0.02** | **0.02** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Days/Year | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| **Indoors** | | | | | | | | | | |
| Roll-off Truck | 311 | 6.49E+01 | 3.66E+01 | 8.77E+01 | 5.47E-01 | 1.22E-03 | 1.12E-03 | 1.13E+05 | 1.70E+00 | 1.92E+00 |
| Street Sweeper | 311 | 2.01E+01 | 1.01E+01 | 1.92E+01 | 7.29E-02 | 2.54E-04 | 2.34E-04 | 2.32E+04 | 4.68E-01 | 2.56E-01 |
| **Outdoors** | | | | | | | | | | |
| Roll-off Truck | 311 | 2.16E+01 | 1.22E+01 | 2.92E+01 | 1.82E-01 | 4.05E-01 | 3.73E-01 | 3.75E+04 | 5.66E-01 | 6.39E-01 |
| Street Sweeper | 311 | 1.81E+02 | 9.08E+01 | 1.72E+02 | 6.56E-01 | 2.29E+00 | 2.11E+00 | 2.09E+05 | 4.22E+00 | 2.30E+00 |
| **Total** | | **287.31** | **149.65** | **308.52** | **1.46** | **2.70** | **2.48** | **381,980.38** | **6.95** | **5.12** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 7**
**Emergency Generator Testing Emissions at MarBorg - Alternative B, MRF at MarBorg**

| Equipment | Horsepower | Hours/Day | Fuel Use (gal/hr) | Emission Factors (g/bhp-hr)[a] | | | | | Emission Factors (g/gal) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CO | ROC | NOx | PM10[b] | PM2.5[b] | $CO_2$[c] | $CH_4$[d] | $N_2O$[d] |
| 500 ekW Standby Generator | 540 | 0.5 | 37 | 2.6 | 0.14 | 2.6 | 0.03 | 0.03 | 10,210 | 0.41 | 0.083 |

[a] Emission factors are Tier 4 emission standards.
[b] PM10 and PM2.5 assumed to be same as PM emission standards.
[c] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.
[d] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.

| Equipment | Load Factor | Emission Rates (lb/hr) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO[a] | ROC[a] | NOx[a] | SOx[b] | PM10[a] | PM2.5[a] | $CO_2$[c] | $CH_4$[c] | $N_2O$[c] |
| 500 ekW Standby Generator | 1 | 3.10 | 0.17 | 3.10 | 0.008 | 0.04 | 0.04 | 832.83 | 0.03 | 0.01 |

Diesel Fuel Density = 6.943 lb/gal
Diesel Fuel Sulfur = 15 ppmw

[a] Emission Rate [lb/hr] = Emission Factor [g/bhp-hr] x Engine Horsepower [hp] x Load Factor [unitless] / 453.6 [g/lb]
[b] Emission Rate [lb/hr] = Fuel Use [gal/hr] x Fuel Density [lb/gal] x Fuel Sulfur [ppmw] x $10^{-6}$ x 2 [lb $SO_2$/lb S]
[c] Emission Rate [lb/hr] = Emission Factor [g/gal] x Fuel Use [gal/hr] / 453.6 [g/lb]

| Equipment | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| 500 ekW Standby Generator | 1.55 | 0.08 | 1.55 | 0.00 | 0.02 | 0.02 | 416.41 | 0.02 | 0.00 |

[a] Daily Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Operating Time [hr/day]

| Equipment | Annual Op. (hr/year) | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| 500 ekW Standby Generator | 26 | 80.48 | 4.33 | 80.48 | 0.20 | 0.93 | 0.93 | 21,653.48 | 0.87 | 0.18 |

[a] Annual Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Operating Time [hr/year]

**Table 8**
**On-Site Fugitive PM Emissions at MarBorg - Alternative B, MRF at MarBorg**

**Material Transfers**

| Material | Transfer | Moisture (%)[a] | Daily Amount (tons) | Annual Op. (Days/year) | Emission Factors (lb/ton)[b] | | Emissions (lb/day)[c,e] | | Emissions (lb/year)[d] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| MSW and CSSR | Into MRF Facility | 28 | 830 | 311 | 3.84E-04 | 5.82E-05 | 3.19E-04 | 4.83E-05 | 0.10 | 0.02 |
| Organics | Into Trucks | 28 | 211 | 311 | 3.84E-04 | 5.82E-05 | 8.11E-05 | 1.23E-05 | 0.03 | 0.00 |
| Residuals | Into Trucks | 28 | 260 | 311 | 3.84E-04 | 5.82E-05 | 9.99E-05 | 1.51E-05 | 0.03 | 0.00 |

[a] Value for MSW from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5; also used for MRF residuals

[b] Emission factor [lb/ton] = k x 0.0032 x (wind speed [mph] / 5)$^{1.3}$ / (material moisture [%] /2 )$^{1.4}$
from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06)

k = 0.35 for PM10
0.053 for PM2.5

Wind speed = 5.47 mph, from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[c] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

[e] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

**Table 9**
**Off-Site Motor Vehicle Exhaust Emissions to and from MarBorg - Alternative B, MRF at MarBorg**

| Vehicle | Use | Fuel | One-Way Trips/Day | Mileage (mpg)[b] | One-Way Trip Dist. (mi) | Miles/ Day |
|---|---|---|---|---|---|---|
| Tractor/Trailer | Recycleables to POLA | Diesel | 28 | 5 | 116 | 3,248 |
| Peterbilt Tractors | Organics and Residuals to Tajiguas Landfill | CNG | 52 | 6 | 28 | 1,456 |
| Fuel Truck | MRF Equipment Refueling | Diesel | 1 | 8 | 0.15 | 0.15 |
| Worker Commuting | From the North[a] | Gasoline | 120 | 22 | 33 | 3,960 |
| Worker Commuting | From the South[a] | Gasoline | 40 | 22 | 26 | 1,040 |
| Worker Commuting | Local[a] | Gasoline | 40 | 22 | 2 | 80 |
| Collection Vehicle | MSW to MarBorg instead of Tajiguas[a] | Diesel | 232 | 5 | -19 | -4,408 |

[a] Round trips per day are from Project Traffic Study
[b] Except for Peterbilt Tractor, calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2017 by total miles in Santa Barbara County
Mileage for Peterbilt Tractor is diesel-equivalent, Mustang estimate
[c] Roundtrip distance is reduction in round-trip miles per vehicle from delivering to MarBorg instead of Tajiguas Landfill

| Vehicle | Use | EMFAC Vehicle Class | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO[a,b] | ROC[a,c] | NOx[a,c] | SOx[a,d] | PM10[a,c] | PM2.5[a,c] | $CO_2$[a,e] | $CH_4$[a,f] | $N_2O$[f,g] |
| Tractor/Trailer | Recycleables to POLA | T7 POLA | 2.62E+00 | 5.58E-01 | 7.87E+00 | 1.76E-02 | 2.09E-01 | 1.38E-01 | 1.75E+03 | 3.05E-02 | 6.07E-02 |
| Peterbilt Tractors | Organics and Residuals to Tajiguas Landfill | N/A | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Fuel Truck | MRF Equipment Refueling | T6 instate small | 7.62E-01 | 2.16E-01 | 3.16E+00 | 1.13E-02 | 2.59E-01 | 1.66E-01 | 1.13E+03 | 1.18E-02 | 3.91E-02 |
| Worker Commuting | From the North | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |
| Worker Commuting | From the South | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |
| Worker Commuting | Local | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |
| Collection Vehicle | MSW to MarBorg instead of Tajiguas | T7 SWCV | 1.05E+00 | 2.13E-01 | 1.23E+01 | 1.84E-02 | 1.61E-01 | 9.40E-02 | 1.83E+03 | 1.17E-02 | 6.33E-02 |

| | | | |
|---|---|---|---|
| Diesel Fuel HV = | 128,450 | Btu/gal | |
| Natural Gas HV = | 1,020 | Btu/scf | |
| Natural Gas S = | 0.5 | grains/100 scf | |
| Diesel Fuel Density = | 6.943 | lb/gal | |
| Diesel Fuel Sulfur = | 15 | ppmw | |
| Natural Gas $CO_2$ EF = | 0.054 | Kg/scf | from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from |

http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Except for Peterbilt Tractor, calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2017 by total miles in Santa Barbara County
[b] Peterbilt tractor calculated by dividing EMFAC2011 calculated total daily CO emissions from 2017 model year T7 tractors in Santa Barbara County in 2017 by total miles in Santa Barbara County
[c] Peterbilt tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
[d] Peterbilt tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g $SO_2$/g S)
[e] Peterbilt tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (Kg/scf) x 1,000 (g/Kg)
[f] Peterbilt Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
[g] Emission factor for gasoline calculated from 0.0416 x NOx emission factor; emission factor for diesel calculated as 0.3316 g/gal; see: http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 9**
**Off-Site Motor Vehicle Exhaust Emissions to and from MarBorg - Alternative B, MRF at MarBorg**

| Vehicle | Use | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Tractor/Trailer | Recycleables to POLA | 18.77 | 4.00 | 56.38 | 0.13 | 1.50 | 0.99 | 12,554.52 | 0.22 | 0.43 |
| Peterbilt Tractors | Organics and Residuals to Tajiguas Landfill | 3.74 | 1.19 | 1.48 | 0.02 | 0.09 | 0.09 | 3,638.02 | 6.31 | 0.56 |
| Fuel Truck | MRF Equipment Refueling | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.37 | 0.00 | 0.00 |
| Worker Commuting | From the North | 30.25 | 2.67 | 3.13 | 0.03 | 0.42 | 0.18 | 2,717.69 | 0.22 | 0.13 |
| Worker Commuting | From the South | 7.94 | 0.70 | 0.82 | 0.01 | 0.11 | 0.05 | 713.74 | 0.06 | 0.03 |
| Worker Commuting | Local | 0.61 | 0.05 | 0.06 | 0.00 | 0.01 | 0.00 | 54.90 | 0.00 | 0.00 |
| Collection Vehicle | MSW to MarBorg instead of Tajiguas | -10.19 | -2.07 | -119.99 | -0.18 | -1.57 | -0.91 | -17,770.69 | -0.11 | -0.62 |
| **Total** | | **51.13** | **6.54** | **-58.11** | **0.01** | **0.56** | **0.40** | **1,908.54** | **6.70** | **0.55** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Op. Days/yr | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Tractor/Trailer | Recycleables to POLA | 311 | 5,836.63 | 1,243.52 | 17,535.16 | 39.21 | 465.51 | 306.99 | 3,904,454.83 | 67.95 | 135.20 |
| Peterbilt Tractors | Organics and Residuals to Tajiguas Landfill | 311 | 1,164.44 | 369.36 | 459.20 | 6.79 | 28.95 | 28.95 | 1,131,423.42 | 1,962.60 | 174.70 |
| Fuel Truck | MRF Equipment Refueling | 300 | 0.08 | 0.02 | 0.31 | 0.00 | 0.03 | 0.02 | 112.08 | 0.00 | 0.00 |
| Worker Commuting | From the North | 311 | 9,407.57 | 831.23 | 973.81 | 10.34 | 131.21 | 57.03 | 845,202.05 | 68.42 | 40.51 |
| Worker Commuting | From the South | 311 | 2,470.68 | 218.30 | 255.75 | 2.72 | 34.46 | 14.98 | 221,972.26 | 17.97 | 10.64 |
| Worker Commuting | Local | 311 | 190.05 | 16.79 | 19.67 | 0.21 | 2.65 | 1.15 | 17,074.79 | 1.38 | 0.82 |
| Collection Vehicle | MSW to MarBorg instead of Tajiguas | 311 | -3,167.92 | -645.05 | -37,317.13 | -55.50 | -487.67 | -284.06 | -5,526,686.05 | -35.25 | -191.38 |
| **Total** | | | **15,901.53** | **2,034.17** | **-18,073.23** | **3.77** | **175.14** | **125.05** | **593,553.38** | **2,083.08** | **170.49** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Off-Site Motor Vehicle Fugitive PM Emissions**

**Emission Factors for Vehicles on Off-Site Paved Roads**

| Parameter | Value | Comments |
|---|---|---|
| Road silt loading ($g/m^2$) | 0.1 | CalEEMod default |
| Onroad vehicles average weight (tons) | 2.4 | CalEEMod Default for Santa Barbara County |
| PM10 emission factor (lb/mile) | 6.61E-04 | 0.0022 x (silt loading $[g/m^2])^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |
| PM2.5 emission factor (lb/mile) | 1.62E-04 | 0.00054 x (silt loading $[g/m^2])^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |

| Vehicle | Use | Miles/ Day | Op. Days/yr | Daily Emissions (lb/day)[a] | | Annual Emissions (lb/year)[b] | |
|---|---|---|---|---|---|---|---|
| | | | | PM10 | PM2.5 | PM10 | PM2.5 |
| Tractor/Trailer | Recycleables to POLA | 3,248 | 311 | 2.15 | 0.53 | 667.75 | 163.90 |
| Peterbilt Tractors | Organics and Residuals to Tajiguas Landfill | 1,456 | 311 | 0.96 | 0.24 | 299.34 | 73.47 |
| Fuel Truck | MRF Equipment Refueling | 0.15 | 300 | 0.00 | 0.00 | 0.03 | 0.01 |
| Worker Commuting | From the North | 3,960 | 311 | 2.62 | 0.64 | 814.13 | 199.83 |
| Worker Commuting | From the South | 1,040 | 311 | 0.69 | 0.17 | 213.81 | 52.48 |
| Worker Commuting | Local | 80 | 311 | 0.05 | 0.01 | 16.45 | 4.04 |
| Collection Vehicle | MSW to MarBorg instead of Tajiguas | -4,408 | 311 | -2.91 | -0.72 | -906.23 | -222.44 |
| **Total** | | | | **3.55** | **0.87** | **1,105.27** | **271.29** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]

[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 10**

**Diesel Exhaust Particulate Matter Emissions at MarBorg - Alternative B, MRF at MarBorg**

**Table 10-A**

**MRF Facility Exhaust - 5:00 a.m. - 6:00 p.m.**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | | |
|---|---|---|---|---|---|---|
| Cat 966 Loader | 311 | 13 | 5.62E-06 | 2.27E-02 | | |
| Skid Steer | 311 | 13 | 9.50E-07 | 3.84E-03 | | |
| Street Sweeper Aux. Engine | 311 | 1.8 | 1.12E-06 | 6.30E-04 | | |
| Boom Lift | 311 | 13 | 6.35E-07 | 2.57E-03 | | |
| Roll-off Truck | 311 | 9.75 | 2.17E-07 | 6.58E-04 | | |
| Street Sweeper | 311 | 1.8 | 4.54E-08 | 2.54E-05 | | |
| Collection Vehicles | 311 | 13 | 7.82E-07 | 3.16E-03 | | Night Fac |
| **Total** | | | **9.38E-06** | **3.36E-02** | **MRFSTKS** | 0.34 |

**Table 10-B**

**MRF Facility Exhaust - 6:00 p.m. - 11:00 p.m.**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | |
|---|---|---|---|---|---|
| Cat 966 Loader | 311 | 5 | 5.62E-06 | 8.74E-03 | |
| Skid Steer | 311 | 5 | 9.50E-07 | 1.48E-03 | |
| Street Sweeper Aux. Engine | 311 | 0 | 0.00E+00 | 0.00E+00 | |
| Boom Lift | 311 | 5 | 6.35E-07 | 9.88E-04 | |
| Roll-off Truck | 311 | 3.75 | 2.17E-07 | 2.53E-04 | |
| Street Sweeper | 311 | 0 | 0.00E+00 | 0.00E+00 | |
| **Total** | | | **7.43E-06** | **1.15E-02** | **MRFSTKS** |

**Table 10-C**

**MRF Facility Outdoor Roll-off Truck - 5:00 a.m. - 11:00 p.m.**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | **ROLLOFF** |
|---|---|---|---|---|---|
| Roll-off Truck | 311 | 4.5 | 2.89E-04 | 4.05E-01 | |
| **Total** | | | **2.89E-04** | **4.05E-01** | |

**Table 10-D**

**MRF Facility Outdoor Street Sweeper - 5:00 a.m. - 11:00 p.m.**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | **SWEEPER** |
|---|---|---|---|---|---|
| Street Sweeper | 311 | 16.2 | 2.76E-03 | 1.39E+01 | |
| **Total** | | | **2.76E-03** | **1.39E+01** | |

**Table 10-E**

**Emergency Generator Testing (10:00 a.m. to 4:00 p.m.)**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | **EGEN** |
|---|---|---|---|---|---|
| 500 ekW Standby Generator | 52 | 0.5 | 3.57E-02 | 9.29E-01 | |
| **Total** | | | **3.57E-02** | **9.29E-01** | |

**Table 10**

**Diesel Exhaust Particulate Matter Emissions at MarBorg - Alternative B, MRF at MarBorg**

**Table 10-F**

**Collection Vehicle DPM Emissions Inside MRF**

| | |
|---|---|
| Vehicles per Day | 116 |
| Travel Distance Inside MRF (ft./vehicle)[a] | 610 |
| Travel Distance Inside MRF (mi/vehicle) | 0.116 |
| Total Travel Distance (mi/day) | 13.402 |
| Operating Hours per Day | 13 |
| Total Hourly Travel Distance (mi/hr) | 1.031 |
| Running Exh. PM10 Emission Factor (g/mi)[b] | 2.17E-01 |
| **Running PM10 Emissions (g/hr)** | **2.24E-01** |
| Idling Time Inside MRF (min./vehicle)[c] | 5 |
| Idling Time Inside MRF (hr/vehicle) | 0.083 |
| Total Daily Idling Time (hr/day) | 9.67 |
| Total Hourly Idling Time (hr/hr) | 0.74 |
| Idling PM10 Emission Factor (g/hr)[d] | 1.76E-01 |
| **Idling PM10 Emissions (g/hr)** | **1.31E-01** |
| **Total PM10 Emissions (g/hr)** | **3.55E-01** |
| **Total PM10 Emissions (lb/hr)** | **7.82E-04** |
| Filtration System Control Efficiency (%) | 99.9 |
| **Controlled PM10 Emissions (lb/hr)** | **7.82E-07** |

[a] Estimated as twice the distance between the tipping floor entrance and exit

[b] From EMFAC2011 for T7 SWCV in Santa Barbara County at 5 mph for 2017

[c] Assumption

[d] From EMFAC2011 for T7 vehicles in Santa Barbara County for 2017

**Table 10-G**

**Collection Vehicle DPM Emissions Outside MRF (5:00 a.m. - 6:00 p.m.)**

| | | |
|---|---|---|
| Vehicles per Day | 116 | |
| Travel Distance Outside MRF (ft./vehicle) | 746 | |
| Travel Distance Inside MRF (mi/vehicle) | 0.141 | |
| Total Travel Distance (mi/day) | 16.39 | |
| Operating Hours per Day | 13 | |
| Vehicles per Hour | 8.92 | |
| Running Exh. PM10 Emission Factor (g/mi)[a] | 1.08E-01 | |
| **PM10 Emissions (lb/hr)** | **3.01E-04** | |
| **Running PM10 Emissions (g/hr-mi)** | **9.66E-01** | |
| **Running PM10 Emissions (lb/yr)** | **1.22E+00** | **ROAD** |

[a] From EMFAC2011 for T7 SWCV in Santa Barbara County at 15 mph for 2017

**Table 11**
**Diesel Exhaust Emissions of TACs with Acute Effects**

**Table 11-A**
**MRF Facility Exhaust - 5:00 a.m. - 6:00 p.m.**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | STCK1-8 | Night Factor - Acute |
|---|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 8.50E-03 | | 0.96 |
| Formaldehyde | 50-00-0 | 1.7261 | 7.87E-02 | | |
| Acetaldehyde | 75-07-0 | 0.7833 | 3.57E-02 | | |
| Acrolein | 107-02-8 | 0.0339 | 1.55E-03 | | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 9.92E-03 | | |
| Toluene | 108-88-3 | 0.1054 | 4.81E-03 | | |
| Xylenes | 1330-20-7 | 0.0424 | 1.93E-03 | | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 8.50E-03 | | |
| Arsenic | 7440-38-2 | 0.0016 | 7.30E-05 | | |
| Copper | 7440-50-8 | 0.0041 | 1.87E-04 | | |
| Mercury | 7439-97-6 | 0.0020 | 9.12E-05 | | |
| Nickel | 7440-02-0 | 0.0039 | 1.78E-04 | | |

Hourly fuel use = 45.62 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 11-B**
**MRF Facility Exhaust - 6:00 p.m. - 11:00 p.m.**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | STCK1-8 |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 8.16E-03 | |
| Formaldehyde | 50-00-0 | 1.7261 | 7.56E-02 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 3.43E-02 | |
| Acrolein | 107-02-8 | 0.0339 | 1.49E-03 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 9.53E-03 | |
| Toluene | 108-88-3 | 0.1054 | 4.62E-03 | |
| Xylenes | 1330-20-7 | 0.0424 | 1.86E-03 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 8.16E-03 | |
| Arsenic | 7440-38-2 | 0.0016 | 7.01E-05 | |
| Copper | 7440-50-8 | 0.0041 | 1.80E-04 | |
| Mercury | 7439-97-6 | 0.0020 | 8.77E-05 | |
| Nickel | 7440-02-0 | 0.0039 | 1.71E-04 | |

Hourly fuel use = 43.83 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 11-C**
**MRF Facility Outdoor Roll-off Truck - 5:00 a.m. - 11:00 p.m.**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | ROLLOFF |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 1.16E-04 | |
| Formaldehyde | 50-00-0 | 1.7261 | 1.08E-03 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 4.90E-04 | |
| Acrolein | 107-02-8 | 0.0339 | 2.12E-05 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 1.36E-04 | |
| Toluene | 108-88-3 | 0.1054 | 6.59E-05 | |
| Xylenes | 1330-20-7 | 0.0424 | 2.65E-05 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 1.16E-04 | |
| Arsenic | 7440-38-2 | 0.0016 | 1.00E-06 | |
| Copper | 7440-50-8 | 0.0041 | 2.56E-06 | |
| Mercury | 7439-97-6 | 0.0020 | 1.25E-06 | |
| Nickel | 7440-02-0 | 0.0039 | 2.44E-06 | |

Hourly fuel use = 0.63 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 11-D**
**MRF Facility Outdoor Street Sweeper - 5:00 a.m. - 11:00 p.m.**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | SWEEPER |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 1.16E-04 | |
| Formaldehyde | 50-00-0 | 1.7261 | 1.08E-03 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 4.90E-04 | |
| Acrolein | 107-02-8 | 0.0339 | 2.12E-05 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 1.36E-04 | |
| Toluene | 108-88-3 | 0.1054 | 6.59E-05 | |
| Xylenes | 1330-20-7 | 0.0424 | 2.65E-05 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 1.16E-04 | |
| Arsenic | 7440-38-2 | 0.0016 | 1.00E-06 | |
| Copper | 7440-50-8 | 0.0041 | 2.56E-06 | |
| Mercury | 7439-97-6 | 0.0020 | 1.25E-06 | |
| Nickel | 7440-02-0 | 0.0039 | 2.44E-06 | |

Hourly fuel use = 0.63 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 11-E**
**Emergency Generator Testing (10:00 a.m. to 4:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | EGEN |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 3.45E-03 | |
| Formaldehyde | 50-00-0 | 1.7261 | 3.19E-02 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 1.45E-02 | |
| Acrolein | 107-02-8 | 0.0339 | 6.27E-04 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 4.02E-03 | |
| Toluene | 108-88-3 | 0.1054 | 1.95E-03 | |
| Xylenes | 1330-20-7 | 0.0424 | 7.84E-04 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 3.45E-03 | |
| Arsenic | 7440-38-2 | 0.0016 | 2.96E-05 | |
| Copper | 7440-50-8 | 0.0041 | 7.59E-05 | |
| Mercury | 7439-97-6 | 0.0020 | 3.70E-05 | |
| Nickel | 7440-02-0 | 0.0039 | 7.22E-05 | |

Hourly fuel use = 18.50 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 11-F**
**Collection Vehicles Outside MRF (5:00 a.m. - 6:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | ROAD |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 3.91E-05 | |
| Formaldehyde | 50-00-0 | 1.7261 | 3.63E-04 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 1.65E-04 | |
| Acrolein | 107-02-8 | 0.0339 | 7.12E-06 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 4.57E-05 | |
| Toluene | 108-88-3 | 0.1054 | 2.21E-05 | |
| Xylenes | 1330-20-7 | 0.0424 | 8.91E-06 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 3.91E-05 | |
| Arsenic | 7440-38-2 | 0.0016 | 3.36E-07 | |
| Copper | 7440-50-8 | 0.0041 | 8.61E-07 | |
| Mercury | 7439-97-6 | 0.0020 | 4.20E-07 | |
| Nickel | 7440-02-0 | 0.0039 | 8.19E-07 | |

Hourly fuel use = 0.21 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 12**
**Emergency Generator Diesel Fuel Tank TAC Emissions**

| CAS | ABBREV | AVRG (lbs/yr) | MAX (lbs/hr) |
|---|---|---|---|
| 95636 | 1,2,4TriMeBenze | 2.30E-01 | 2.63E-05 |
| 71432 | Benzene | 1.00E-02 | 1.14E-06 |
| 100414 | Ethyl Benzene | 2.00E-02 | 2.28E-06 |
| 110543 | Hexane | 1.00E-02 | 1.14E-06 |
| 108383 | m-Xylene | 2.90E-01 | 3.31E-05 |
| 108883 | Toluene | 1.20E-01 | 1.37E-05 |

**Table 13**
**CHP Engine Emissions - Alternative B, MRF at MarBorg**

| Type | Engine Rating (hp) | Biogas Input @ Full Load (scfh)[a] | Heat Input @ Full Load (MMBtu/ hr) | Number Engines | Daily Op. (hr/day) | Emission Factors (normal operation) CO (g/bhp-hr)[b] | ROC (g/bhp-hr)[b] | NOx (g/bhp-hr)[b] | SOx (g/scf)[c] | PM10 (g/bhp-hr)[d] | PM2.5 (g/bhp-hr)[d] | Combust. $CO_2$ (g/MMBtu)[e] | $CH_4$ (g/MMBtu)[f] | $N_2O$ (g/MMBtu)[f] | Pass-through $CO_2$ (g/scf)[g] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jenbacher/GE JMS416vB82 | 1,573 | 16,828 | 9.88 | 2 | 24 | 0.3 | 0.12 | 0.12 | 0.00151 | 0.118 | 0.118 | 53,020 | 1.0 | 0.10 | 21.23 |

Biogas heating value = 587 Btu/scf Mustang estimate
Biogas sulfur = 20 ppmv Mustang estimate
Biogas $CO_2$ fraction = 0.41 Conservative estimate

[a] Biogas input at full load [scfh] = Heat input at full load [MMBtu/hr] x 106 [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Control system vendor specifications
[c] SOx emission factor [g/scf] = Biogas sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb
[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr. Filterable PM10 and PM2.5 assumed equal to filterable PM
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engibes from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2 is 9.91 x $10^{-3}$ lb/MMBtu = 9.91 x $10^{-3}$ lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.0118 g/bhp-hr.
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.
[g] "Pass-through" $CO_2$ emission factor [g/scf] = Biogas CO2 volume fraction [unitless] x 44 [lb/lb-mole $CO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

**Emission Factors (start-up)**

| CO (g/bhp-hr)[a] | ROC (g/bhp-hr)[a] | NOx (g/bhp-hr)[a] | SOx (g/scf)[b] | PM10 (g/bhp-hr)[b] | PM2.5 (g/bhp-hr)[b] | Combust. $CO_2$ (g/MMBtu)[b] | $CH_4$ (g/MMBtu)[b] | $N_2O$ (g/MMBtu)[b] | Pass-through $CO_2$ (g/scf)[b] |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 0.43 | 0.6 | 0.00151 | 0.11800 | 0.11800 | 53,020 | 1.0 | 0.10 | 21.23 |

[a] Engine vendor specification
[b] Same as during normal operation

**Emission Factors (SCR catalyst burn-in)**

| CO (g/bhp-hr)[a] | ROC (g/bhp-hr)[a] | NOx (g/bhp-hr)[b] | SOx (g/scf)[a] | PM10 (g/bhp-hr)[a] | PM2.5 (g/bhp-hr)[a] | Combust. $CO_2$ (g/MMBtu)[a] | $CH_4$ (g/MMBtu)[a] | $N_2O$ (g/MMBtu)[a] | Pass-through $CO_2$ (g/scf)[a] |
|---|---|---|---|---|---|---|---|---|---|
| 0.3 | 0.12 | 0.36 | 0.00151 | 0.11800 | 0.11800 | 53,020 | 1.0 | 0.10 | 21.23 |

[a] Same as during normal operation
[b] Based on average of 50 percent of normal NOx control efficiency

**Hourly Emissions per Engine, Normal Operation (lb/hr)[a]**

| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 1.04 | 0.42 | 0.42 | 0.06 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 7.87E+02 |

[a] Except for SOx, $CO_2$, $CH_4$ and $N_2O$, Hourly emissions [lb/hr] = Engine rating [hp] x Emission factor [g/bhp-hr] / 453.6 [g/lb]
SOx and pass-though $CO_2$ hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]
Combustion $CO_2$, $CH_4$ and $N_2O$ hourly emisisons [lb/hr] = Heat input [MMBtu/hr] x Emission factor [g/MMBtu] / 453.6 [g/lb]

**Hourly Emissions per Engine, Start-Up (lb/hr)[a]**

| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 5.72 | 0.95 | 1.25 | 0.06 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 7.87E+02 |

[a] Start-up is 30 minutes with no CO, ROC or NOx control by SCR/catalyst system. Emissions are for one-hour period that includes 30-minute start-up

**Hourly Emissions per Engine, SCR Catalyst Burn-In (lb/hr)[a]**

| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 1.04 | 0.42 | 1.25 | 0.06 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 7.87E+02 |

**Daily Emissions, both Engines Normal Operation (lb/day)[a]**

| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 49.94 | 19.97 | 19.97 | 2.68 | 19.64 | 19.64 | 5.54E+04 | 1.05E+00 | 1.05E-01 | 3.78E+04 |

[a] Daily emissions [lb/day] = Number engines x Daily operating time [hr/day] x Hourly emissions [lb/hr]

**Daily Emissions, both Engines Normal Operation plus one Start-up for One Engine (lb/day)[a]**

| CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 54.62 | 20.51 | 20.81 | 2.68 | 19.64 | 19.64 | 5.54E+04 | 1.05E+00 | 1.05E-01 | 3.78E+04 |

**Annual Emissions, both Engines (lb/year)[c]**

| | Annual Op. (hr/year-engine) | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Start-Up[a] | 18 | 205.99 | 34.33 | 44.94 | 2.01 | 14.73 | 14.73 | 4.16E+04 | 7.84E-01 | 7.84E-02 | 2.83E+04 |
| SCR Catalyst Burn-In[a] | 120 | 249.68 | 99.87 | 299.62 | 13.41 | 98.21 | 98.21 | 2.77E+05 | 5.23E+00 | 5.23E-01 | 1.89E+05 |
| Normal Operation[b] | 8,184 | 17,028.35 | 6,811.34 | 6,811.34 | 914.56 | 6,697.82 | 6,697.82 | 1.89E+07 | 3.56E+02 | 3.56E+01 | 1.29E+07 |
| Total | **8,322** | **17,484.02** | **6,945.54** | **7,155.90** | **929.98** | **6,810.76** | **6,810.76** | **1.92E+07** | **3.62E+02** | **3.62E+01** | **1.31E+07** |

[a] Mustang estimate
[b] Based on operating 95% of the time, excluding start-up hours and SCR catalyst burn-in, with 5% downtime for maintenance or other reasons.
[c] Annual emissions [lb/year] = Operating time [hr/year-engine] x Hourly emissions at full load [lb/hr-engine] x Number engines

**Table 14**
**Flare Emissions - Alternative B, MRF at MarBorg**

| Type | Heat Input (MMBtu/hr)[a] | Biogas Flow Rate (scfh)[a] | Daily Op. (hr/day) | Emission Factors CO (lb/MMBtu)[b] | ROC (lb/MMBtu)[c] | NOx (lb/MMBtu)[b] | SOx (g/scf)[d] | PM10 (lb/MMBtu)[b] | PM2.5 (lb/MMBtu)[b] | Combust. $CO_2$ (g/MMBtu)[e] | $CH_4$ (g/MMBtu)[f] | $N_2O$ (g/MMBtu)[f] | Pass-through $CO_2$ (g/scf)[g] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| John Zink ZTOF | 1.23 | 2,103 | 1 | 0.2 | 0.0027 | 0.06 | 0.01506 | 0.042 | 0.042 | 53,020 | 3.2 | 0.63 | 21.23 |

Biogas sulfur = 200 ppmv
Biogas $CO_2$ fraction = 0.41 Conservative estimate

[a] Heat input assumed to be 1/16 of heat input to two CHP engines when purging one digester. Biogas flow rate assumed to be 1/16 0f biogas to two CHP engines.
[b] Manufacturer's specifications
[c] From SBCAPCD Rule 359
[d] SOx emission factor [g/scf] = Biogas sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.
[g] "Pass-through" $CO_2$ emission factor [g/scf] = Biogas $CO_2$ volume fraction [unitless] x 44 [lb/lb-mole $CO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

| Heat Input (MMBtu/hr)[a] | Biogas Flow Rate (scfh)[a] | Digester Purging Hourly Emissions[b] CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.23 | 2,103 | 0.25 | 0.00 | 0.07 | 0.07 | 0.05 | 0.05 | 144.33 | 0.01 | 0.00 | 98.44 |

[a] Heat input assumed to be 1/16 of heat input to two CHP engines when purging one digester. Biogas flow rate assumed to be 1/16 0f biogas to two CHP engines.
[b] Except for SOx and pass-through $CO_2$, Hourly emissions [lb/hr] = Heat input [MMBtu/hr] x Emission factor [lb/MMBtu]
SOx and pass-through $CO_2$ hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]

| Daily Op. (hr/day) | Digester Purging Daily Emissions[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.25 | 0.00 | 0.07 | 0.07 | 0.05 | 0.05 | 144.33 | 0.01 | 0.00 | 98.44 |

[a] Daily emissions [lb/day] = Daily operating time [hr/day] x Hourly emissions [lb/hr]

| Annual Op. (hr/year) | Digester Purging Annual Emissions[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 278 | 68.65 | 0.93 | 20.60 | 19.42 | 14.42 | 14.42 | 40,122.73 | 2.42 | 0.48 | 27,365.15 |

[a] Annual emissions [lb/year] = Annual op. [hr/year] x Hourly emissions [lb/hr]

| Heat Input (MMBtu/hr)[a] | Flow Rate (scfh)[a] | Hourly Flaring Emissions for Two Engines Off-Line[b] CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 19.76 | 33,656 | 3.95 | 0.05 | 1.19 | 1.12 | 0.83 | 0.83 | 2,309.22 | 0.14 | 0.03 | 1,574.97 |

[a] Heat input assumed to be heat input to two CHP engines. Flow rate assumed to be biogas flow rate to two CHP engines.
[b] Except for SOx and pass-through $CO_2$, Hourly emissions [lb/hr] = Heat input [MMBtu/hr] x Emission factor [lb/MMBtu]
SOx and pass-through $CO_2$ hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]

| Daily Op. (hr/day) | Daily Flaring Emissions for Two Engines Off-Line[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 24 | 94.83 | 1.28 | 28.45 | 26.82 | 19.91 | 19.91 | 55421.33 | 3.34 | 0.66 | 37,799.35 |

[a] Daily emissions [lb/day] = Daily operating time [hr/day] x Hourly emissions [lb/hr]

| Annual Op. (hr/year) | Annual Flaring Emissions for Engines Off-Line[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 876 | 3,461.25 | 46.73 | 1,038.38 | 978.93 | 726.86 | 726.86 | 2,022,878.51 | 122.09 | 24.04 | 1,379,676.20 |

[a] Annual operating hours assumes each engine is off-line 5% of the time during a year (438 hrs/engine)
[b] Annual emissions [lb/year] = Annual op. [hr/year] x Hourly emissions [lb/hr]

**Table 15**
**Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions - Alternative B, MRF at MarBorg**



## TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | MRF/AD Tank |
| City: | Santa Barbara |
| State: | California |
| Company: | Mustang |
| Type of Tank: | Horizontal Tank |
| Description: | Diesel Storage tank for MRF & AD equipment. |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 27.00 |
| Diameter (ft): | 8.00 |
| Volume (gallons): | 10,000.00 |
| Turnovers: | 24.00 |
| Net Throughput(gal/yr): | 240,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Santa Barbara, California (Avg Atmospheric Pressure = 14.65 psia)

**Table 15**
**Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions - Alternative B, MRF at MarBorg**



## TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**MRF/AD Tank - Horizontal Tank**
**Santa Barbara, California**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diesel | All | 61.28 | 55.71 | 66.86 | 59.13 | 0.0068 | 0.0056 | 0.0082 | 130.0000 | | | 188.00 | Option 1: VP60 = .0065 VP70 = .009 |
| 1,2,4-Trimethylbenzene | | | | | | 0.0215 | 0.0172 | 0.0268 | 120.1900 | 0.0100 | 0.0456 | 120.19 | Option 2: A=7.04383, B=1573.267, C=208.56 |
| Benzene | | | | | | 1.2100 | 1.0356 | 1.4082 | 78.1100 | 0.0000 | 0.0021 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Ethylbenzene | | | | | | 0.1135 | 0.0933 | 0.1372 | 106.1700 | 0.0001 | 0.0031 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Hexane (-n) | | | | | | 1.9782 | 1.7095 | 2.2807 | 86.1700 | 0.0000 | 0.0004 | 86.17 | Option 2: A=6.876, B=1171.17, C=224.41 |
| Toluene | | | | | | 0.3436 | 0.2885 | 0.4073 | 92.1300 | 0.0003 | 0.0233 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Unidentified Components | | | | | | 0.0058 | 0.0053 | 0.0056 | 134.4372 | 0.9866 | 0.8674 | 189.60 | |
| Xylene (-m) | | | | | | 0.0945 | 0.0776 | 0.1146 | 106.1700 | 0.0029 | 0.0581 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**Table 15**
**Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions - Alternative B, MRF at MarBorg**



## TANKS 4.0.9d
## Emissions Report - Detail Format
## Detail Calculations (AP-42)

### MRF/AD Tank - Horizontal Tank
### Santa Barbara, California

Annual Emission Calcaulations

| | |
|---|---|
| Standing Losses (lb): | 1.9420 |
| Vapor Space Volume (cu ft): | 864.4382 |
| Vapor Density (lb/cu ft): | 0.0002 |
| Vapor Space Expansion Factor: | 0.0389 |
| Vented Vapor Saturation Factor: | 0.9986 |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 864.4382 |
| Tank Diameter (ft): | 8.0000 |
| Effective Diameter (ft): | 16.5879 |
| Vapor Space Outage (ft): | 4.0000 |
| Tank Shell Length (ft): | 27.0000 |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0002 |
| Vapor Molecular Weight (lb/lb-mole): | 130.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0068 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 520.9532 |
| Daily Average Ambient Temp. (deg. F): | 59.1125 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 518.8025 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,608.0000 |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0389 |
| Daily Vapor Temperature Range (deg. R): | 22.2881 |
| Daily Vapor Pressure Range (psia): | 0.0026 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0068 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.0056 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.0082 |
| Daily Avg. Liquid Surface Temp. (deg R): | 520.9532 |
| Daily Min. Liquid Surface Temp. (deg R): | 515.3812 |
| Daily Max. Liquid Surface Temp. (deg R): | 526.5253 |
| Daily Ambient Temp. Range (deg. R): | 20.3250 |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9986 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.0068 |
| Vapor Space Outage (ft): | 4.0000 |
| Working Losses (lb): | 5.0669 |
| Vapor Molecular Weight (lb/lb-mole): | 130.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0068 |
| Annual Net Throughput (gal/yr.): | 240,000.0000 |
| Annual Turnovers: | 24.0000 |
| Turnover Factor: | 1.0000 |
| Tank Diameter (ft): | 8.0000 |
| Working Loss Product Factor: | 1.0000 |
| Total Losses (lb): | 7.0089 |

**Table 15**
**Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions - Alternative B, MRF at MarBorg**



## TANKS 4.0.9d
## Emissions Report - Detail Format
## Individual Tank Emission Totals

### Emissions Report for: Annual

**MRF/AD Tank - Horizontal Tank**
**Santa Barbara, California**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Diesel | 5.07 | 1.94 | 7.01 |
| Benzene | 0.01 | 0.00 | 0.01 |
| Toluene | 0.12 | 0.05 | 0.16 |
| Ethylbenzene | 0.02 | 0.01 | 0.02 |
| Xylene (-m) | 0.29 | 0.11 | 0.41 |
| 1,2,4-Trimethylbenzene | 0.23 | 0.09 | 0.32 |
| Unidentified Components | 4.39 | 1.68 | 6.08 |
| Hexane (-n) | 0.00 | 0.00 | 0.00 |

**Table 16**

**Equipment Exhaust Emissions at Tajiguas Landfill - Alternative B, MRF at MarBorg**

| Equipment | Horsepower | Number | Hours/Day | Fuel Use (gal/hr) | Emission Stds. | Emission Factors (g/bhp-hr)[a] CO | ROC[b] | NOx[b] | PM10[c] | PM2.5[c] | Emission Factor [g/gal] $CO_2$[d] | $CH_4$[e] | $N_2O$[e] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Anaerobic Digestion Facility Building** | | | | | | | | | | | | | |
| Volvo L110G Loader | 260 | 1 | 8 | 3.5 | Tier 4 | 2.2 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| **Composting Area** | | | | | | | | | | | | | |
| Volvo L90G Loader | 173 | 1 | 8 | 2.7 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Compost Screen Machine 612T | 84 | 1 | 8 | 5 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Vermeer CT1010 TX Windrow Turner | 215 | 1 | 8 | 12 | Tier 4 | 2.2 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |

[a] Emission factors assumed the same as emission standards.

[b] Where standard is for NMHC+NOx (Volvo L20F, Toyota forklifts and Tennant sweeper), emissions assumed to be 5 percent ROC and 95 percent NOx, from Table D-25 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[c] PM10 and PM2.5 assumed to be same as PM emission standards.

[d] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.

[e] $CH_4$ and $N_2O$ from Table 13.7 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

| Equipment | Load Factor[c] | Emission Rates Each Unit (lb/hr) CO[a] | ROC[a] | NOx[a] | SOx[b] | PM10[a, d] | PM2.5[a, d] | $CO_2$[e] | $CH_4$[e] | $N_2O$[e] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Anaerobic Digestion Facility Building** | | | | | | | | | | |
| Volvo L110G Loader | 0.3618 | 0.456 | 0.029 | 0.062 | 0.00073 | 3.11E-06 | 3.11E-06 | 78.78 | 4.48E-03 | 2.01E-03 |
| **Composting Area** | | | | | | | | | | |
| Volvo L90G Loader | 0.3618 | 0.511 | 0.019 | 0.041 | 0.00056 | 2.07E-06 | 2.07E-06 | 60.77 | 3.45E-03 | 1.55E-03 |
| Compost Screen Machine 612T | 0.3417 | 0.234 | 0.009 | 0.019 | 0.00104 | 0.00095 | 0.00095 | 112.54 | 6.39E-03 | 2.87E-03 |
| Vermeer CT820 Windrow Turner | 0.3953 | 0.412 | 0.026 | 0.056 | 0.00250 | 0.00281 | 0.00281 | 270.11 | 1.53E-02 | 6.88E-03 |

Diesel Fuel Density = 6.943 lb/gal

Diesel Fuel Sulfur = 15 ppmw

[a] Emission Rate [lb/hr] = Emission Factor [g/bhp-hr] x Engine Horsepower [hp] x Load Factor [unitless] / 453.6 [g/lb]

[b] Emission Rate [lb/hr] = Fuel Use [gal/hr] x Fuel Density [lb/gal] x Fuel Sulfur [ppmw] x $10^{-6}$ x 2 [lb $SO_2$/lb S]

[c] From OFFROAD 2011 model

[d] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

[e] Emission rate [lb/hr] = Fuel use [gal/hr] x Emission factor [g/gal] / 453.6 [lb/gal]

| Equipment | Daily Emissions (lb/day)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|---|---|---|---|---|
| **Anaerobic Digestion Facility Building** | | | | | | | | | |
| Volvo L110G Loader | 3.65 | 0.23 | 0.50 | 0.01 | 2.49E-05 | 2.49E-05 | 630.25 | 0.04 | 0.02 |
| **Total** | **3.65** | **0.23** | **0.50** | **0.01** | **0.00** | **0.00** | **630.25** | **0.04** | **0.02** |
| **Composting Area** | | | | | | | | | |
| Volvo L90G Loader | 4.08 | 0.15 | 0.33 | 0.00 | 0.00 | 0.00 | 486.19 | 0.03 | 0.01 |
| Compost Screen Machine 612T | 1.87 | 0.07 | 0.15 | 0.01 | 0.01 | 0.01 | 900.35 | 0.05 | 0.02 |
| Vermeer CT820 Windrow Turner | 3.30 | 0.21 | 0.45 | 0.02 | 0.02 | 0.02 | 2,160.85 | 0.12 | 0.06 |
| **Total** | **9.26** | **0.44** | **0.93** | **0.03** | **0.03** | **0.03** | **3,547.39** | **0.20** | **0.09** |

[a] Daily Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Number Units x Operating Time [hr/day]

| Equipment | Days/Year | Annual Emissions (lb/year)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|
| **Anaerobic Digestion Facility Building** | | | | | | | | | | |
| Volvo L110G Loader | 208 | 759.18 | 48.31 | 103.52 | 1.21 | 0.01 | 0.01 | 1.31E+05 | 7.45 | 3.34 |
| **Total** | | **759.18** | **48.31** | **103.52** | **1.21** | **0.01** | **0.01** | **1.31E+05** | **7.45** | **3.34** |
| **Composting Area** | | | | | | | | | | |
| Volvo L90G Loader | 311 | 1,270.26 | 48.06 | 102.99 | 1.40 | 0.01 | 0.01 | 1.51E+05 | 8.59 | 3.85 |
| Compost Screen Machine 612T | 311 | 582.51 | 22.04 | 47.23 | 2.59 | 2.36 | 2.36 | 2.80E+05 | 15.91 | 7.13 |
| Vermeer CT820 Windrow Turner | 52 | 171.48 | 10.91 | 23.38 | 1.04 | 1.17 | 1.17 | 1.12E+05 | 6.38 | 2.86 |
| **Total** | | **753.99** | **32.95** | **70.61** | **3.63** | **3.53** | **3.53** | **3.92E+05** | **22.29** | **9.99** |

[a] Annual Emissions [lb/year] = Daily Emissions [lb/day] x Operating Days [days/year]

**Table 17**

**On-Site Motor Vehicle Exhaust Emissions at Tajiguas Landfill - Alternative B, MRF at MarBorg**

| Vehicle | Use | Fuel | Number | Mileage (mpg)[b] | Round-Trip Dist. (mi) | Round-Trips/Day | Miles/ Day |
|---|---|---|---|---|---|---|---|
| Freightliner Tractor | Compost Export[a] | CNG | 1 | 6 | 1.5 | 4 | 6 |
| Ford F350 XL | Utility truck and trailer | Diesel | 1 | 14 | 6 | 6 | 36 |

[a] Round trips/day = 25,760 tons/yr / 311 op. days/yr / 22 tons/trip = 3.8 trips/day rounded up to 4 trips/day

[b] Mileage for Freightliner Tractor is diesel-equivalent

| Vehicle | Use | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO[a] | ROC[b] | NOx[b] | SOx[c] | PM10[b] | PM2.5[b] | $CO_2$[d] | $CH_4$[e] | $N_2O$[e,f] |
| Freightliner Tractor | Compost Export | 1.23E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Ford F350 XL | Utility truck and trailer | 1.71E-01 | 2.63E-02 | 4.69E-01 | 6.75E-03 | 4.90E-03 | 4.90E-03 | 4.93E+02 | 1.00E-03 | 2.37E-02 |

| | | | |
|---|---|---|---|
| Diesel Fuel HV = | 128,450 | Btu/gal | |
| Natural Gas HV = | 1,020 | Btu/scf | |
| Natural Gas S = | 0.5 | grains/100 scf | |
| Diesel Fuel Density = | 6.943 | lb/gal | |
| Diesel Fuel Sulfur = | 15 | ppmw | |
| Natural Gas $CO_2$ EF = | 0.054 | Kg/scf | from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf |

[a] Freightliner tractor is 2010 and later model year standard in g/bhp-hr converted to g/mi using conversion factor from Table D-28 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[b] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[c] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g $SO_2$/g S)
Ford F350 XL calculated from (1/diesel mpg) x diesel fuel density (lb/gal) x diesel fuel sulfur (ppmw) x $10^{-6}$ x 453.6 (g/lb) x 2 (g $SO_2$/g S)

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (kg/scf) x 1,000 (g/kg)
CO2 emission factor from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[e] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[f] Emission factor for Ford F350 XL calculated as 0.3316 [g/gal] / mileage [mpg]; see: http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 17**
**On-Site Motor Vehicle Exhaust Emissions at Tajiguas Landfill - Alternative B, MRF at MarBorg**

| Vehicle | Use | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractor | Compost Export | 0.02 | 0.00 | 0.01 | 9.00E-05 | 3.84E-04 | 3.84E-04 | 1.50E+01 | 2.60E-02 | 2.31E-03 |
| Ford F350 XL | Utility truck and trailer | 0.01 | 0.00 | 0.04 | 5.36E-04 | 3.89E-04 | 3.89E-04 | 3.91E+01 | 7.94E-05 | 1.88E-03 |
| **Total** | | **0.03** | **0.01** | **0.04** | **0.00** | **0.00** | **0.00** | **54.12** | **0.03** | **0.00** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Days/Year | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractor | Compost Export | 311 | 5.05 | 1.52 | 1.89 | 0.03 | 0.12 | 0.12 | 4,662.46 | 8.09 | 0.72 |
| Ford F350 XL | Utility truck and trailer | 311 | 4.21 | 0.65 | 11.58 | 0.17 | 0.12 | 0.12 | 12,169.66 | 0.02 | 0.58 |
| **Total** | | | **9.26** | **2.17** | **13.47** | **0.19** | **0.24** | **0.24** | **16,832.12** | **8.11** | **1.30** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 18**
**Off-Site Motor Vehicle Exhaust Emissions to and from Tajiguas Landfill - Alternative B, MRF at MarBorg**

| Vehicle | Use | Fuel | One-Way Trips/Day | Mileage (mpg)[c] | One-Way Trip Dist. (mi) | Miles/ Day |
|---|---|---|---|---|---|---|
| Freightliner Tractors | Compost to North County[a] | CNG | 8 | 6 | 57 | 456 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous[b] | Diesel | 8 | 19 | 25 | 200 |
| Worker Commuting | From the North[d] | Gasoline | 3 | 22 | 37 | 111 |
| Worker Commuting | From the South[d] | Gasoline | 1 | 22 | 15 | 15 |

[a] Round trips/day = 25,760 tons/yr / 311 op. days/yr / 22 tons/trip = 3.8 one-way trips/day x 2 = 7.6 one-way trips/day rounded up to 8

[b] Trips/day are Mustang estimates

[c] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2017 by total miles in Santa Barbara County
Mileage for Freightliner Tractor is diesel-equivalent, Mustang estimate

[d] Trips/day are from Project Traffic Study

| Vehicle | Use | EMFAC Vehicle Class | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO[a,b] | ROC[a,c] | NOx[a,c] | SOx[a,d] | PM10[a,c] | PM2.5[a,c] | $CO_2$[a,e] | $CH_4$[a,f] | $N_2O$[f,g] |
| Freightliner Tractors | Compost to North County | N/A | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | LHD1 | 1.22E+00 | 2.23E-01 | 3.57E+00 | 5.02E-03 | 1.38E-01 | 8.12E-02 | 4.99E+02 | 1.22E-02 | 1.73E-02 |
| Worker Commuting | From the North | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |
| Worker Commuting | From the South | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |

| | | | |
|---|---|---|---|
| Diesel Fuel HV = | 128,450 | Btu/gal | |
| Natural Gas HV = | 1,020 | Btu/scf | |
| Natural Gas S = | 0.5 | grains/100 scf | |
| Diesel Fuel Density = | 6.943 | lb/gal | |
| Diesel Fuel Sulfur = | 15 | ppmw | |
| Natural Gas $CO_2$ EF = | 0.054 | Kg/scf | from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf |

[a] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2017 by total miles in Santa Barbara County

[b] Freightliner tractor calculated by dividing EMFAC2011 calculated total daily CO emissions from 2017 model year T7 tractors in Santa Barbara County in 2017
by total miles in Santa Barbara County

[c] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines -
http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) /
natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x
2 (g $SO_2$/g S)

[e] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) /
natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (Kg/scf) x 1,000 (g/Kg)

[f] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[g] Emission factor for gasoline calculated from 0.0416 x NOx emission factor; emission factor for diesel calculated as 0.3316 g/gal; see:
http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 18**
**Off-Site Motor Vehicle Exhaust Emissions to and from Tajiguas Landfill - Alternative B, MRF at MarBorg**

| Vehicle | Use | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractors | Compost to North County | 1.17 | 0.37 | 0.46 | 0.01 | 0.03 | 0.03 | 1,139.38 | 1.98 | 0.18 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 0.54 | 0.10 | 1.57 | 0.00 | 0.06 | 0.04 | 220.21 | 0.01 | 0.01 |
| Worker Commuting | From the North | 0.85 | 0.07 | 0.09 | 0.00 | 0.01 | 0.01 | 76.18 | 0.01 | 0.00 |
| Worker Commuting | From the South | 0.11 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 10.29 | 0.00 | 0.00 |
| **Total** | | **2.67** | **0.56** | **2.14** | **0.01** | **0.10** | **0.07** | **1,446.06** | **1.99** | **0.19** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Op. Days/yr | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractors | Compost to North County | 311 | 364.69 | 115.68 | 143.82 | 2.13 | 9.07 | 9.07 | 354,346.90 | 614.66 | 54.71 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 311 | 167.22 | 30.62 | 489.43 | 0.69 | 18.90 | 11.14 | 68,483.80 | 1.67 | 2.37 |
| Worker Commuting | From the North | 311 | 263.70 | 23.30 | 27.30 | 0.29 | 3.68 | 1.60 | 23,691.27 | 1.92 | 1.14 |
| Worker Commuting | From the South | 311 | 35.63 | 3.15 | 3.69 | 0.04 | 0.50 | 0.22 | 3,201.52 | 0.26 | 0.15 |
| **Total** | | | **831.24** | **172.75** | **664.24** | **3.14** | **32.14** | **22.02** | **449,723.48** | **618.51** | **58.37** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Off-Site Motor Vehicle Fugitive PM Emissions**

**Emission Factors for Vehicles on Off-Site Paved Roads**

| Parameter | Value | Comments |
|---|---|---|
| Road silt loading (g/$m^2$) | 0.1 | CalEEMod default |
| Onroad vehicles average weight (tons) | 2.4 | CalEEMod Default for Santa Barbara County |
| PM10 emission factor (lb/mile) | 6.61E-04 | 0.0022 x (silt loading [g/$m^2$])$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |
| PM2.5 emission factor (lb/mile) | 1.62E-04 | 0.00054 x (silt loading [g/$m^2$])$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |

| Vehicle | Use | Miles/ Day | Op. Days/yr | Daily Emissions (lb/day)[a] | | Annual Emissions (lb/year)[b] | |
|---|---|---|---|---|---|---|---|
| | | | | PM10 | PM2.5 | PM10 | PM2.5 |
| Freightliner Tractors | Compost to North County | 456 | 311 | 0.30 | 0.07 | 93.75 | 23.01 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 200 | 311 | 0.13 | 0.03 | 41.12 | 10.09 |
| Worker Commuting | From the North | 111 | 311 | 0.07 | 0.02 | 22.82 | 5.60 |
| Worker Commuting | From the South | 15 | 311 | 0.01 | 0.00 | 3.08 | 0.76 |
| **Total** | | | | **0.52** | **0.13** | **160.77** | **39.46** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]
[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 19**
**On-Site Fugitive PM Emissions at Tajiguas Landfill - Alternative B, MRF at MarBorg**

**On-Site Motor Vehicle Fugitive PM Emissions without CSSR**

| Vehicle | Use | Weight (tons)[a] | Miles/Day | Annual Op. (Days/year) | Emission Factors (lb/mi)[b] | | Control Efficiency (%)[c] | Emissions (lb/day)[d] | | Emissions (lb/year)[e] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PM10 | PM2.5 | | PM10 | PM2.5 | PM10 | PM2.5 |
| Freightliner Tractor | Compost Export | 13.75 | 6 | 311 | 1.69 | 0.17 | 86 | 1.42 | 0.14 | 441.53 | 44.15 |
| Ford F350 XL | Utility truck and trailer | 7 | 36 | 311 | 1.25 | 0.12 | 86 | 6.29 | 0.63 | 1,955.11 | 195.51 |

[a] Freightliner tractor + trailer = average of 40,000 lbs loaded and 15,000 lbs empty.
Ford F350 XL based on specification of 14,000 lbs gross vehicle weight rating

[b] Emission factor [lb/mi] = k x (silt content [%] / 12)$^{0.9}$ (weight [tons] / 3)$^{0.45}$
from AP-42, Section 13.2.2 (Unpaved Roads), Equation 1a (11/06)

k = 1.5 for PM10
0.15 for PM2.5

silt content = 6.4 % from AP-42, Section 13.2.2 (Unpaved Roads), Table 13.2.2-1 (11/06)

[c] Based on hourly watering at 0.18 gal/sq. yd. and 15 mph speed limit, from Appendix E.7, page 3, of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5.

[d] Emissions [lb/day] = Emission factor [lb/mi] x Miles/day x (1- control efficiency [%] / 100)

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

**Table 19**
**On-Site Fugitive PM Emissions at Tajiguas Landfill - Alternative B, MRF at MarBorg**
**Material Transfers**

| Material | Transfer | Moisture (%)[a] | Daily Amount (tons)[b] | Annual Op. (Days/year) | Emission Factors (lb/ton)[c] | | Emissions (lb/day)[d, f] | | Emissions (lb/year)[e] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| Digestate | Into Screen | 50 | 288 | 208 | 1.71E-04 | 2.58E-05 | 4.92E-05 | 7.46E-06 | 0.01 | 0.00 |
| Digestate | Out of Screen | 50 | 288 | 208 | 1.71E-04 | 2.58E-05 | 4.92E-05 | 7.46E-06 | 0.01 | 0.00 |
| Digestate | Into Truck | 50 | 288 | 208 | 1.71E-04 | 2.58E-05 | 4.92E-05 | 7.46E-06 | 0.01 | 0.00 |
| Digestate | Onto Windrow | 50 | 288 | 208 | 1.71E-04 | 2.58E-05 | 4.92E-02 | 7.46E-03 | 10.24 | 1.55 |
| Windrow | Windrow turning | 40 | 15,363 | 52 | 2.33E-04 | 3.53E-05 | 3.58E+00 | 5.43E-01 | 186.38 | 28.22 |
| Compost | Into Screen | 40 | 83 | 311 | 2.33E-04 | 3.53E-05 | 1.93E-02 | 2.93E-03 | 6.01 | 0.91 |
| Compost | Out of Screen | 40 | 83 | 311 | 2.33E-04 | 3.53E-05 | 1.93E-02 | 2.93E-03 | 6.01 | 0.91 |
| Compost | Onto Storage Pile | 40 | 83 | 311 | 2.33E-04 | 3.53E-05 | 1.93E-02 | 2.93E-03 | 6.01 | 0.91 |
| Compost | Into Export Truck | 40 | 83 | 311 | 2.33E-04 | 3.53E-05 | 1.93E-02 | 2.93E-03 | 6.01 | 0.91 |
| MSW | Into AD Facility | 28 | 240 | 311 | 3.84E-04 | 5.82E-05 | 9.23E-05 | 1.40E-05 | 0.03 | 0.00 |

[a] Typical amount for digestate from Project Description; lower end of range for compost;
value for MSW from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project,
Santa Barbara County No. 01-EIR-5 used for MSW, and MRF and digestate residuals

[b] For digestate, 60,000 tpy / 208 op. days/yr; for windrow turning, 15,363 tons / op. day;
for compost, 25,760 tpy / 311 op. days/yr

[c] Emission factor [lb/ton] = k x 0.0032 x (wind speed [mph] / 5)$^{1.3}$ / (material moisture [%] /2 )$^{1.4}$
from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06)

k = 0.35 for PM10
0.053 for PM2.5

Wind speed = 5.47 mph, from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[d] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

[f] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

**Table 19**
**On-Site Fugitive PM Emissions at Tajiguas Landfill - Alternative B, MRF at MarBorg**
**Screening**

| Material | Daily Amount (tons)[a] | Annual Op. (Days/year) | Emission Factors (lb/ton)[b] | | Emissions (lb/day)[c, e] | | Emissions (lb/year)[d] | |
|---|---|---|---|---|---|---|---|---|
| | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| Digestate | 288 | 208 | 0.00074 | 0.00005 | 2.13E-03 | 1.44E-04 | 4.44E-01 | 3.00E-02 |
| Compost | 83 | 311 | 0.00074 | 0.00005 | 6.13E-02 | 4.14E-03 | 1.91E+01 | 1.29E+00 |

[a] For digestate, 60,000 tpy / 208 op. days/yr; for compost, 25,760 tpy / 311 op. days/yr
[b] From AP-42, Section 11.19, Crushed Stone Processing and Pulverized Mineral Processing (08/04), Table 11.19.2-2 for controlled screening
[c] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]
[d] Emissions [lb/year] = Emissions [lb/day] x Days/year
[e] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

**Chipper/Grinder**

| Material | Hourly Amount (tph) | Operating Time (hr/day) | Annual Op. (Days/year) | Emission Factors (lb/ton)[a] | | Emissions (lb/hr)[b] | | Emissions (lb/day)[c] | | Emissions (lb/year)[d] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| Wood | 45.5 | 1.5 | 311 | 0.0144 | 0.0144 | 0.66 | 0.66 | 0.98 | 0.98 | 305.65 | 305.65 |

[a] From Bay Area Air Quality Management District Permit Handbook, Section 11.3, http://hank.baaqmd.gov/pmt/handbook/rev02/PH_00_05_11_13.pdf. PM2.5 assumed to be equal to PM10.
[b] Emissions [lb/hr] = Emission factor [lb/ton] x Hourly amount [tph]
[c] Emissions [lb/day] = Hourly emissions [lb/hr] x Daily operating time [hr/day]
[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

**Table 20**
**Windrow ROC Emissions - Alternative B, MRF at MarBorg**

| Item | Value | Comment |
|---|---|---|
| Digestate production (ton/yr) | 73,590 | AD design capacity |
| Digestate production (ton/day) | 201.62 | Annual / 365 days/year |
| Fraction food waste | 0.682 | Mustang estimate |
| Fraction green waste | 0.232 | Mustang estimate |
| Digestate from food waste (ton/day) | 137.50 | |
| Digestate from green waste (ton/day) | 46.78 | |
| Food waste EF (lb VOC/ton) | 37.1 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Green waste EF (lb VOC/ton) | 5.71 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| VOC from food waste (lb/day) | 5,101.34 | |
| VOC from green waste (lb/day) | 267.09 | |
| Total VOC (lb/day) | 5,368 | |
| Reduction from digestion process | 0.97 | See note b |
| VOC after reduction from digestion (lb/day) | 161.05 | |
| Reduction from Best Available Control Tech | 0.90 | See note c |
| VOC after BMP reductions (lb/day) | 16.11 | |
| VOC after BMP reductions (lb/hour) | 0.67 | Daily / 24 hours/day |
| VOC after BMP reductions (lb/yr) | 5,878 | |

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at:
http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

[b] From Bay Area Air Quality Management District engineering evaluation for Zero Waste Energy proposed anaerobic digestion facility

[c] Best Available Control Technologies:
1. 40% inert, dry wood chip blending
2. Interactive pile management (i.e., turning)
3. 20 minutes irrigation after turning
4. Large pile size
5. Finished compost blanket pseudo biofilter

References for emission reductions include:
Advice from Bekon based on 20 facilities operating in Europe
***Comparison of Mitugation Measures for Reduction of Emissions from Greenwaste Composting*** prepared from SJVAPCD 2009:
http://valleyair.org/busind/pto/emission_factors/Criteria/Criteria/Composting/FINAL-COMPOST-STUDY-REPORT.pdf
***Greenwaste Compost Air Emissions Review*** (Modesto Compost Facility) prepared fror CIWMB June 2008:
http://www.calrecycle.ca.gov/publications/Documents/Organics%5C44207009.pdf
***Greenwaste Compost Site Emissions Reductions*** Prepared for San Joaquin Valley Technology Advancement Program May 2013:
http://www.valleyair.org/grant_programs/TAP/documents/C-15636-ACP/C-15636_ACP_FinalReport.pdf

**Table 21**
**AD Fugitive ROC Emissions**

| Item | Value | Comment |
|---|---|---|
| Digestate production (ton/yr) | 73,590 | AD design capacity |
| Digestate production (ton/day) | 201.62 | Annual / 365 days/year |
| Fraction food waste | 0.682 | Mustang estimate |
| Fraction green waste | 0.232 | Mustang estimate |
| Digestate from food waste (ton/day) | 137.50 | |
| Digestate from green waste (ton/day) | 46.78 | |
| Food waste EF (lb VOC/ton-composting cycle) | 37.1 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Green waste EF (lb VOC/ton-composting cycle) | 5.71 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Food waste EF (lb VOC/ton-day) | 0.618 | For one day of 60-day composting cycle |
| Green waste EF (lb VOC/ton-day) | 0.095 | For one day of 60-day composting cycle |
| VOC from food waste (lb/day) | 85.02 | |
| VOC from green waste (lb/day) | 4.45 | |
| Total VOC (lb/day) | 89 | |
| Reduction from biofilter | 0.95 | |
| VOC after biofilter (lb/day) | 4.47 | |
| VOC after biofilter (lb/hour) | 0.19 | Daily / 24 hours/day |
| VOC after biofilter (lb/yr) | 1,633 | |

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at:
http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

**Table 22**
**Motor Vehicle Emission Factors in Santa Barbara County for 2017**

| | | | Emission Factors (g/mi)[a] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Vehicle Class** | **Fuel** | | **CO** | **ROG** | **NOx** | **SOx** | **PM10** | **PM2.5** | **$CO_2$** | **TOG** | **$CH_4$** | **$N_2O$** | **Mileage (mpg)** |
| LDA | GAS | LDAGAS | 1.48E+00 | 1.31E-01 | 1.48E-01 | 3.26E-03 | 4.68E-02 | 1.97E-02 | 2.51E+02 | 1.45E-01 | 1.31E-02 | 6.14E-03 | 26.09 |
| LDA | DSL | LDADSL | 1.55E-01 | 2.65E-02 | 4.71E-01 | 3.31E-03 | 6.34E-02 | 3.49E-02 | 2.71E+02 | 3.01E-02 | 1.45E-03 | 1.14E-02 | 29.10 |
| LDT1 | GAS | LDT1GAS | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 3.33E-01 | 2.52E-02 | 1.49E-02 | 22.32 |
| LDT1 | DSL | LDT1DSL | 2.53E-01 | 5.47E-02 | 6.14E-01 | 3.38E-03 | 8.97E-02 | 5.91E-02 | 2.78E+02 | 6.23E-02 | 2.99E-03 | 1.16E-02 | 28.49 |
| LDT2 | GAS | LDT2GAS | 2.46E+00 | 2.27E-01 | 3.47E-01 | 4.46E-03 | 4.73E-02 | 2.01E-02 | 3.69E+02 | 2.49E-01 | 2.11E-02 | 1.44E-02 | 19.08 |
| LDT2 | DSL | LDT2DSL | 1.81E-01 | 3.17E-02 | 5.51E-01 | 3.32E-03 | 6.82E-02 | 3.94E-02 | 2.82E+02 | 3.60E-02 | 1.73E-03 | 1.14E-02 | 28.99 |
| LHD1 | GAS | LHD1GAS | 5.86E+00 | 7.03E-01 | 1.13E+00 | 1.00E-02 | 4.85E-02 | 2.12E-02 | 9.44E+02 | 7.56E-01 | 4.55E-02 | 4.70E-02 | 8.48 |
| LHD1 | DSL | LHD1DSL | 1.22E+00 | 2.23E-01 | 3.57E+00 | 5.02E-03 | 1.38E-01 | 8.12E-02 | 4.99E+02 | 2.54E-01 | 1.22E-02 | 1.73E-02 | 19.17 |
| LHD2 | GAS | LHD2GAS | 3.94E+00 | 5.03E-01 | 9.78E-01 | 9.99E-03 | 4.73E-02 | 2.01E-02 | 9.44E+02 | 5.43E-01 | 4.03E-02 | 4.07E-02 | 8.51 |
| LHD2 | DSL | LHD2DSL | 1.16E+00 | 2.07E-01 | 3.36E+00 | 5.02E-03 | 1.47E-01 | 8.38E-02 | 4.99E+02 | 2.36E-01 | 1.13E-02 | 1.73E-02 | 19.19 |
| MCY | GAS | MCYGAS | 2.85E+01 | 3.62E+00 | 1.35E+00 | 2.17E-03 | 4.55E-02 | 1.84E-02 | 1.55E+02 | 3.90E+00 | 2.41E-01 | 5.61E-02 | 39.15 |
| MDV | GAS | MDVGAS | 3.37E+00 | 2.87E-01 | 5.08E-01 | 5.66E-03 | 4.73E-02 | 2.01E-02 | 4.85E+02 | 3.20E-01 | 3.14E-02 | 2.11E-02 | 15.03 |
| MDV | DSL | MDVDSL | 1.47E-01 | 2.63E-02 | 4.04E-01 | 3.32E-03 | 6.53E-02 | 3.66E-02 | 2.94E+02 | 2.99E-02 | 1.43E-03 | 1.14E-02 | 29.00 |
| MH | GAS | MHGAS | 5.38E+00 | 2.11E-01 | 8.76E-01 | 6.86E-03 | 4.71E-02 | 1.99E-02 | 6.44E+02 | 2.48E-01 | 2.33E-02 | 3.64E-02 | 12.41 |
| MH | DSL | MHDSL | 7.31E-01 | 2.32E-01 | 7.05E+00 | 1.15E-02 | 3.36E-01 | 2.37E-01 | 1.14E+03 | 2.64E-01 | 1.27E-02 | 3.95E-02 | 8.40 |
| Motor Coach | DSL | Motor Coac | 1.31E+00 | 2.74E-01 | 6.55E+00 | 1.74E-02 | 2.16E-01 | 1.27E-01 | 1.73E+03 | 3.12E-01 | 1.50E-02 | 6.00E-02 | 5.52 |
| OBUS | GAS | OBUSGAS | 1.62E+01 | 1.21E+00 | 2.87E+00 | 7.40E-03 | 4.65E-02 | 1.93E-02 | 6.77E+02 | 1.29E+00 | 8.25E-02 | 1.19E-01 | 11.49 |
| PTO | DSL | PTODSL | 7.94E-01 | 2.26E-01 | 9.79E+00 | 2.05E-02 | 6.43E-02 | 5.92E-02 | 2.05E+03 | 2.58E-01 | 1.24E-02 | 7.08E-02 | 4.68 |
| SBUS | GAS | SBUSGAS | 7.34E+00 | 6.16E-01 | 1.05E+00 | 7.64E-03 | 4.68E-02 | 1.96E-02 | 7.14E+02 | 6.70E-01 | 1.01E-01 | 4.37E-02 | 11.14 |
| SBUS | DSL | SBUSDSL | 8.65E-01 | 2.48E-01 | 1.18E+01 | 1.34E-02 | 8.77E-01 | 4.33E-01 | 1.33E+03 | 2.82E-01 | 1.35E-02 | 4.61E-02 | 7.20 |
| T6 Ag | DSL | T6 AgDSL | 1.07E+00 | 3.24E-01 | 4.79E+00 | 1.15E-02 | 3.11E-01 | 2.14E-01 | 1.15E+03 | 3.69E-01 | 1.77E-02 | 3.97E-02 | 8.36 |
| T6 Public | DSL | T6 PublicD | 3.34E-01 | 8.46E-02 | 6.51E+00 | 1.18E-02 | 1.81E-01 | 9.45E-02 | 1.18E+03 | 9.63E-02 | 4.62E-03 | 4.07E-02 | 8.15 |
| T6 CAIRP heavy | DSL | T6 CAIRP | 4.46E-01 | 1.22E-01 | 3.30E+00 | 1.14E-02 | 1.85E-01 | 9.85E-02 | 1.13E+03 | 1.39E-01 | 6.69E-03 | 3.92E-02 | 8.45 |
| T6 CAIRP small | DSL | T6 CAIRP | 5.60E-01 | 1.54E-01 | 1.93E+00 | 1.13E-02 | 2.10E-01 | 1.22E-01 | 1.13E+03 | 1.76E-01 | 8.43E-03 | 3.90E-02 | 8.51 |
| T6 OOS heavy | DSL | T6 OOS he | 4.46E-01 | 1.22E-01 | 3.30E+00 | 1.14E-02 | 1.85E-01 | 9.85E-02 | 1.13E+03 | 1.39E-01 | 6.69E-03 | 3.92E-02 | 8.45 |
| T6 OOS small | DSL | T6 OOS sr | 5.60E-01 | 1.54E-01 | 1.93E+00 | 1.13E-02 | 2.10E-01 | 1.22E-01 | 1.13E+03 | 1.76E-01 | 8.43E-03 | 3.90E-02 | 8.51 |
| T6 instate construction heavy | DSL | T6 instate | 4.61E-01 | 1.31E-01 | 6.42E+00 | 1.15E-02 | 1.96E-01 | 1.09E-01 | 1.15E+03 | 1.49E-01 | 7.17E-03 | 3.97E-02 | 8.35 |
| T6 instate construction small | DSL | T6 instate | 8.12E-01 | 2.31E-01 | 3.47E+00 | 1.14E-02 | 2.70E-01 | 1.76E-01 | 1.13E+03 | 2.63E-01 | 1.26E-02 | 3.92E-02 | 8.47 |
| T6 instate heavy | DSL | T6 instate | 4.62E-01 | 1.30E-01 | 5.77E+00 | 1.15E-02 | 1.95E-01 | 1.07E-01 | 1.14E+03 | 1.48E-01 | 7.12E-03 | 3.96E-02 | 8.37 |
| T6 instate small | DSL | T6 instate | 7.62E-01 | 2.16E-01 | 3.16E+00 | 1.13E-02 | 2.59E-01 | 1.66E-01 | 1.13E+03 | 2.46E-01 | 1.18E-02 | 3.91E-02 | 8.48 |
| T6 utility | DSL | T6 utilityDS | 3.86E-01 | 9.17E-02 | 3.53E+00 | 1.17E-02 | 1.74E-01 | 8.79E-02 | 1.16E+03 | 1.04E-01 | 5.01E-03 | 4.03E-02 | 8.24 |
| T6TS | GAS | T6TSGAS | 1.29E+01 | 1.02E+00 | 1.95E+00 | 7.24E-03 | 4.70E-02 | 1.98E-02 | 6.67E+02 | 1.09E+00 | 5.04E-02 | 8.10E-02 | 11.76 |
| T7 Ag | DSL | T7 AgDSL | 1.86E+00 | 4.07E-01 | 8.81E+00 | 1.71E-02 | 2.86E-01 | 2.08E-01 | 1.71E+03 | 4.63E-01 | 2.22E-02 | 5.91E-02 | 5.61 |
| T7 CAIRP | DSL | T7 CAIRPI | 1.74E+00 | 3.60E-01 | 4.50E+00 | 1.76E-02 | 1.81E-01 | 1.12E-01 | 1.75E+03 | 4.10E-01 | 1.97E-02 | 6.06E-02 | 5.47 |
| T7 CAIRP construction | DSL | T7 CAIRP | 1.74E+00 | 3.60E-01 | 4.65E+00 | 1.76E-02 | 1.81E-01 | 1.12E-01 | 1.75E+03 | 4.10E-01 | 1.97E-02 | 6.06E-02 | 5.47 |
| T7 NNOOS | DSL | T7 NNOOS | 1.68E+00 | 3.39E-01 | 2.95E+00 | 1.77E-02 | 1.63E-01 | 9.53E-02 | 1.76E+03 | 3.86E-01 | 1.85E-02 | 6.10E-02 | 5.44 |
| T7 NOOS | DSL | T7 NOOSI | 1.89E+00 | 3.87E-01 | 4.66E+00 | 1.78E-02 | 1.82E-01 | 1.13E-01 | 1.78E+03 | 4.41E-01 | 2.12E-02 | 6.15E-02 | 5.39 |
| T7 other port | DSL | T7 other po | 2.45E+00 | 5.29E-01 | 7.87E+00 | 1.73E-02 | 2.09E-01 | 1.38E-01 | 1.72E+03 | 6.02E-01 | 2.89E-02 | 5.96E-02 | 5.56 |
| T7 POLA | DSL | T7 POLAD | 2.62E+00 | 5.58E-01 | 7.87E+00 | 1.76E-02 | 2.09E-01 | 1.38E-01 | 1.75E+03 | 6.36E-01 | 3.05E-02 | 6.07E-02 | 5.46 |
| T7 Public | DSL | T7 PublicD | 1.38E+00 | 2.76E-01 | 1.54E+01 | 2.01E-02 | 1.67E-01 | 9.92E-02 | 2.00E+03 | 3.14E-01 | 1.51E-02 | 6.93E-02 | 4.79 |
| T7 Single | DSL | T7 SingleD | 8.53E-01 | 1.83E-01 | 8.92E+00 | 1.71E-02 | 1.59E-01 | 9.17E-02 | 1.70E+03 | 2.08E-01 | 1.00E-02 | 5.90E-02 | 5.62 |
| T7 single construction | DSL | T7 single c | 8.46E-01 | 1.82E-01 | 9.18E+00 | 1.71E-02 | 1.59E-01 | 9.21E-02 | 1.70E+03 | 2.07E-01 | 9.93E-03 | 5.90E-02 | 5.62 |
| T7 SWCV | DSL | T7 SWCVI | 1.05E+00 | 2.13E-01 | 1.23E+01 | 1.84E-02 | 1.61E-01 | 9.40E-02 | 1.83E+03 | 2.43E-01 | 1.17E-02 | 6.33E-02 | 5.24 |
| T7 tractor | DSL | T7 tractorD | 1.16E+00 | 2.53E-01 | 6.95E+00 | 1.69E-02 | 1.80E-01 | 1.11E-01 | 1.68E+03 | 2.88E-01 | 1.38E-02 | 5.81E-02 | 5.71 |
| T7 tractor construction | DSL | T7 tractor | 1.25E+00 | 2.69E-01 | 7.90E+00 | 1.71E-02 | 1.81E-01 | 1.12E-01 | 1.70E+03 | 3.06E-01 | 1.47E-02 | 5.90E-02 | 5.62 |
| T7 utility | DSL | T7 utilityDS | 1.90E+00 | 3.60E-01 | 9.58E+00 | 1.99E-02 | 1.48E-01 | 8.14E-02 | 1.98E+03 | 4.10E-01 | 1.97E-02 | 6.86E-02 | 4.83 |
| T7IS | GAS | T7ISGAS | 4.33E+01 | 1.28E+00 | 5.91E+00 | 6.63E-03 | 4.58E-02 | 1.87E-02 | 5.63E+02 | 1.45E+00 | 1.01E-01 | 2.46E-01 | 12.82 |
| UBUS | GAS | UBUSGAS | 1.85E+01 | 3.27E+00 | 4.52E+00 | 7.86E-03 | 4.83E-02 | 2.11E-02 | 7.11E+02 | 3.48E+00 | 1.30E-01 | 1.88E-01 | 10.83 |
| UBUS | DSL | UBUSDSL | 2.17E+00 | 4.67E-01 | 1.26E+01 | 2.36E-02 | 1.08E+00 | 5.78E-01 | 2.35E+03 | 5.32E-01 | 2.55E-02 | 8.14E-02 | 4.07 |
| All Other Buses | DSL | All Other B | 5.08E-01 | 1.42E-01 | 5.35E+00 | 1.15E-02 | 1.98E-01 | 1.10E-01 | 1.14E+03 | 1.62E-01 | 7.78E-03 | 3.95E-02 | 8.39 |

[a] CO, ROC NOx, $SO_2$, PM10, PM2.5, TOG and $CO_2$ calculated by dividing total daily emissions in Santa Barbara County for 2017 by total miles, and mileage calculated by dividing total daily fuel use by total miles from EMFAC2011 online data (http://www.arb.ca.gov/emfac/). $CH_4$ for gasoline-fueled vehicles calculated by dividing total daily emissions in Santa Barbara County for 2017 by total miles calculated with EMFAC2011-LDV (http://www.arb.ca.gov/msei/emfac2011_ldv.htm). $CH_4$ for diesel-fueled vehciles calculated as 0.048 x TOG (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07). $N_2O$ for gasoline-fueled vehicles calculated as 0.046 x NOx, and $N_2O$ for diesel-fueled vehicles calculated as 0.3316 grams/gallon (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07)

# Attachment G

# Emission Calculations for Alternative C

**Table 1**
**Criteria Pollutant Daily Emissions Summary - Alternative C, MRF at SCRTS**

| Source | Emissions (lb/day) | | | | | |
|---|---|---|---|---|---|---|
| | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| **Onsite** | | | | | | |
| **MRF at SCRTS** | | | | | | |
| MRF Facility Equipment | 43.69 | 2.15 | 14.77 | 0.08 | 0.01 | 0.01 |
| Material Handling Fugitive PM | | | | | 0.00 | 0.00 |
| **Total** | **43.69** | **2.15** | **14.77** | **0.08** | **0.02** | **0.01** |
| **Tajiguas Landfill** | | | | | | |
| CHP Engines | 0.00 | 20.51 | 0.00 | 0.00 | 0.00 | 0.00 |
| Flare | 95.08 | 0.00 | 28.52 | 26.89 | 19.97 | 19.97 |
| AD Facility Equipment | 3.65 | 0.23 | 0.50 | 0.01 | 0.00 | 0.00 |
| Composting Equipment Exhaust | 9.26 | 0.44 | 0.93 | 0.03 | 0.03 | 0.03 |
| Diesel Fuel Storage Tank | | 0.02 | | | | |
| Material Handling Fugitive PM | | | | | 3.71 | 0.56 |
| AD Digestate Screening Fugitive PM | | | | | 0.00 | 0.00 |
| Compost Screening Fugitive PM | | | | | 0.06 | 0.00 |
| Chipper/Grinder Fugitive PM | | | | | 0.98 | 0.98 |
| Motor Vehicle Fugitive PM | | | | | 7.71 | 0.77 |
| AD Fugitive ROC | | 4.47 | | | | |
| Windrow ROC | | 16.11 | | | | |
| Motor Vehicle Exhaust | 0.03 | 0.01 | 0.04 | 0.00 | 0.00 | 0.00 |
| **Total** | **108.01** | **41.79** | **30.00** | **26.93** | **32.46** | **22.32** |
| **Onsite Total** | **151.70** | **43.94** | **44.77** | **27.01** | **32.48** | **22.33** |
| | | | | | | |
| **Offsite** | | | | | | |
| **MRF at SCRTS** | | | | | | |
| Export and Commuter Motor Vehicle Exhaust | 37.56 | 5.92 | 22.02 | 0.12 | 1.00 | 0.65 |
| Export Motor Vehicle Fugitive PM | | | | | 5.39 | 1.32 |
| Reduction from MSW to SCRTS instead of Tajiguas Landfill[a] | -7.02 | -1.43 | -82.75 | -0.12 | -3.09 | -1.12 |
| **Total** | **30.54** | **4.49** | **-60.74** | **0.00** | **3.29** | **0.85** |
| **Tajiguas Landfill** | | | | | | |
| Motor Vehicle Exhaust | 2.67 | 0.56 | 2.14 | 0.01 | 0.10 | 0.07 |
| Motor Vehicle Fugitive PM | | | | | 0.52 | 0.13 |
| **Total** | **2.67** | **0.56** | **2.14** | **0.01** | **0.62** | **0.20** |
| **Offsite Total** | **33.21** | **5.05** | **-58.60** | **0.01** | **3.91** | **1.04** |
| | | | | | | |
| **Total** | **184.91** | **48.99** | **-13.83** | **27.02** | **36.39** | **23.37** |

[a] The one-way travel distance for delivering MSW to the SCRTS is 20 miles less than to Tajiguas Landfill

**Table 2**
**Criteria Pollutant Annual Emissions Summary - Alternative C, MRF at SCRTS**

| Source | Emissions (ton/year) | | | | | |
|---|---|---|---|---|---|---|
| | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| **Onsite** | | | | | | |
| **MRF at SCRTS** | | | | | | |
| MRF Facility Equipment | 6.79 | 0.33 | 2.30 | 0.01 | 0.00 | 0.00 |
| Material Handling Fugitive PM | | | | | 0.00 | 0.00 |
| **Total** | **6.79** | **0.33** | **2.30** | **0.01** | **0.00** | **0.00** |
| **Tajiguas Landfill** | | | | | | |
| CHP Engines | 8.74 | 3.47 | 3.58 | 0.46 | 3.41 | 3.41 |
| Flare | 1.76 | 0.02 | 0.53 | 0.50 | 0.37 | 0.37 |
| AD Facility Equipment | 0.38 | 0.02 | 0.05 | 0.00 | 0.00 | 0.00 |
| Composting Equipment Exhaust | 0.38 | 0.02 | 0.04 | 0.00 | 0.00 | 0.00 |
| Diesel Fuel Storage Tank | | 0.00 | | | | |
| Material Handling Fugitive PM | | | | | 0.00 | 0.00 |
| AD Digestate Screening Fugitive PM | | | | | 0.00 | 0.00 |
| Compost Screening Fugitive PM | | | | | 0.01 | 0.00 |
| Chipper/Grinder Fugitive PM | | | | | 0.15 | 0.15 |
| Motor Vehicle Fugitive PM | | | | | 1.20 | 0.12 |
| AD Fugitive ROC | | 0.82 | | | | |
| Windrow ROC | | 2.94 | | | | |
| Motor Vehicle Exhaust | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| **Total** | **11.27** | **7.30** | **4.20** | **0.97** | **5.14** | **4.05** |
| **Onsite Total** | **18.06** | **7.63** | **6.50** | **0.98** | **5.14** | **4.05** |
| | | | | | | |
| **Offsite** | | | | | | |
| **MRF at SCRTS** | | | | | | |
| Export Motor Vehicle Exhaust | 5.84 | 0.92 | 3.42 | 0.02 | 0.16 | 0.10 |
| Export Motor Vehicle Fugitive PM | | | | | 0.16 | 0.10 |
| Reduction from MSW to SCRTS instead of Tajiguas Landfill[a] | -1.09 | -0.22 | -12.87 | -0.02 | -0.48 | -0.17 |
| **Total** | **4.75** | **0.70** | **-9.44** | **0.00** | **-0.17** | **0.03** |
| **Tajiguas Landfill** | | | | | | |
| Motor Vehicle Exhaust | 0.42 | 0.09 | 0.33 | 0.00 | 0.02 | 0.01 |
| Motor Vehicle Fugitive PM | | | | | 0.08 | 0.02 |
| **Total** | **0.42** | **0.09** | **0.33** | **0.00** | **0.10** | **0.03** |
| **Offsite Total** | **5.16** | **0.79** | **-9.11** | **0.00** | **-0.07** | **0.06** |
| | | | | | | |
| **Total** | **23.23** | **8.42** | **-2.61** | **0.98** | **5.07** | **4.11** |

[a] The one-way travel distance for delivering MSW to the SCRTS is 20 miles less than to Tajiguas Landfill

**Table 3**
**Greenhouse Gas Annual Emissions Summary - Alternative C, MRF at SCRTS**

| | Emissions (MT/year)[a] | | | | |
|---|---|---|---|---|---|
| **Source** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **$CO_2e$[b]** | |
| **Onsite** | | | | | |
| **MRF at SCRTS** | | | | | |
| MRF Facility Equipment | 1,229.48 | 0.07 | 0.03 | 1,240.56 | |
| **Total** | **1,229.48** | **0.07** | **0.03** | **1,240.56** | |
| **Tajiguas Landfill** | | | | | |
| CHP Engines Combustion | 8,716.99 | 0.16 | 0.02 | 8,726.00 | 9.01 |
| CHP Engines Pass-through $CO_2$ | 5,945.30 | | | 5,945.30 | 0.00 |
| Flare Combustion | 935.78 | 0.06 | 0.01 | 940.50 | 4.73 |
| Flare Pass-through $CO_2$ | 638.23 | | | 638.23 | 0.00 |
| AD Facility Equipment | 59.46 | 0.00 | 0.00 | 60.00 | |
| Composting Equipment Exhaust | 177.98 | 0.01 | 0.00 | 179.58 | |
| Motor Vehicle Exhaust | 7.64 | 0.00 | 0.00 | 7.90 | |
| **Total** | **16,481.38** | **0.24** | **0.03** | **16,497.52** | |
| **Onsite Total** | **17,710.86** | **0.31** | **0.07** | **17,738.08** | |
| | | | | | |
| **Offsite** | | | | | |
| **MRF at SCRTS** | | | | | |
| Export and Commuter Motor Vehicle Exhaust | 2,205.47 | 2.39 | 0.24 | 2,337.75 | |
| Reduction from MSW to MarBorg instead of Tajiguas Landfill[c] | -1,728.90 | -0.01 | -0.06 | -1,747.02 | |
| **Total** | **476.57** | **2.38** | **0.18** | **590.73** | |
| **Tajiguas Landfill** | | | | | |
| Motor Vehicle Exhaust | 203.99 | 0.28 | 0.03 | 218.90 | |
| **Total** | **203.99** | **0.28** | **0.03** | **218.90** | |
| **Offsite Total** | **680.56** | **2.66** | **0.21** | **809.63** | |
| | | | | | |
| | | | | | |
| **Total** | **18,391.42** | **2.97** | **0.28** | **18,547.71** | |

[a] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[b] $CO_2e$ = CO2-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

[c] The one-way travel distance for delivering MSW and CSSR to the SCRTS is 20 miles less than to Tajiguas Landfill

**Table 4**
**Emission Rates at SCRTS for Dispersion Modeling - Alternative C, MRF at SCRTS**

**Table 4-A**
**Daily Emissions from MRF Facility Tipping Floor Biofilter - 7:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 7:00 a.m. - 11:00 p.m. | 1.71E+00 | 7.87E-02 | 3.55E-01 | 2.69E-03 | 4.43E-05 | 1.39E-05 |

**Table 4-B**
**Annual Average Hourly Emissions from MRF Facility Tipping Floor Biofilter - 7:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 7:00 a.m. - 11:00 p.m. | 1.46E+00 | 6.71E-02 | 3.03E-01 | 2.29E-03 | 3.77E-05 | 1.19E-05 |

**Table 4-C**
**Daily Emissions from MRF Facility Tipping Floor Biofilter - 11:00 p.m. - 7:00 a.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 11:00 p.m. - 7:00 a.m. | 2.34E-01 | 1.11E-02 | 2.10E-01 | 8.33E-04 | 1.27E-06 | 1.27E-06 |

**Table 4-D**
**Annual Average Hourly Emissions from MRF Facility Tipping Floor Biofilter - 11:00 p.m. - 7:00 a.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 11:00 p.m. - 7:00 a.m. | 1.99E-01 | 9.44E-03 | 1.79E-01 | 7.10E-04 | 1.08E-06 | 1.08E-06 |

**Table 4-E**
**Daily Emissions from MRF Facility Loadout Area Biofilter - 7:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 7:00 a.m. - 11:00 p.m. | 9.71E-01 | 5.34E-02 | 5.25E-01 | 2.50E-03 | 2.59E-05 | 8.92E-06 |

**Table 4-F**
**Annual Average Hourly Emissions from MRF Facility Loadout Area Biofilter - 7:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 7:00 a.m. - 11:00 p.m. | 8.27E-01 | 4.55E-02 | 4.47E-01 | 2.13E-03 | 2.21E-05 | 7.60E-06 |

**Table 4-G**
**Daily Emissions from MRF Facility Loadout Area Biofilter - 11:00 p.m. - 7:00 a.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 11:00 p.m. - 7:00 a.m. | 2.34E-01 | 1.11E-02 | 2.10E-01 | 8.33E-04 | 1.27E-06 | 1.27E-06 |

**Table 4-H**
**Annual Average Hourly Emissions from MRF Facility Loadout Area Biofilter - 11:00 p.m. - 7:00 a.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 11:00 p.m. - 7:00 a.m. | 1.99E-01 | 9.44E-03 | 1.79E-01 | 7.10E-04 | 1.08E-06 | 1.08E-06 |

**Table 4-I**
**Daily Emissions from MRF Facility Outdoor Bin Area - 7:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 7:00 a.m. - 11:00 p.m. | 1.65E-01 | 7.82E-03 | 1.49E-01 | 2.71E-04 | 8.93E-04 | 8.93E-04 |

**Table 4-J**
**Annual Average Hourly Emissions from MRF Facility Outdoor Bin Area - 7:00 a.m. - 11:00 p.m.**

| | Emissions (lb/hr) | | | | | |
|---|---|---|---|---|---|---|
| Time Period | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| 7:00 a.m. - 11:00 p.m. | 1.41E-01 | 6.66E-03 | 1.27E-01 | 2.31E-04 | 7.61E-04 | 7.61E-04 |

**Table 5**
**Equipment Exhaust Emissions at SCRTS - Alternative C, MRF at SCRTS**

| Equipment | Horsepower | Number | Hours/Day | Fuel Use (gal/hr) | Emission Stds. | Emission Factors (g/bhp-hr)[a] | | | | | Emission Factor (g/gal) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | CO | ROC[b] | NOx[b] | PM10[c] | PM2.5[c] | $CO_2$[d] | $CH_4$[e] | $N_2O$[e] |
| **Materials Recovery Facility Building** | | | | | | | | | | | | | |
| **Tipping Floor** | | | | | | | | | | | | | |
| Caterpillar M322D Material Handler | 173 | 1 | 16 | 2.7 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Volvo L110G Loader | 260 | 1 | 16 | 3.5 | Tier 4 | 2.2 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Volvo L90G Loader | 173 | 1 | 16 | 2.7 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Tennant 800 Sweeper | 63 | 1 | 12 | 4 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |
| **Loadout Area** | | | | | | | | | | | | | |
| Volvo L110G Loader | 260 | 1 | 16 | 3.5 | Tier 4 | 2.2 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Toyota 6,000 lb Forklift | 57 | 3 | 16 | 1.5 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |
| Tennant 800 Sweeper | 63 | 1 | 12 | 4 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |
| **Outdoors** | | | | | | | | | | | | | |
| Volvo L20F Loader | 56 | 1 | 16 | 1.3 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |

[a] Emission factors assumed the same as emission standards.
[b] Where standard is for NMHC+NOx (Volvo L20F, Toyota forklifts and Tennant sweeper), emissions assumed to be 5 percent ROC and 95 percent NOx, from Table D-25 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
[c] PM10 and PM2.5 assumed to be same as PM emission standards.
[d] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.
[e] $CH_4$ and $N_2O$ from Table 13.7 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

| Equipment | Load Factor[c] | Emission Rates Each Unit (lb/hr) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO[a] | ROC[a] | NOx[a] | SOx[b] | PM10[a, d] | PM2.5[a, d] | $CO_2$[e] | $CH_4$[e] | $N_2O$[e] |
| **Tipping Floor** | | | | | | | | | | |
| Caterpillar M322D Material Handler | 0.3618 | 0.511 | 0.019 | 0.041 | 0.00056 | 2.07E-06 | 2.07E-06 | 60.774 | 3.45E-03 | 1.55E-03 |
| Volvo L110G Loader | 0.3618 | 0.456 | 0.029 | 0.062 | 0.00073 | 3.11E-06 | 3.11E-06 | 78.781 | 4.48E-03 | 2.01E-03 |
| Volvo L90G Loader | 0.3618 | 0.511 | 0.019 | 0.041 | 0.00056 | 2.07E-06 | 2.07E-06 | 60.774 | 3.45E-03 | 1.55E-03 |
| Tennant 800 Sweeper | 0.4556 | 0.234 | 0.011 | 0.210 | 0.00083 | 1.27E-06 | 1.27E-06 | 90.035 | 5.11E-03 | 2.29E-03 |
| **Loadout Area** | | | | | | | | | | |
| Volvo L110G Loader | 0.3618 | 0.456 | 0.029 | 0.062 | 0.00073 | 3.11E-06 | 3.11E-06 | 78.781 | 4.48E-03 | 2.01E-03 |
| Toyota 6,000 lb Forklift | 0.201 | 0.093 | 0.004 | 0.084 | 0.00031 | 5.05E-07 | 5.05E-07 | 33.763 | 1.92E-03 | 8.60E-04 |
| Tennant 800 Sweeper | 0.4556 | 0.234 | 0.011 | 0.210 | 0.00083 | 1.27E-06 | 1.27E-06 | 90.035 | 5.11E-03 | 2.29E-03 |
| **Outdoors** | | | | | | | | | | |
| Volvo L20F Loader | 0.3618 | 0.165 | 0.008 | 0.149 | 0.00027 | 8.93E-04 | 8.93E-04 | 29.261 | 1.66E-03 | 7.45E-04 |

Diesel Fuel Density = 6.943 lb/gal
Diesel Fuel Sulfur = 15 ppmw
[a] Emission Rate [lb/hr] = Emission Factor [g/bhp-hr] x Engine Horsepower [hp] x Load Factor [unitless] / 453.6 [g/lb]
[b] Emission Rate [lb/hr] = Fuel Use [gal/hr] x Fuel Density [lb/gal] x Fuel Sulfur [ppmw] x $10^{-6}$ x 2 [lb $SO_2$/lb S]
[c] From OFFROAD 2011 model
[d] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency
[e] Emission rate [lb/hr] = Fuel use [gal/hr] x Emission factor [g/gal] / 453.6 [lb/gal]

| Equipment | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| **Tipping Floor** | | | | | | | | | |
| Caterpillar M322D Material Handler | 8.17 | 0.31 | 0.66 | 0.01 | 3.31E-05 | 3.31E-05 | 972.38 | 0.06 | 0.02 |
| Volvo L110G Loader | 7.30 | 0.46 | 1.00 | 0.01 | 4.98E-05 | 4.98E-05 | 1260.49 | 0.07 | 0.03 |
| Volvo L90G Loader | 8.17 | 0.31 | 0.66 | 0.01 | 3.31E-05 | 3.31E-05 | 972.38 | 0.06 | 0.02 |
| Tennant 800 Sweeper | 2.81 | 0.13 | 2.52 | 0.01 | 1.52E-05 | 1.52E-05 | 1080.42 | 0.06 | 0.03 |
| **Loadout Area** | | | | | | | | | |
| Volvo L110G Loader | 7.30 | 0.46 | 1.00 | 0.01 | 4.98E-05 | 4.98E-05 | 1260.49 | 0.07 | 0.03 |
| Toyota 6,000 lb Forklift | 4.49 | 0.21 | 4.03 | 0.01 | 2.42E-05 | 2.42E-05 | 1620.63 | 0.09 | 0.04 |
| Tennant 800 Sweeper | 2.81 | 0.13 | 2.52 | 0.01 | 1.52E-05 | 1.52E-05 | 1080.42 | 0.06 | 0.03 |
| **Outdoors** | | | | | | | | | |
| Volvo L20F Loader | 2.64 | 0.13 | 2.38 | 0.00 | 1.43E-02 | 1.43E-02 | 468.18 | 0.03 | 0.01 |
| **Total** | **43.69** | **2.15** | **14.77** | **0.08** | **0.01** | **0.01** | **8,715.41** | **0.50** | **0.22** |

[a] Daily Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Number Units x Operating Time [hr/day]

| Equipment | Days/Year | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| **Tipping Floor** | | | | | | | | | | |
| Caterpillar M322D Material Handler | 311 | 2,540.53 | 96.13 | 205.99 | 2.80 | 0.01 | 0.01 | 3.02E+05 | 17.18 | 7.70 |
| Volvo L110G Loader | 311 | 2,270.24 | 144.47 | 309.58 | 3.63 | 0.02 | 0.02 | 3.92E+05 | 22.27 | 9.98 |
| Volvo L90G Loader | 311 | 2,540.53 | 96.13 | 205.99 | 2.80 | 0.01 | 0.01 | 3.02E+05 | 17.18 | 7.70 |
| Tennant 800 Sweeper | 311 | 873.76 | 41.33 | 785.21 | 3.11 | 0.00 | 0.00 | 3.36E+05 | 19.09 | 8.56 |
| **Loadout Area** | | | | | | | | | | |
| Volvo L110G Loader | 311 | 2,270.24 | 144.47 | 309.58 | 3.63 | 0.02 | 0.02 | 3.92E+05 | 22.27 | 9.98 |
| Toyota 6,000 lb Forklift | 311 | 1,395.09 | 65.98 | 1,253.69 | 4.66 | 0.01 | 0.01 | 5.04E+05 | 28.63 | 12.83 |
| Tennant 800 Sweeper | 311 | 873.76 | 41.33 | 785.21 | 3.11 | 0.00 | 0.00 | 3.36E+05 | 19.09 | 8.56 |
| **Outdoors** | | | | | | | | | | |
| Volvo L20F Loader | 311 | 822.37 | 38.90 | 739.02 | 1.35 | 4.45 | 4.45 | 1.46E+05 | 8.27 | 3.71 |
| **Total** | | **13,586.52** | **668.73** | **4,594.26** | **25.08** | **4.51** | **4.51** | **2.71E+06** | **153.98** | **69.02** |

[a] Annual Emissions [lb/year] = Daily Emissions [lb/day] x Operating Days [days/year]

**Table 6**
**On-Site Fugitive PM Emissions at SCRTS - Alternative C, MRF at SCRTS**

**Material Transfers**

| Material | Transfer | Moisture (%)[a] | Daily Amount (tons) | Annual Op. (Days/year) | Emission Factors (lb/ton)[b] | | Emissions (lb/day)[c,e] | | Emissions (lb/year)[d] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| MSW | Into MRF Facility | 28 | 930 | 311 | 3.84E-04 | 5.82E-05 | 3.57E-04 | 5.41E-05 | 0.11 | 0.02 |
| Organics | Into Trucks | 28 | 240 | 311 | 3.84E-04 | 5.82E-05 | 9.23E-05 | 1.40E-05 | 0.03 | 0.00 |
| Residuals | Into Trucks | 28 | 280 | 311 | 3.84E-04 | 5.82E-05 | 1.08E-04 | 1.63E-05 | 0.03 | 0.01 |

[a] Value for MSW from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5; also used for MRF residuals

[b] Emission factor [lb/ton] = k x 0.0032 x (wind speed [mph] / 5)$^{1.3}$ / (material moisture [%] /2 )$^{1.4}$
from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06)

k = 0.35 for PM10
0.053 for PM2.5
Wind speed = 5.47 mph, from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[c] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

[e] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

**Table 7**
**Off-Site Motor Vehicle Exhaust Emissions to and from SCRTS - Alternative C, MRF at SCRTS**

| Vehicle | Use | Fuel | One-Way Trips/Day | Mileage (mpg)[b] | One-Way Trip Dist. (mi) | Miles/ Day |
|---|---|---|---|---|---|---|
| Freightliner Tractors | Recycleables to POLA, New | CNG | 26 | 6 | 118 | 3,068 |
| Freightliner Tractors | Recycleables to POLA, Replace Gold Coast[a] | CNG | 10 | 6 | 79 | 790 |
| Tractor/Trailer | Organics and Residuals to Tajiguas Landfill | Diesel | 46 | 6 | 22 | 1,012 |
| Collection Vehicle | MSW to SCRTS instead of Tajiguas[c,d] | Diesel | 152 | 5 | -20 | -3,040 |
| Worker Commuting | From the North[d] | Gasoline | 45 | 22 | 33 | 1,485 |
| Worker Commuting | From the South[d] | Gasoline | 69 | 22 | 26 | 1,794 |

[a] Net increase in mileage is distance from SCRTS to POLA minus distance from SCRTS to Gold Coast (78 miles)
[b] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2017 by total miles in Santa Barbara County
Mileage for Freightliner Tractor is diesel-equivalent, Mustang estimate
[c] Distance is reduction in miles per vehicle-trip from delivering to SCRTS instead of Tajiguas Landfill
[d] Trips per day are from Project Traffic Study

| Vehicle | Use | EMFAC Vehicle Class | Emission Factors (g/mi) $CO^{a,b}$ | $ROC^{a,c}$ | $NOx^{a,c}$ | $SOx^{a,d}$ | $PM10^{a,c}$ | $PM2.5^{a,c}$ | $CO_2^{a,e}$ | $CH_4^{a,f}$ | $N_2O^{f,g}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Freightliner Tractors | Recycleables to POLA, New | N/A | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Freightliner Tractors | Recycleables to POLA, Replace Gold Coast | N/A | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Tractor/Trailer | Organics and Residuals to Tajiguas Landfill | T7 tractor | 1.16E+00 | 2.53E-01 | 6.95E+00 | 1.69E-02 | 1.80E-01 | 1.11E-01 | 1.68E+03 | 1.38E-02 | 5.81E-02 |
| Collection Vehicle | MSW to SCRTS instead of Tajiguas | T7 SWCV | 1.05E+00 | 2.13E-01 | 1.23E+01 | 1.84E-02 | 1.61E-01 | 9.40E-02 | 1.83E+03 | 1.17E-02 | 6.33E-02 |
| Worker Commuting | From the North[f] | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |
| Worker Commuting | From the South[f] | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |

Diesel Fuel HV = 128,450 Btu/gal
Natural Gas HV = 1,020 Btu/scf
Natural Gas S = 0.5 grains/100 scf
Diesel Fuel Density = 6.943 lb/gal
Diesel Fuel Sulfur = 15 ppmw
Natural Gas $CO_2$ EF = 0.054 Kg/scf from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2017 by total miles in Santa Barbara County
[b] Freightliner tractor calculated by dividing EMFAC2011 calculated total daily CO emissions from 2017 model year T7 tractors in Santa Barbara County in 2017
by total miles in Santa Barbara County
[c] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines -
http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) /
natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x
2 (g $SO_2$/g S)
[e] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) /
natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (Kg/scf) x 1,000 (g/Kg)
[f] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
[g] Emission factor for gasoline calculated from 0.0416 x NOx emission factor; emission factor for diesel calculated as 0.3316 g/gal; see:
http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

| Vehicle | Use | Daily Emissions (lb/day)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Freightliner Tractors | Recycleables to POLA, New | 7.89 | 2.50 | 3.11 | 0.05 | 0.20 | 0.20 | 7,665.82 | 13.30 | 1.18 |
| Freightliner Tractors | Recycleables to POLA, Replace Gold Coast | 2.03 | 0.64 | 0.80 | 0.01 | 0.05 | 0.05 | 1,973.92 | 3.42 | 0.30 |
| Tractor/Trailer | Organics and Residuals to Tajiguas Landfill | 2.59 | 0.56 | 15.51 | 0.04 | 0.40 | 0.25 | 3,743.84 | 0.03 | 0.13 |
| Collection Vehicle | MSW and CSSR to SCRTS instead of Tajiguas | -7.02 | -1.43 | -82.75 | -0.12 | -1.08 | -0.63 | -12,255.65 | -0.08 | -0.42 |
| Worker Commuting | From the North | 11.34 | 1.00 | 1.17 | 0.01 | 0.16 | 0.07 | 1,019.13 | 0.08 | 0.05 |
| Worker Commuting | From the South | 13.70 | 1.21 | 1.42 | 0.02 | 0.19 | 0.08 | 1,231.20 | 0.10 | 0.06 |
| **Total** | | **30.54** | **4.49** | **-60.74** | **0.00** | **-0.08** | **0.02** | **3,378.26** | **16.86** | **1.30** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Op. Days/yr | Annual Emissions (lb/year)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Freightliner Tractors | Recycleables to POLA, New | 311 | 2,453.65 | 778.30 | 967.61 | 14.30 | 61.00 | 61.00 | 2,384,070.78 | 4,135.48 | 368.11 |
| Freightliner Tractors | Recycleables to POLA, Replace Gold Coast | 311 | 631.81 | 200.41 | 249.16 | 3.68 | 15.71 | 15.71 | 613,890.45 | 1,064.87 | 94.79 |
| Tractor/Trailer | Organics and Residuals to Tajiguas Landfill | 311 | 806.52 | 175.41 | 4,823.84 | 11.69 | 124.95 | 77.17 | 1,164,333.27 | 9.59 | 40.32 |
| Collection Vehicle | MSW and CSSR to SCRTS instead of Tajiguas | 311 | -2,184.77 | -444.86 | -25,735.95 | -38.28 | -336.33 | -195.91 | -3,811,507.62 | -24.31 | -131.99 |
| Worker Commuting | From the North | 311 | 3,527.84 | 311.71 | 365.18 | 3.88 | 49.20 | 21.38 | 316,950.77 | 25.66 | 15.19 |
| Worker Commuting | From the South | 311 | 4,261.92 | 376.57 | 441.16 | 4.69 | 59.44 | 25.83 | 382,902.14 | 31.00 | 18.35 |
| **Total** | | | **9,496.96** | **1,397.53** | **-18,889.01** | **-0.03** | **-26.02** | **5.19** | **1,050,639.79** | **5,242.29** | **404.78** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Off-Site Motor Vehicle Fugitive PM Emissions**

**Emission Factors for Vehicles on Off-Site Paved Roads**

| Parameter | Value | Comments |
|---|---|---|
| Road silt loading (g/m$^2$) | 0.1 | CalEEMod default |
| Onroad vehicles average weight (tons) | 2.4 | CalEEMod Default for Santa Barbara County |
| PM10 emission factor (lb/mile) | 6.61E-04 | 0.0022 x (silt loading [g/m$^2$])$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |
| PM2.5 emission factor (lb/mile) | 1.62E-04 | 0.00054 x (silt loading [g/m$^2$])$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |

| Vehicle | Use | Miles/ Day | Op. Days/yr | Daily Emissions (lb/day)[a] PM10 | PM2.5 | Annual Emissions (lb/year)[b] PM10 | PM2.5 |
|---|---|---|---|---|---|---|---|
| Freightliner Tractors | Recycleables to POLA, New | 3,068 | 311 | 2.03 | 0.50 | 630.75 | 154.82 |
| Freightliner Tractors | Recycleables to POLA, Replace Gold Coast | 790 | 311 | 0.52 | 0.13 | 162.41 | 39.87 |
| Tractor/Trailer | Organics and Residuals to Tajiguas Landfill | 1,012 | 311 | 0.67 | 0.16 | 208.06 | 51.07 |
| Collection Vehicle | MSW and CSSR to SCRTS instead of Tajiguas | -3,040 | 311 | -2.01 | -0.49 | -624.99 | -153.41 |
| Worker Commuting | From the North | 1,485 | 311 | 0.98 | 0.24 | 305.30 | 74.94 |
| Worker Commuting | From the South | 1,794 | 311 | 1.19 | 0.29 | 368.83 | 90.53 |
| **Total** | | | | **3.38** | **0.83** | **1,050.35** | **257.81** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]
[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 8**

**MRF Operations Diesel Exhaust Particulate Matter Emissions at SCRTS - Alternative C, MRF at SCRTS**

**Table 8-A**

**MRF Facility Tipping Floor Biofilter (7:00 a.m. - 5:00 p.m.)**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | | |
|---|---|---|---|---|---|---|
| Caterpillar M322D Material Handler | 311 | 10 | 2.07E-06 | 6.44E-03 | | |
| Volvo L110G Loader | 311 | 10 | 3.11E-06 | 9.67E-03 | | 7*0.06 10*1 6*0.56 1*0.06 |
| Volvo L90G Loader | 311 | 10 | 2.07E-06 | 6.44E-03 | | |
| Tennant 800 Sweeper | 311 | 5 | 1.27E-06 | 1.97E-03 | | |
| Collection and Export Vehicles | 311 | 10 | 6.22E-07 | 1.93E-03 | | 0.56 EveningFactor |
| **Total** | | | **9.14E-06** | **2.65E-02** | **BioB** | 0.06 NightFactor |

**Table 8-B**

**MRF Facility Tipping Floor Biofilter (5:00 p.m. - 11:00 p.m.)**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) |
|---|---|---|---|---|
| Caterpillar M322D Material Handler | 311 | 6 | 2.07E-06 | 3.86E-03 |
| Volvo L110G Loader | 311 | 6 | 3.11E-06 | 5.80E-03 |
| Volvo L90G Loader | 311 | 6 | 2.07E-06 | 3.86E-03 |
| Tennant 800 Sweeper | 311 | 3 | 1.27E-06 | 1.18E-03 |
| **Total** | | | **8.52E-06** | **1.47E-02** |

**Table 8-C**

**MRF Tipping Floor Biofilter (11:00 p.m. a.m. - 7:00 a.m.)**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) |
|---|---|---|---|---|
| Tennant 800 Sweeper | 311 | 4 | 1.27E-06 | 1.57E-03 |
| **Total** | | | **1.27E-06** | **1.57E-03** |

**Table 8-D**

**MRF Facility Loadout Area Biofilter (7:00 a.m. - 11:00 p.m.)**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | | |
|---|---|---|---|---|---|---|
| Volvo L110G Loader | 311 | 16 | 3.11E-06 | 1.55E-02 | | |
| Toyota 6,000 lb Forklift | 311 | 16 | 1.52E-06 | 7.54E-03 | | |
| Tennant 800 Sweeper | 311 | 8 | 1.27E-06 | 3.15E-03 | | |
| **Total** | | | **5.89E-06** | **2.62E-02** | **BioA** | 0.06 NightFactor |

**Table 8-E**

**MRF Loadout Area Biofilter (11:00 p.m. a.m. - 7:00 a.m.)**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) |
|---|---|---|---|---|
| Tennant 800 Sweeper | 311 | 4 | 1.27E-06 | 1.57E-03 |
| **Total** | | | **1.27E-06** | **1.57E-03** |

**Table 8-F**

**MRF Facility Outdoor Bin Area (7:00 a.m. - 11:00 p.m.)**

| Equipment | Operating Days per Year | Operating Hours per Day | Hourly Emissions (lb/hr) | Annual Emissions (lb/yr) | |
|---|---|---|---|---|---|
| Volvo L20F Loader | 311 | 16 | 8.93E-04 | 4.45E+00 | |
| **Total** | | | **8.93E-04** | **4.45E+00** | **OUTSD_BN** |

**Table 8-I**

**Collection and Export Vehicle DPM Emissions Outside MRF (7:00 a.m. - 5:00 p.m.)**

| | | | |
|---|---|---|---|
| **Collection Vehicles** | | | |
| Vehicles per Day | 76 | | |
| Operating Hours per Day | 10 | | |
| Vehicles per Hour | 7.60 | | |
| Distance per Vehicle (mi) | 0.24 | | |
| Hourly travel distance (mi/hr) | 1.84 | | |
| Running Exh. PM10 Emission Factor (g/mi)[a] | 1.08E-01 | | |
| **Running PM10 Emissions (lb/hr)** | **4.40E-04** | | |
| **Export Vehicles to Tajiguas** | | | |
| Vehicles per Day | 23 | | |
| Operating Hours per Day | 10 | | |
| Vehicles per Hour | 2.30 | | |
| Distance per Vehicle (mi) | 0.24 | | |
| Hourly travel distance (mi/hr) | 0.56 | | |
| Running Exh. PM10 Emission Factor (g/mi)[b] | 9.73E-02 | | 0.027027 |
| **Running PM10 Emissions (lb/hr)** | **1.20E-04** | **ROADIN+OUT** | 37 volumes |
| **Total PM10 Emissions (lb/hr)** | **5.59E-04** | | |
| Operating Days/Year | 311 | | |
| **Total PM10 Emissions (lb/year)** | **1.74E+00** | | |

[a] From EMFAC2011 for T7 SWCV in Santa Barbara County at 15 mph for 2017

[a] From EMFAC2011 for T7 in Santa Barbara County at 15 mph for 2017

**Table 9**
**MRF Operations Diesel Exhaust Emissions of TACS with Acute Effects at SCRTS -**
**Alternative C, MRF at SCRTS**

**Table 9-A**
**MRF Facility Tipping Floor Biofilter (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | BioB | |
|---|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 2.43E-03 | 0.99 | Evening Factor |
| Formaldehyde | 50-00-0 | 1.7261 | 2.25E-02 | 0.31 | Night Factor |
| Acetaldehyde | 75-07-0 | 0.7833 | 1.02E-02 | | |
| Acrolein | 107-02-8 | 0.0339 | 4.42E-04 | | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 2.83E-03 | | |
| Toluene | 108-88-3 | 0.1054 | 1.37E-03 | | |
| Xylenes | 1330-20-7 | 0.0424 | 5.52E-04 | | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 2.43E-03 | | |
| Arsenic | 7440-38-2 | 0.0016 | 2.08E-05 | | |
| Copper | 7440-50-8 | 0.0041 | 5.34E-05 | | |
| Mercury | 7439-97-6 | 0.0020 | 2.61E-05 | | |
| Nickel | 7440-02-0 | 0.0039 | 5.08E-05 | | |

Hourly fuel use = 13.03 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 9-B**
**MRF Facility Tipping Floor Biofilter (5:00 p.m. - 11:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) |
|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 2.40E-03 |
| Formaldehyde | 50-00-0 | 1.7261 | 2.23E-02 |
| Acetaldehyde | 75-07-0 | 0.7833 | 1.01E-02 |
| Acrolein | 107-02-8 | 0.0339 | 4.37E-04 |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 2.80E-03 |
| Toluene | 108-88-3 | 0.1054 | 1.36E-03 |
| Xylenes | 1330-20-7 | 0.0424 | 5.47E-04 |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 2.40E-03 |
| Arsenic | 7440-38-2 | 0.0016 | 2.06E-05 |
| Copper | 7440-50-8 | 0.0041 | 5.29E-05 |
| Mercury | 7439-97-6 | 0.0020 | 2.58E-05 |
| Nickel | 7440-02-0 | 0.0039 | 5.03E-05 |

Hourly fuel use = 12.90 gal/hr

[a] From Ventura County Air Pollution Control District AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 9-C**
**MRF Tipping Floor Biofilter (11:00 p.m. a.m. - 7:00 a.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) |
|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 7.45E-04 |
| Formaldehyde | 50-00-0 | 1.7261 | 6.90E-03 |
| Acetaldehyde | 75-07-0 | 0.7833 | 3.13E-03 |
| Acrolein | 107-02-8 | 0.0339 | 1.36E-04 |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 8.70E-04 |
| Toluene | 108-88-3 | 0.1054 | 4.22E-04 |
| Xylenes | 1330-20-7 | 0.0424 | 1.70E-04 |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 7.45E-04 |
| Arsenic | 7440-38-2 | 0.0016 | 6.40E-06 |
| Copper | 7440-50-8 | 0.0041 | 1.64E-05 |
| Mercury | 7439-97-6 | 0.0020 | 8.00E-06 |
| Nickel | 7440-02-0 | 0.0039 | 1.56E-05 |

Hourly fuel use = 4.00 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 9-D**
**MRF Facility Loadout Area Biofilter (7:00 a.m. - 11:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | BioA | |
|---|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 2.24E-03 | 0.33 | Night Factor |
| Formaldehyde | 50-00-0 | 1.7261 | 2.07E-02 | | |
| Acetaldehyde | 75-07-0 | 0.7833 | 9.40E-03 | | |
| Acrolein | 107-02-8 | 0.0339 | 4.07E-04 | | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 2.61E-03 | | |
| Toluene | 108-88-3 | 0.1054 | 1.26E-03 | | |
| Xylenes | 1330-20-7 | 0.0424 | 5.09E-04 | | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 2.24E-03 | | |
| Arsenic | 7440-38-2 | 0.0016 | 1.92E-05 | | |
| Copper | 7440-50-8 | 0.0041 | 4.92E-05 | | |
| Mercury | 7439-97-6 | 0.0020 | 2.40E-05 | | |
| Nickel | 7440-02-0 | 0.0039 | 4.68E-05 | | |

Hourly fuel use = 12.00 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 9-E**
**MRF Loadout Area Biofilter (11:00 p.m. a.m. - 7:00 a.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) |
|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 7.45E-04 |
| Formaldehyde | 50-00-0 | 1.7261 | 6.90E-03 |
| Acetaldehyde | 75-07-0 | 0.7833 | 3.13E-03 |
| Acrolein | 107-02-8 | 0.0339 | 1.36E-04 |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 8.70E-04 |
| Toluene | 108-88-3 | 0.1054 | 4.22E-04 |
| Xylenes | 1330-20-7 | 0.0424 | 1.70E-04 |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 7.45E-04 |
| Arsenic | 7440-38-2 | 0.0016 | 6.40E-06 |
| Copper | 7440-50-8 | 0.0041 | 1.64E-05 |
| Mercury | 7439-97-6 | 0.0020 | 8.00E-06 |
| Nickel | 7440-02-0 | 0.0039 | 1.56E-05 |

Hourly fuel use = 4.00 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 9-F**
**MRF Facility Outdoor Bin Area (7:00 a.m. - 11:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | OUTSD_BN |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 2.42E-04 | |
| Formaldehyde | 50-00-0 | 1.7261 | 2.24E-03 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 1.02E-03 | |
| Acrolein | 107-02-8 | 0.0339 | 4.41E-05 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 2.83E-04 | |
| Toluene | 108-88-3 | 0.1054 | 1.37E-04 | |
| Xylenes | 1330-20-7 | 0.0424 | 5.51E-05 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 2.42E-04 | |
| Arsenic | 7440-38-2 | 0.0016 | 2.08E-06 | |
| Copper | 7440-50-8 | 0.0041 | 5.33E-06 | |
| Mercury | 7439-97-6 | 0.0020 | 2.60E-06 | |
| Nickel | 7440-02-0 | 0.0039 | 5.07E-06 | |

Hourly fuel use = 1.30 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 9-G**
**MRF Facility Outdoor Trucks (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) | ROAD |
|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 8.38E-05 | |
| Formaldehyde | 50-00-0 | 1.7261 | 7.76E-04 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 3.52E-04 | |
| Acrolein | 107-02-8 | 0.0339 | 1.52E-05 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 9.77E-05 | |
| Toluene | 108-88-3 | 0.1054 | 4.74E-05 | |
| Xylenes | 1330-20-7 | 0.0424 | 1.91E-05 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 8.38E-05 | |
| Arsenic | 7440-38-2 | 0.0016 | 7.19E-07 | |
| Copper | 7440-50-8 | 0.0041 | 1.84E-06 | |
| Mercury | 7439-97-6 | 0.0020 | 8.99E-07 | |
| Nickel | 7440-02-0 | 0.0039 | 1.75E-06 | |

Hourly fuel use = 0.45 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 10**

**Existing Equipment and Motor Vehicle Diesel Exhaust Particulate Matter Emissions at SCRTS - Alternative C, MRF at SCRTS**

**Table 10-A**

**Existing Equipment Exhaust DPM Emissions, Outdoor Bin Area (7:00 a.m. - 5:00 p.m.)**

| Equipment | Model Year | Horsepower | Number | Hours/Day | Days/Year | Fuel Use (gal/hr) | Emission Stds. | Load Factor[a] | PM10 Emission Factor (g/bhp-hr)[a] | PM10 Emissions Lb/Hr | PM10 Emissions Lb/Year | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Caterpillar 914G Loader | 2006 | 96 | 1 | 4 | 307 | 1.75 | Tier 2 | 0.3618 | 0.3 | 2.30E-02 | 2.82E+01 | |
| **Total** | | | | | | | | | | **2.30E-02** | **2.82E+01** | |
| | | | | | | | | | + Project | 8.93E-04 | 4.45E+00 | |
| | | | | | | | | | + Vehicle Exh | 7.89E-03 | 3.33E+00 | Evening F |
| | | | | | | | | **OUTSD_BN** | **TOTAL** | **3.18E-02** | **3.60E+01** | 0.12 |

[a] From OFFROAD2011 Model

[b] Emission factor assumed equal to emission standard

**Table 10-B**

**Existing Motor Vehicle Exhaust DPM Emissions, Outdoor Bin Area (7:00 a.m. - 5:00 p.m.)**

| Vehicle | Model Year | Number | Miles/ Day | Miles/ Year | Fuel Use (gal/hr) | PM10 Emission Factor (g/mi)[a] | PM10 Emissions Lb/Hr[b] | PM10 Emissions Lb/Year |
|---|---|---|---|---|---|---|---|---|
| Shop Truck | 2001 | 1 | 1.63 | 500 | 0.15 | 2.95E+00 | 3.59E-03 | 3.26E+00 |
| Water Truck | 2009 | 1 | 1.95 | 600 | 0.98 | 5.63E-02 | 4.30E-03 | 7.45E-02 |
| **Total** | | | | | | | **7.89E-03** | **3.33E+00** |

[a] From EMFAC2011 for T6 instate for calendar year 2017 at 5 mph in Santa Barbara County

[b] Assumes entire daily travel occurs in one hour

**Table 10-C**

**Existing Motor Vehicle DPM Emissions In and Out of SCRTS (7:00 a.m. - 5:00 p.m.)**

| | | | | | | |
|---|---|---|---|---|---|---|
| Vehicles per Day | 20 | BYPASS+RDOUT | | | | |
| Operating Hours per Day | 10 | | | | | |
| Vehicles per Hour | 2.00 | | | | | |
| Distance per Vehicle (mi) | 0.24 | | Bypass | RDOUT | | |
| Hourly travel distance (mi/hr) | 0.48 | | 0.02222 | 0.04925 | | |
| Running Exh. PM10 Emission Factor (g/mi)[a] | 9.73E-02 | | 45 | volumes | **ROAD** | |
| **Running PM10 Emissions (lb/hr)** | **1.04E-04** | | | | | |
| Operating Days/Year | 307 | | | | | |
| **Total PM10 Emissions (lb/year)** | **3.19E-01** | 1.74E+00 | | | **2.06E+00** | LB/YR |

[a] From EMFAC2011 for T7 Tractor in Santa Barbara County at 15 mph for 2017

**Table 11**
**Diesel Exhaust Emissions of TACs with**
**Acute Effects from Existing Sources at SCRTS -**
**Alternative C, MRF at SCRTS**

**Table 11-A**
**Existing Equipment , Outdoor Bin Area (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | EXISTING Emissions (lb/hour) | EXISTING MV Emissions (lb/hr) | PROJECT Emissions (lb/hr) | TOTAL Emissions (lb/hr) | OUTSD_BN |
|---|---|---|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 3.26E-04 | 2.11E-04 | 2.42E-04 | 7.79E-04 | 3.11E-01 |
| Formaldehyde | 50-00-0 | 1.7261 | 3.02E-03 | 1.95E-03 | 2.24E-03 | 7.22E-03 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 1.37E-03 | 8.85E-04 | 1.02E-03 | 3.27E-03 | |
| Acrolein | 107-02-8 | 0.0339 | 5.93E-05 | 3.83E-05 | 4.41E-05 | 1.42E-04 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 3.80E-04 | 2.46E-04 | 2.83E-04 | 9.09E-04 | |
| Toluene | 108-88-3 | 0.1054 | 1.84E-04 | 1.19E-04 | 1.37E-04 | 4.41E-04 | |
| Xylenes | 1330-20-7 | 0.0424 | 7.42E-05 | 4.79E-05 | 5.51E-05 | 1.77E-04 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 3.26E-04 | 2.11E-04 | 2.42E-04 | 7.79E-04 | |
| Arsenic | 7440-38-2 | 0.0016 | 2.80E-06 | 1.81E-06 | 2.08E-06 | 6.69E-06 | |
| Copper | 7440-50-8 | 0.0041 | 7.18E-06 | 4.63E-06 | 5.33E-06 | 1.71E-05 | |
| Mercury | 7439-97-6 | 0.0020 | 3.50E-06 | 2.26E-06 | 2.60E-06 | 8.36E-06 | |
| Nickel | 7440-02-0 | 0.0039 | 6.83E-06 | 4.41E-06 | 5.07E-06 | 1.63E-05 | |

Hourly fuel use = 1.75 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 11-B**
**Existing Motor Vehicles, Outdoor Bin Area (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | Emissions (lb/hour) |
|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 2.11E-04 |
| Formaldehyde | 50-00-0 | 1.7261 | 1.95E-03 |
| Acetaldehyde | 75-07-0 | 0.7833 | 8.85E-04 |
| Acrolein | 107-02-8 | 0.0339 | 3.83E-05 |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 2.46E-04 |
| Toluene | 108-88-3 | 0.1054 | 1.19E-04 |
| Xylenes | 1330-20-7 | 0.0424 | 4.79E-05 |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 2.11E-04 |
| Arsenic | 7440-38-2 | 0.0016 | 1.81E-06 |
| Copper | 7440-50-8 | 0.0041 | 4.63E-06 |
| Mercury | 7439-97-6 | 0.0020 | 2.26E-06 |
| Nickel | 7440-02-0 | 0.0039 | 4.41E-06 |

Hourly fuel use = 1.13 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 11-C**
**Existing Motor Vehicles In and Out of SCRTS (7:00 a.m. - 5:00 p.m.)**

| Compound | CAS Number | Emission Factor (lb/1,000 gal)[a] | EXISTING Emissions (lb/hour) | PROJECT Emissions (lb/hr) | TOTAL Emissions (lb/hr) | ROAD |
|---|---|---|---|---|---|---|
| Benzene | 71-43-2 | 0.1863 | 1.58E-05 | 8.38E-05 | 9.96E-05 | |
| Formaldehyde | 50-00-0 | 1.7261 | 1.47E-04 | 7.76E-04 | 9.23E-04 | |
| Acetaldehyde | 75-07-0 | 0.7833 | 6.66E-05 | 3.52E-04 | 4.19E-04 | |
| Acrolein | 107-02-8 | 0.0339 | 2.88E-06 | 1.52E-05 | 1.81E-05 | |
| 1,3-Butadiene | 106-99-0 | 0.2174 | 1.85E-05 | 9.77E-05 | 1.16E-04 | |
| Toluene | 108-88-3 | 0.1054 | 8.96E-06 | 4.74E-05 | 5.63E-05 | |
| Xylenes | 1330-20-7 | 0.0424 | 3.60E-06 | 1.91E-05 | 2.27E-05 | |
| Hydrogen chloride | 7647-01-0 | 0.1863 | 1.58E-05 | 8.38E-05 | 9.96E-05 | |
| Arsenic | 7440-38-2 | 0.0016 | 1.36E-07 | 7.19E-07 | 8.55E-07 | |
| Copper | 7440-50-8 | 0.0041 | 3.48E-07 | 1.84E-06 | 2.19E-06 | |
| Mercury | 7439-97-6 | 0.0020 | 1.70E-07 | 8.99E-07 | 1.07E-06 | |
| Nickel | 7440-02-0 | 0.0039 | 3.31E-07 | 1.75E-06 | 2.08E-06 | |

Hourly fuel use = 0.08 gal/hr

[a] From Ventura County Air Pollution Control District
AB 2588 Emission Factors for Diesel Fuel Internal
Combustion.
http://www.vcapcd.org/pubs/Engineering/AirToxics/combem.pdf
Only includes TACs with acute reference exposure levels.

**Table 12**
**CHP Engine Emissions**

| Type | Engine Rating (hp) | Biogas Input @ Full Load (scfh)[a] | Heat Input @ Full Load (MMBtu/hr) | Number Engines | Daily Op. (hr/day) | Emission Factors (normal operation) CO (g/bhp-hr)[b] | ROC (g/bhp-hr)[b] | NOx (g/bhp-hr)[b] | SOx (g/scf)[c] | PM10 (g/bhp-hr)[d] | PM2.5 (g/bhp-hr)[d] | Combust. $CO_2$ (g/MMBtu)[e] | $CH_4$ (g/MMBtu)[f] | $N_2O$ (g/MMBtu)[f] | Pass-through $CO_2$ (g/scf)[g] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jenbacher/GE JMS416vB82 | 1,573 | 16,828 | 9.88 | 2 | 24 | 0.3 | 0.12 | 0.12 | 0.00151 | 0.118 | 0.118 | 53,020 | 1.0 | 0.10 | 21.23 |

| | | | |
|---|---|---|---|
| Biogas heating value = | 587 | Btu/scf | Mustang estimate |
| Biogas sulfur = | 20 | ppmv | Mustang estimate |
| Biogas $CO_2$ fraction = | 0.41 | | Conservative estimate |

[a] Biogas input at full load [scfh] = Heat input at full load [MMBtu/hr] x 106 [Btu/MMBtu] / Biogas heating value [Btu/scf]
[b] Control system vendor specifications
[c] SOx emission factor [g/scf] = Biogas sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb
[d] Bekon estimate for filterable PM is 0.09 g/bhp-hr. Filterable PM10 and PM2.5 assumed equal to filterable PM
Condensable PM emission factor for 4-stroke lean-burn natural gas fired engibes from AP-42, Section 3.2 (Natural Gas-fired Reciprocating Internal Combustion Engines, 7/2000), Table 3.2-2 is 9.91 x $10^{-3}$ lb/MMBtu = 9.91 x $10^{-3}$ lb/MMBtu x 9.88 MMBtu/hr heat input / 1,573 hp engine rating x 453.6 g/lb = 0.0282 g/bhp-hr.
Total PM10 and PM2.5 emission factor = 0.09 g/bhp-hr filterable + 0.0282 g/bhp-hr condensable = 0.0118 g/bhp-hr.
[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.
[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.
[g] "Pass-through" $CO_2$ emission factor [g/scf] = Biogas CO2 volume fraction [unitless] x 44 [lb/lb-mole $CO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

| Emission Factors (start-up) CO (g/bhp-hr)[a] | ROC (g/bhp-hr)[a] | NOx (g/bhp-hr)[a] | SOx (g/scf)[b] | PM10 (g/bhp-hr)[b] | PM2.5 (g/bhp-hr)[b] | Combust. $CO_2$ (g/MMBtu)[b] | $CH_4$ (g/MMBtu)[b] | $N_2O$ (g/MMBtu)[b] | Pass-through $CO_2$ (g/scf)[b] |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 0.43 | 0.6 | 0.00151 | 0.11800 | 0.11800 | 53,020 | 1.0 | 0.10 | 21.23 |

[a] Engine vendor specification
[b] Same as during normal operation

| Emission Factors (SCR catalyst burn-in) CO (g/bhp-hr)[a] | ROC (g/bhp-hr)[a] | NOx (g/bhp-hr)[b] | SOx (g/scf)[a] | PM10 (g/bhp-hr)[a] | PM2.5 (g/bhp-hr)[a] | Combust. $CO_2$ (g/MMBtu)[a] | $CH_4$ (g/MMBtu)[a] | $N_2O$ (g/MMBtu)[a] | Pass-through $CO_2$ (g/scf)[a] |
|---|---|---|---|---|---|---|---|---|---|
| 0.3 | 0.12 | 0.36 | 0.00151 | 0.11800 | 0.11800 | 53,020 | 1.0 | 0.10 | 21.23 |

[a] Same as during normal operation
[b] Based on average of 50 percent of normal NOx control efficiency

| Hourly Emissions per Engine, Normal Operation (lb/hr)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 1.04 | 0.42 | 0.42 | 0.06 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 7.87E+02 |

[a] Except for SOx, $CO_2$, $CH_4$ and $N_2O$, Hourly emissions [lb/hr] = Engine rating [hp] x Emission factor [g/bhp-hr] / 453.6 [g/lb]
SOx and pass-though $CO_2$ hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]
Combustion $CO_2$, $CH_4$ and $N_2O$ hourly emisisons [lb/hr] = Heat input [MMBtu/hr] x Emission factor [g/MMBtu] / 453.6 [g/lb]

| Hourly Emissions per Engine, Start-Up (lb/hr)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 5.72 | 0.95 | 1.25 | 0.06 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 7.87E+02 |

[a] Start-up is 30 minutes with no CO, ROC or NOx control by SCR/catalyst system. Emissions are for one-hour period that includes 30-minute start-up

| Hourly Emissions per Engine, SCR Catalyst Burn-In (lb/hr)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 1.04 | 0.42 | 1.25 | 0.06 | 0.41 | 0.41 | 1.15E+03 | 2.18E-02 | 2.18E-03 | 7.87E+02 |

| Daily Emissions, both Engines Normal Operation (lb/day)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 49.94 | 19.97 | 19.97 | 2.68 | 19.64 | 19.64 | 5.54E+04 | 1.05E+00 | 1.05E-01 | 3.78E+04 |

[a] Daily emissions [lb/day] = Number engines x Daily operating time [hr/day] x Hourly emissions [lb/hr]

| Daily Emissions, both Engines Normal Operation plus one Start-up for One Engine (lb/day)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| 54.62 | 20.51 | 20.81 | 2.68 | 19.64 | 19.64 | 5.54E+04 | 1.05E+00 | 1.05E-01 | 3.78E+04 |

| | Annual Op. (hr/year-engine) | Annual Emissions, both Engines (lb/year)[c] CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Start-Up[a] | 18 | 205.99 | 34.33 | 44.94 | 2.01 | 14.73 | 14.73 | 4.16E+04 | 7.84E-01 | 7.84E-02 | 2.83E+04 |
| SCR Catalyst Burn-In[a] | 120 | 249.68 | 99.87 | 299.62 | 13.41 | 98.21 | 98.21 | 2.77E+05 | 5.23E+00 | 5.23E-01 | 1.89E+05 |
| Normal Operation[b] | 8,184 | 17,028.35 | 6,811.34 | 6,811.34 | 914.56 | 6,697.82 | 6,697.82 | 1.89E+07 | 3.56E+02 | 3.56E+01 | 1.29E+07 |
| Total | **8,322** | **17,484.02** | **6,945.54** | **7,155.90** | **929.98** | **6,810.76** | **6,810.76** | **1.92E+07** | **3.62E+02** | **3.62E+01** | **1.31E+07** |

[a] Mustang estimate
[b] Based on operating 95% of the time, excluding start-up hours and SCR catalyst burn-in, with 5% downtime for maintenance or other reasons.
[c] Annual emissions [lb/year] = Operating time [hr/year-engine] x Hourly emissions at full load [lb/hr-engine] x Number engines

**Table 13**
**Flare Emissions**

| Type | Heat Input (MMBtu/hr)[a] | Biogas Flow Rate (scfh)[a] | Daily Op. (hr/day) | Emission Factors | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CO (lb/MMBtu)[b] | ROC (lb/MMBtu)[c] | NOx (lb/MMBtu)[b] | SOx (g/scf)[d] | PM10 (lb/MMBtu)[b] | PM2.5 (lb/MMBtu)[b] | Combust. $CO_2$ (g/MMBtu)[e] | $CH_4$ (g/MMBtu)[f] | $N_2O$ (g/MMBtu)[f] | Pass-through $CO_2$ (g/scf)[g] |
| John Zink ZTOF | 1.23 | 2,103 | 1 | 0.2 | 0.0027 | 0.06 | 0.01506 | 0.042 | 0.042 | 53,020 | 3.2 | 0.63 | 21.23 |

Biogas sulfur = 200 ppmv

Biogas $CO_2$ fraction = 0.41 Conservative estimate

[a] Heat input assumed to be 1/16 of heat input to two CHP engines when purging one digester. Biogas flow rate assumed to be 1/16 0f biogas to two CHP engines.

[b] Manufacturer's specifications

[c] From SBCAPCD Rule 359

[d] SOx emission factor [g/scf] = Biogas sulfur [ppmv] x $10^{-6}$ x 64 [lb/lb-mole $SO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

[e] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.

[f] From Table C-2 of Title 40, Code of Federal Regulations, Subpart 98 for natural gas. Biogas assumed same as natural gas because heat content is primarily from methane. Does not include "pass-through" CO2 from biogas.

[g] "Pass-through" $CO_2$ emission factor [g/scf] = Biogas $CO_2$ volume fraction [unitless] x 44 [lb/lb-mole $CO_2$] / 385.5 [scf/lb-mole] x 453.6 g/lb

| Heat Input (MMBtu/hr)[a] | Biogas Flow Rate (scfh)[a] | Digester Purging Hourly Emissions[b] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 1.23 | 2,103 | 0.25 | 0.00 | 0.07 | 0.07 | 0.05 | 0.05 | 144.33 | 0.01 | 0.00 | 98.44 |

[a] Heat input assumed to be 1/16 of heat input to two CHP engines when purging one digester. Biogas flow rate assumed to be 1/16 0f biogas to two CHP engines.

[b] Except for SOx and pass-through $CO_2$, Hourly emissions [lb/hr] = Heat input [MMBtu/hr] x Emission factor [lb/MMBtu]

SOx and pass-through $CO_2$ hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]

| Daily Op. (hr/day) | Digester Purging Daily Emissions[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 1 | 0.25 | 0.00 | 0.07 | 0.07 | 0.05 | 0.05 | 144.33 | 0.01 | 0.00 | 98.44 |

[a] Daily emissions [lb/day] = Daily operating time [hr/day] x Hourly emissions [lb/hr]

| Annual Op. (hr/year) | Digester Purging Annual Emissions[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 278 | 68.65 | 0.93 | 20.60 | 19.42 | 14.42 | 14.42 | 40,122.73 | 2.42 | 0.48 | 27,365.15 |

[a] Annual emissions [lb/year] = Annual op. [hr/year] x Hourly emissions [lb/hr]

| Heat Input (MMBtu/hr)[a] | Flow Rate (scfh)[a] | Hourly Flaring Emissions for Two Engines Off-Line[b] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 19.76 | 33,656 | 3.95 | 0.05 | 1.19 | 1.12 | 0.83 | 0.83 | 2,309.22 | 0.14 | 0.03 | 1,574.97 |

[a] Heat input assumed to be heat input to two CHP engines. Flow rate assumed to be biogas flow rate to two CHP engines.

[b] Except for SOx and pass-through $CO_2$, Hourly emissions [lb/hr] = Heat input [MMBtu/hr] x Emission factor [lb/MMBtu]

SOx and pass-through $CO_2$ hourly emissions [lb/hr] = Biogas input [scfh] x Emission factor [g/scf] / 453.6 [g/lb]

| Daily Op. (hr/day) | Daily Flaring Emissions for Two Engines Off-Line[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 24 | 94.83 | 1.28 | 28.45 | 26.82 | 19.91 | 19.91 | 55421.33 | 3.34 | 0.66 | 37,799.35 |

[a] Daily emissions [lb/day] = Daily operating time [hr/day] x Hourly emissions [lb/hr]

| Annual Op. (hr/year) | Annual Flaring Emissions for Engines Off-Line[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | Combust. $CO_2$ | $CH_4$ | $N_2O$ | Pass-through $CO_2$ |
| 876 | 3,461.25 | 46.73 | 1,038.38 | 978.93 | 726.86 | 726.86 | 2,022,878.51 | 122.09 | 24.04 | 1,379,676.20 |

[a] Annual operating hours assumes each engine is off-line 5% of the time during a year (438 hrs/engine)

[b] Annual emissions [lb/year] = Annual op. [hr/year] x Hourly emissions [lb/hr]

**Table 14**
**Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions - Alternative C, MRF at SCRTS**



# TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | MRF/AD Tank |
| City: | Santa Barbara |
| State: | California |
| Company: | Mustang |
| Type of Tank: | Horizontal Tank |
| Description: | Diesel Storage tank for MRF & AD equipment. |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 27.00 |
| Diameter (ft): | 8.00 |
| Volume (gallons): | 10,000.00 |
| Turnovers: | 24.00 |
| Net Throughput(gal/yr): | 240,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Santa Barbara, California (Avg Atmospheric Pressure = 14.65 psia)

**Table 14**
**Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions - Alternative C, MRF at SCRTS**



## TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**MRF/AD Tank - Horizontal Tank**
**Santa Barbara, California**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diesel | All | 61.28 | 55.71 | 66.86 | 59.13 | 0.0068 | 0.0056 | 0.0082 | 130.0000 | | | 188.00 | Option 1: VP60 = .0065 VP70 = .009 |
| 1,2,4-Trimethylbenzene | | | | | | 0.0215 | 0.0172 | 0.0268 | 120.1900 | 0.0100 | 0.0456 | 120.19 | Option 2: A=7.04383, B=1573.267, C=208.56 |
| Benzene | | | | | | 1.2100 | 1.0356 | 1.4082 | 78.1100 | 0.0000 | 0.0021 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Ethylbenzene | | | | | | 0.1135 | 0.0933 | 0.1372 | 106.1700 | 0.0001 | 0.0031 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Hexane (-n) | | | | | | 1.9782 | 1.7095 | 2.2807 | 86.1700 | 0.0000 | 0.0004 | 86.17 | Option 2: A=6.876, B=1171.17, C=224.41 |
| Toluene | | | | | | 0.3436 | 0.2885 | 0.4073 | 92.1300 | 0.0003 | 0.0233 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Unidentified Components | | | | | | 0.0058 | 0.0053 | 0.0056 | 134.4372 | 0.9866 | 0.8674 | 189.60 | |
| Xylene (-m) | | | | | | 0.0945 | 0.0776 | 0.1146 | 106.1700 | 0.0029 | 0.0581 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**Table 14**
**Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions - Alternative C, MRF at SCRTS**



## TANKS 4.0.9d
## Emissions Report - Detail Format
## Detail Calculations (AP-42)

**MRF/AD Tank - Horizontal Tank**
**Santa Barbara, California**

| Annual Emission Calcaulations | |
|---|---|
| Standing Losses (lb): | 1.9420 |
| Vapor Space Volume (cu ft): | 864.4382 |
| Vapor Density (lb/cu ft): | 0.0002 |
| Vapor Space Expansion Factor: | 0.0389 |
| Vented Vapor Saturation Factor: | 0.9986 |
| | |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 864.4382 |
| Tank Diameter (ft): | 8.0000 |
| Effective Diameter (ft): | 16.5879 |
| Vapor Space Outage (ft): | 4.0000 |
| Tank Shell Length (ft): | 27.0000 |
| | |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0002 |
| Vapor Molecular Weight (lb/lb-mole): | 130.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0068 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 520.9532 |
| Daily Average Ambient Temp. (deg. F): | 59.1125 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 518.8025 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,608.0000 |
| | |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0389 |
| Daily Vapor Temperature Range (deg. R): | 22.2881 |
| Daily Vapor Pressure Range (psia): | 0.0026 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0068 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.0056 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.0082 |
| Daily Avg. Liquid Surface Temp. (deg R): | 520.9532 |
| Daily Min. Liquid Surface Temp. (deg R): | 515.3812 |
| Daily Max. Liquid Surface Temp. (deg R): | 526.5253 |
| Daily Ambient Temp. Range (deg. R): | 20.3250 |
| | |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9986 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.0068 |
| Vapor Space Outage (ft): | 4.0000 |
| | |
| Working Losses (lb): | 5.0669 |
| Vapor Molecular Weight (lb/lb-mole): | 130.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0068 |
| Annual Net Throughput (gal/yr.): | 240,000.0000 |
| Annual Turnovers: | 24.0000 |
| Turnover Factor: | 1.0000 |
| Tank Diameter (ft): | 8.0000 |
| Working Loss Product Factor: | 1.0000 |
| | |
| Total Losses (lb): | 7.0089 |

**Table 14**
**Anaerobic Digester Facility Equipment Diesel Fuel Storage Tank Emissions - Alternative C, MRF at SCRTS**



## TANKS 4.0.9d
## Emissions Report - Detail Format
## Individual Tank Emission Totals

### Emissions Report for: Annual

**MRF/AD Tank - Horizontal Tank**
**Santa Barbara, California**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Diesel | 5.07 | 1.94 | 7.01 |
| Benzene | 0.01 | 0.00 | 0.01 |
| Toluene | 0.12 | 0.05 | 0.16 |
| Ethylbenzene | 0.02 | 0.01 | 0.02 |
| Xylene (-m) | 0.29 | 0.11 | 0.41 |
| 1,2,4-Trimethylbenzene | 0.23 | 0.09 | 0.32 |
| Unidentified Components | 4.39 | 1.68 | 6.08 |
| Hexane (-n) | 0.00 | 0.00 | 0.00 |

**Table 15**
**Equipment Exhaust Emissions at Tajiguas Landfill - Alternative C, MRF at SCRTS**

| | | | | | | Emission Factors (g/bhp-hr)[a] | | | | | Emission Factor [g/gal] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Equipment** | **Horsepower** | **Number** | **Hours/Day** | **Fuel Use (gal/hr)** | **Emission Stds.** | **CO** | **ROC[b]** | **NOx[b]** | **PM10[c]** | **PM2.5[c]** | **$CO_2$[d]** | **$CH_4$[e]** | **$N_2O$[e]** |
| **Anaerobic Digestion Facility Building** | | | | | | | | | | | | | |
| Volvo L110G Loader | 260 | 1 | 8 | 3.5 | Tier 4 | 2.2 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| **Composting Area** | | | | | | | | | | | | | |
| Volvo L90G Loader | 173 | 1 | 8 | 2.7 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Compost Screen Machine 612T | 84 | 1 | 8 | 5 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Vermeer CT1010 TX Windrow Turner | 215 | 1 | 8 | 12 | Tier 4 | 2.2 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |

[a] Emission factors assumed the same as emission standards.

[b] Where standard is for NMHC+NOx (Volvo L20F, Toyota forklifts and Tennant sweeper), emissions assumed to be 5 percent ROC and 95 percent NOx, from Table D-25 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[c] PM10 and PM2.5 assumed to be same as PM emission standards.

[d] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.

[e] $CH_4$ and $N_2O$ from Table 13.7 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

| | | Emission Rates Each Unit (lb/hr) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Equipment** | **Load Factor[c]** | **CO[a]** | **ROC[a]** | **NOx[a]** | **SOx[b]** | **PM10[a, d]** | **PM2.5[a, d]** | **$CO_2$[e]** | **$CH_4$[e]** | **$N_2O$[e]** |
| **Anaerobic Digestion Facility Building** | | | | | | | | | | |
| Volvo L110G Loader | 0.3618 | 0.456 | 0.029 | 0.062 | 0.00073 | 3.11E-06 | 3.11E-06 | 78.78 | 4.48E-03 | 2.01E-03 |
| **Composting Area** | | | | | | | | | | |
| Volvo L90G Loader | 0.3618 | 0.511 | 0.019 | 0.041 | 0.00056 | 2.07E-06 | 2.07E-06 | 60.77 | 3.45E-03 | 1.55E-03 |
| Compost Screen Machine 612T | 0.3417 | 0.234 | 0.009 | 0.019 | 0.00104 | 0.00095 | 0.00095 | 112.54 | 6.39E-03 | 2.87E-03 |
| Vermeer CT820 Windrow Turner | 0.3953 | 0.412 | 0.026 | 0.056 | 0.00250 | 0.00281 | 0.00281 | 270.11 | 1.53E-02 | 6.88E-03 |

Diesel Fuel Density = 6.943 lb/gal
Diesel Fuel Sulfur = 15 ppmw

[a] Emission Rate [lb/hr] = Emission Factor [g/bhp-hr] x Engine Horsepower [hp] x Load Factor [unitless] / 453.6 [g/lb]

[b] Emission Rate [lb/hr] = Fuel Use [gal/hr] x Fuel Density [lb/gal] x Fuel Sulfur [ppmw] x $10^{-6}$ x 2 [lb $SO_2$/lb S]

[c] From OFFROAD 2011 model

[d] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

[e] Emission rate [lb/hr] = Fuel use [gal/hr] x Emission factor [g/gal] / 453.6 [lb/gal]

| | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Equipment** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **$CO_2$** | **$CH_4$** | **$N_2O$** |
| **Anaerobic Digestion Facility Building** | | | | | | | | | |
| Volvo L110G Loader | 3.65 | 0.23 | 0.50 | 0.01 | 2.49E-05 | 2.49E-05 | 630.25 | 0.04 | 0.02 |
| **Total** | **3.65** | **0.23** | **0.50** | **0.01** | **0.00** | **0.00** | **630.25** | **0.04** | **0.02** |
| **Composting Area** | | | | | | | | | |
| Volvo L90G Loader | 4.08 | 0.15 | 0.33 | 0.00 | 0.00 | 0.00 | 486.19 | 0.03 | 0.01 |
| Compost Screen Machine 612T | 1.87 | 0.07 | 0.15 | 0.01 | 0.01 | 0.01 | 900.35 | 0.05 | 0.02 |
| Vermeer CT820 Windrow Turner | 3.30 | 0.21 | 0.45 | 0.02 | 0.02 | 0.02 | 2,160.85 | 0.12 | 0.06 |
| **Total** | **9.26** | **0.44** | **0.93** | **0.03** | **0.03** | **0.03** | **3,547.39** | **0.20** | **0.09** |

[a] Daily Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Number Units x Operating Time [hr/day]

| | | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Equipment** | **Days/Year** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **$CO_2$** | **$CH_4$** | **$N_2O$** |
| **Anaerobic Digestion Facility Building** | | | | | | | | | | |
| Volvo L110G Loader | 208 | 759.18 | 48.31 | 103.52 | 1.21 | 0.01 | 0.01 | 1.31E+05 | 7.45 | 3.34 |
| **Total** | | **759.18** | **48.31** | **103.52** | **1.21** | **0.01** | **0.01** | **1.31E+05** | **7.45** | **3.34** |
| **Composting Area** | | | | | | | | | | |
| Volvo L90G Loader | 311 | 1,270.26 | 48.06 | 102.99 | 1.40 | 0.01 | 0.01 | 1.51E+05 | 8.59 | 3.85 |
| Compost Screen Machine 612T | 311 | 582.51 | 22.04 | 47.23 | 2.59 | 2.36 | 2.36 | 2.80E+05 | 15.91 | 7.13 |
| Vermeer CT820 Windrow Turner | 52 | 171.48 | 10.91 | 23.38 | 1.04 | 1.17 | 1.17 | 1.12E+05 | 6.38 | 2.86 |
| **Total** | | **753.99** | **32.95** | **70.61** | **3.63** | **3.53** | **3.53** | **3.92E+05** | **22.29** | **9.99** |

[a] Annual Emissions [lb/year] = Daily Emissions [lb/day] x Operating Days [days/year]

**Table 16**
**On-Site Motor Vehicle Exhaust Emissions at Tajiguas Landfill - Alternative C, MRF at SCRTS**

| Vehicle | Use | Fuel | Number | Mileage (mpg)[b] | Round-Trip Dist. (mi) | Round-Trips/Day | Miles/Day |
|---|---|---|---|---|---|---|---|
| Freightliner Tractor | Compost Export[a] | CNG | 1 | 6 | 1.5 | 4 | 6 |
| Ford F350 XL | Utility truck and trailer | Diesel | 1 | 14 | 6 | 6 | 36 |

[a] Round trips/day = 25,760 tons/yr / 311 op. days/yr / 22 tons/trip = 3.8 trips/day rounded up to 4 trips/day

[b] Mileage for Freightliner Tractor is diesel-equivalent

| Vehicle | Use | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO[a] | ROC[b] | NOx[b] | SOx[c] | PM10[b] | PM2.5[b] | $CO_2$[d] | $CH_4$[e] | $N_2O$[e,f] |
| Freightliner Tractor | Compost Export | 1.23E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Ford F350 XL | Utility truck and trailer | 1.71E-01 | 2.63E-02 | 4.69E-01 | 6.75E-03 | 4.90E-03 | 4.90E-03 | 4.93E+02 | 1.00E-03 | 2.37E-02 |

Diesel Fuel HV = 128,450 Btu/gal
Natural Gas HV = 1,020 Btu/scf
Natural Gas S = 0.5 grains/100 scf
Diesel Fuel Density = 6.943 lb/gal
Diesel Fuel Sulfur = 15 ppmw
Natural Gas $CO_2$ EF = 0.054 Kg/scf from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Freightliner tractor is 2010 and later model year standard in g/bhp-hr converted to g/mi using conversion factor from Table D-28 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[b] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[c] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g $SO_2$/g S)

Ford F350 XL calculated from (1/diesel mpg) x diesel fuel density (lb/gal) x diesel fuel sulfur (ppmw) x $10^{-6}$ x 453.6 (g/lb) x 2 (g $SO_2$/g S)

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (kg/scf) x 1,000 (g/kg)
CO2 emission factor from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[e] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[f] Emission factor for Ford F350 XL calculated as 0.3316 [g/gal] / mileage [mpg]; see: http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

| Vehicle | Use | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractor | Compost Export | 0.02 | 0.00 | 0.01 | 9.00E-05 | 3.84E-04 | 3.84E-04 | 1.50E+01 | 2.60E-02 | 2.31E-03 |
| Ford F350 XL | Utility truck and trailer | 0.01 | 0.00 | 0.04 | 5.36E-04 | 3.89E-04 | 3.89E-04 | 3.91E+01 | 7.94E-05 | 1.88E-03 |
| **Total** | | **0.03** | **0.01** | **0.04** | **0.00** | **0.00** | **0.00** | **54.12** | **0.03** | **0.00** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Days/Year | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractor | Compost Export | 311 | 5.05 | 1.52 | 1.89 | 0.03 | 0.12 | 0.12 | 4,662.46 | 8.09 | 0.72 |
| Ford F350 XL | Utility truck and trailer | 311 | 4.21 | 0.65 | 11.58 | 0.17 | 0.12 | 0.12 | 12,169.66 | 0.02 | 0.58 |
| **Total** | | | **9.26** | **2.17** | **13.47** | **0.19** | **0.24** | **0.24** | **16,832.12** | **8.11** | **1.30** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 17**
**Off-Site Motor Vehicle Exhaust Emissions to and from Tajiguas Landfill - Alternative C, MRF at SCRTS**

| Vehicle | Use | Fuel | One-Way Trips/Day | Mileage (mpg)[c] | One-Way Trip Dist. (mi) | Miles/ Day |
|---|---|---|---|---|---|---|
| Freightliner Tractors | Compost to North County[a] | CNG | 8 | 6 | 57 | 456 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous[b] | Diesel | 8 | 19 | 25 | 200 |
| Worker Commuting | From the North[d] | Gasoline | 3 | 22 | 37 | 111 |
| Worker Commuting | From the South[d] | Gasoline | 1 | 22 | 15 | 15 |

[a] Round trips/day = 25,760 tons/yr / 311 op. days/yr / 22 tons/trip = 3.8 one-way trips/day x 2 = 7.6 one-way trips/day rounded up to 8
[b] Trips/day are Mustang estimates
[c] Except for Freightliner Tractor, calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2017 by total miles in Santa Barbara County
Mileage for Freightliner Tractor is diesel-equivalent, Mustang estimate
[d] Trips/day are from Project Traffic Study

| Vehicle | Use | EMFAC Vehicle Class | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO[a,b] | ROC[a,c] | NOx[a,c] | SOx[a,d] | PM10[a,c] | PM2.5[a,c] | $CO_2$[a,e] | $CH_4$[a,f] | $N_2O$[f,g] |
| Freightliner Tractors | Compost to North County | N/A | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | LHD1 | 1.22E+00 | 2.23E-01 | 3.57E+00 | 5.02E-03 | 1.38E-01 | 8.12E-02 | 4.99E+02 | 1.22E-02 | 1.73E-02 |
| Worker Commuting | From the North | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |
| Worker Commuting | From the South | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |

Diesel Fuel HV = 128,450 Btu/gal
Natural Gas HV = 1,020 Btu/scf
Natural Gas S = 0.5 grains/100 scf
Diesel Fuel Density = 6.943 lb/gal
Diesel Fuel Sulfur = 15 ppmw
Natural Gas $CO_2$ EF = 0.054 Kg/scf from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2017 by total miles in Santa Barbara County
[b] Freightliner tractor calculated by dividing EMFAC2011 calculated total daily CO emissions from 2017 model year T7 tractors in Santa Barbara County in 2017 by total miles in Santa Barbara County
[c] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g $SO_2$/g S)
[e] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (Kg/scf) x 1,000 (g/Kg)
[f] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
[g] Emission factor for gasoline calculated from 0.0416 x NOx emission factor; emission factor for diesel calculated as 0.3316 g/gal; see: http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

| Vehicle | Use | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractors | Compost to North County | 1.17 | 0.37 | 0.46 | 0.01 | 0.03 | 0.03 | 1,139.38 | 1.98 | 0.18 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 0.54 | 0.10 | 1.57 | 0.00 | 0.06 | 0.04 | 220.21 | 0.01 | 0.01 |
| Worker Commuting | From the North | 0.85 | 0.07 | 0.09 | 0.00 | 0.01 | 0.01 | 76.18 | 0.01 | 0.00 |
| Worker Commuting | From the South | 0.11 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 10.29 | 0.00 | 0.00 |
| **Total** | | **2.67** | **0.56** | **2.14** | **0.01** | **0.10** | **0.07** | **1,446.06** | **1.99** | **0.19** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Op. Days/yr | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractors | Compost to North County | 311 | 364.69 | 115.68 | 143.82 | 2.13 | 9.07 | 9.07 | 354,346.90 | 614.66 | 54.71 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 311 | 167.22 | 30.62 | 489.43 | 0.69 | 18.90 | 11.14 | 68,483.80 | 1.67 | 2.37 |
| Worker Commuting | From the North | 311 | 263.70 | 23.30 | 27.30 | 0.29 | 3.68 | 1.60 | 23,691.27 | 1.92 | 1.14 |
| Worker Commuting | From the South | 311 | 35.63 | 3.15 | 3.69 | 0.04 | 0.50 | 0.22 | 3,201.52 | 0.26 | 0.15 |
| **Total** | | | **831.24** | **172.75** | **664.24** | **3.14** | **32.14** | **22.02** | **449,723.48** | **618.51** | **58.37** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Off-Site Motor Vehicle Fugitive PM Emissions**

**Emission Factors for Vehicles on Off-Site Paved Roads**

| Parameter | Value | Comments |
|---|---|---|
| Road silt loading (g/m$^2$) | 0.1 | CalEEMod default |
| Onroad vehicles average weight (tons) | 2.4 | CalEEMod Default for Santa Barbara County |
| PM10 emission factor (lb/mile) | 6.61E-04 | 0.0022 x (silt loading [g/m$^2$])$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |
| PM2.5 emission factor (lb/mile) | 1.62E-04 | 0.00054 x (silt loading [g/m$^2$])$^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |

| Vehicle | Use | Miles/ Day | Op. Days/yr | Daily Emissions (lb/day)[a] | | Annual Emissions (lb/year)[b] | |
|---|---|---|---|---|---|---|---|
| | | | | PM10 | PM2.5 | PM10 | PM2.5 |
| Freightliner Tractors | Compost to North County | 456 | 311 | 0.30 | 0.07 | 93.75 | 23.01 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 200 | 311 | 0.13 | 0.03 | 41.12 | 10.09 |
| Worker Commuting | From the North | 111 | 311 | 0.07 | 0.02 | 22.82 | 5.60 |
| Worker Commuting | From the South | 15 | 311 | 0.01 | 0.00 | 3.08 | 0.76 |
| **Total** | | | | **0.52** | **0.13** | **160.77** | **39.46** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]
[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 18**
**On-Site Fugitive PM Emissions at Tajiguas Landfill - Alternative C, MRF at SCRTS**

**On-Site Motor Vehicle Fugitive PM Emissions without CSSR**

| Vehicle | Use | Weight (tons)[a] | Miles/Day | Annual Op. (Days/year) | Emission Factors (lb/mi)[b] | | Control Efficiency (%)[c] | Emissions (lb/day)[d] | | Emissions (lb/year)[e] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PM10 | PM2.5 | | PM10 | PM2.5 | PM10 | PM2.5 |
| Freightliner Tractor | Compost Export | 13.75 | 6 | 311 | 1.69 | 0.17 | 86 | 1.42 | 0.14 | 441.53 | 44.15 |
| Ford F350 XL | Utility truck and trailer | 7 | 36 | 311 | 1.25 | 0.12 | 86 | 6.29 | 0.63 | 1,955.11 | 195.51 |

[a] Freightliner tractor + trailer = average of 40,000 lbs loaded and 15,000 lbs empty.
Ford F350 XL based on specification of 14,000 lbs gross vehicle weight rating

[b] Emission factor [lb/mi] = k x (silt content [%] / 12)$^{0.9}$ (weight [tons] / 3)$^{0.45}$
from AP-42, Section 13.2.2 (Unpaved Roads), Equation 1a (11/06)
k = 1.5 for PM10
0.15 for PM2.5
silt content = 6.4 % from AP-42, Section 13.2.2 (Unpaved Roads), Table 13.2.2-1 (11/06)

[c] Based on hourly watering at 0.18 gal/sq. yd. and 15 mph speed limit, from Appendix E.7, page 3, of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5.

[d] Emissions [lb/day] = Emission factor [lb/mi] x Miles/day x (1- control efficiency [%] / 100)

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

**Material Transfers**

| Material | Transfer | Moisture (%)[a] | Daily Amount (tons)[b] | Annual Op. (Days/year) | Emission Factors (lb/ton)[c] | | Emissions (lb/day)[d, f] | | Emissions (lb/year)[e] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| Digestate | Into Screen | 50 | 288 | 208 | 1.71E-04 | 2.58E-05 | 4.92E-05 | 7.46E-06 | 0.01 | 0.00 |
| Digestate | Out of Screen | 50 | 288 | 208 | 1.71E-04 | 2.58E-05 | 4.92E-05 | 7.46E-06 | 0.01 | 0.00 |
| Digestate | Into Truck | 50 | 288 | 208 | 1.71E-04 | 2.58E-05 | 4.92E-05 | 7.46E-06 | 0.01 | 0.00 |
| Digestate | Onto Windrow | 50 | 288 | 208 | 1.71E-04 | 2.58E-05 | 4.92E-02 | 7.46E-03 | 10.24 | 1.55 |
| Windrow | Windrow turning | 40 | 15,363 | 52 | 2.33E-04 | 3.53E-05 | 3.58E+00 | 5.43E-01 | 186.38 | 28.22 |
| Compost | Into Screen | 40 | 83 | 311 | 2.33E-04 | 3.53E-05 | 1.93E-02 | 2.93E-03 | 6.01 | 0.91 |
| Compost | Out of Screen | 40 | 83 | 311 | 2.33E-04 | 3.53E-05 | 1.93E-02 | 2.93E-03 | 6.01 | 0.91 |
| Compost | Onto Storage Pile | 40 | 83 | 311 | 2.33E-04 | 3.53E-05 | 1.93E-02 | 2.93E-03 | 6.01 | 0.91 |
| Compost | Into Export Truck | 40 | 83 | 311 | 2.33E-04 | 3.53E-05 | 1.93E-02 | 2.93E-03 | 6.01 | 0.91 |
| MSW | Into AD Facility | 28 | 240 | 311 | 3.84E-04 | 5.82E-05 | 9.23E-05 | 1.40E-05 | 0.03 | 0.00 |

[a] Typical amount for digestate from Project Description; lower end of range for compost;
value for MSW from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project,
Santa Barbara County No. 01-EIR-5 used for MSW, and MRF and digestate residuals

[b] For digestate, 60,000 tpy / 208 op. days/yr; for windrow turning, 15,363 tons / op. day;
for compost, 25,760 tpy / 311 op. days/yr

[c] Emission factor [lb/ton] = k x 0.0032 x (wind speed [mph] / 5)$^{1.3}$ / (material moisture [%] /2 )$^{1.4}$
from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06)
k = 0.35 for PM10
0.053 for PM2.5
Wind speed = 5.47 mph, from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[d] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

[f] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

**Screening**

| Material | Daily Amount (tons)[a] | Annual Op. (Days/year) | Emission Factors (lb/ton)[b] | | Emissions (lb/day)[c, e] | | Emissions (lb/year)[d] | |
|---|---|---|---|---|---|---|---|---|
| | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| Digestate | 288 | 208 | 0.00074 | 0.00005 | 2.13E-03 | 1.44E-04 | 4.44E-01 | 3.00E-02 |
| Compost | 83 | 311 | 0.00074 | 0.00005 | 6.13E-02 | 4.14E-03 | 1.91E+01 | 1.29E+00 |

[a] For digestate, 60,000 tpy / 208 op. days/yr; for compost, 25,760 tpy / 311 op. days/yr

[b] From AP-42, Section 11.19, Crushed Stone Processing and Pulverized Mineral Processing (08/04),
Table 11.19.2-2 for controlled screening

[c] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

[e] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

**Chipper/Grinder**

| Material | Hourly Amount (tph) | Operating Time (hr/day) | Annual Op. (Days/year) | Emission Factors (lb/ton)[a] | | Emissions (lb/hr)[b] | | Emissions (lb/day)[c] | | Emissions (lb/year)[d] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| Wood | 45.5 | 1.5 | 311 | 0.0144 | 0.0144 | 0.66 | 0.66 | 0.98 | 0.98 | 305.65 | 305.65 |

[a] From Bay Area Air Quality Management District Permit Handbook, Section 11.3,
http://hank.baaqmd.gov/pmt/handbook/rev02/PH_00_05_11_13.pdf. PM2.5 assumed to be equal to PM10.

[b] Emissions [lb/hr] = Emission factor [lb/ton] x Hourly amount [tph]

[c] Emissions [lb/day] = Hourly emissions [lb/hr] x Daily operating time [hr/day]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

**Table 19**
**Windrow ROC Emissions - Alternative C, MRF at SCRTS**

| Item | Value | Comment |
|---|---|---|
| Digestate production (ton/yr) | 73,590 | AD design capacity |
| Digestate production (ton/day) | 201.62 | Annual / 365 days/year |
| Fraction food waste | 0.682 | Mustang estimate |
| Fraction green waste | 0.232 | Mustang estimate |
| Digestate from food waste (ton/day) | 137.50 | |
| Digestate from green waste (ton/day) | 46.78 | |
| Food waste EF (lb VOC/ton) | 37.1 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Green waste EF (lb VOC/ton) | 5.71 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| VOC from food waste (lb/day) | 5,101.34 | |
| VOC from green waste (lb/day) | 267.09 | |
| Total VOC (lb/day) | 5,368 | |
| Reduction from digestion process | 0.97 | See note b |
| VOC after reduction from digestion (lb/day) | 161.05 | |
| Reduction from Best Available Control Technologies | 0.90 | See note c |
| VOC after BMP reductions (lb/day) | 16.11 | |
| VOC after BMP reductions (lb/hour) | 0.67 | Daily / 24 hours/day |
| VOC after BMP reductions (lb/yr) | 5,878 | |

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at:
http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

[b] From Bay Area Air Quality Management District engineering evaluation for Zero Waste Energy proposed anaerobic digestion facility

[c] Best Available Control Technologies:
1. 40% inert, dry wood chip blending
2. Interactive pile management (i.e., turning)
3. 20 minutes irrigation after turning
4. Large pile size
5. Finished compost blanket pseudo biofilter

References for emission reductions include:
Advice from Bekon based on 20 facilities operating in Europe
***Comparison of Mitugation Measures for Reduction of Emissions from Greenwaste Composting*** prepared from SJVAPCD 2009:
http://valleyair.org/busind/pto/emission_factors/Criteria/Criteria/Composting/FINAL-COMPOST-STUDY-REPORT.pdf
***Greenwaste Compost Air Emissions Review*** (Modesto Compost Facility) prepared fror CIWMB June 2008:
http://www.calrecycle.ca.gov/publications/Documents/Organics%5C44207009.pdf
***Greenwaste Compost Site Emissions Reductions*** Prepared for San Joaquin Valley Technology Advancement Program May 2013:
http://www.valleyair.org/grant_programs/TAP/documents/C-15636-ACP/C-15636_ACP_FinalReport.pdf

**Table 20**
**AD Fugitive ROC Emissions**

| Item | Value | Comment |
|---|---|---|
| Digestate production (ton/yr) | 73,590 | AD design capacity |
| Digestate production (ton/day) | 201.62 | Annual / 365 days/year |
| Fraction food waste | 0.682 | Mustang estimate |
| Fraction green waste | 0.232 | Mustang estimate |
| Digestate from food waste (ton/day) | 137.50 | |
| Digestate from green waste (ton/day) | 46.78 | |
| Food waste EF (lb VOC/ton-composting cycle) | 37.1 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Green waste EF (lb VOC/ton-composting cycle) | 5.71 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Food waste EF (lb VOC/ton-day) | 0.618 | For one day of 60-day composting cycle |
| Green waste EF (lb VOC/ton-day) | 0.095 | For one day of 60-day composting cycle |
| VOC from food waste (lb/day) | 85.02 | |
| VOC from green waste (lb/day) | 4.45 | |
| Total VOC (lb/day) | 89 | |
| Reduction from biofilter | 0.95 | |
| VOC after biofilter (lb/day) | 4.47 | |
| VOC after biofilter (lb/hour) | 0.19 | Daily / 24 hours/day |
| VOC after biofilter (lb/yr) | 1,633 | |

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at:
http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

**Table 21**
**Motor Vehicle Emission Factors in Santa Barbara County for 2017**

| | | | Emission Factors (g/mi)[a] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Vehicle Class** | **Fuel** | | **CO** | **ROG** | **NOx** | **SOx** | **PM10** | **PM2.5** | **$CO_2$** | **TOG** | **$CH_4$** | **$N_2O$** | **Mileage (mpg)** |
| LDA | GAS | LDAGAS | 1.48E+00 | 1.31E-01 | 1.48E-01 | 3.26E-03 | 4.68E-02 | 1.97E-02 | 2.51E+02 | 1.45E-01 | 1.31E-02 | 6.14E-03 | 26.09 |
| LDA | DSL | LDADSL | 1.55E-01 | 2.65E-02 | 4.71E-01 | 3.31E-03 | 6.34E-02 | 3.49E-02 | 2.71E+02 | 3.01E-02 | 1.45E-03 | 1.14E-02 | 29.10 |
| LDT1 | GAS | LDT1GAS | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 3.33E-01 | 2.52E-02 | 1.49E-02 | 22.32 |
| LDT1 | DSL | LDT1DSL | 2.53E-01 | 5.47E-02 | 6.14E-01 | 3.38E-03 | 8.97E-02 | 5.91E-02 | 2.78E+02 | 6.23E-02 | 2.99E-03 | 1.16E-02 | 28.49 |
| LDT2 | GAS | LDT2GAS | 2.46E+00 | 2.27E-01 | 3.47E-01 | 4.46E-03 | 4.73E-02 | 2.01E-02 | 3.69E+02 | 2.49E-01 | 2.11E-02 | 1.44E-02 | 19.08 |
| LDT2 | DSL | LDT2DSL | 1.81E-01 | 3.17E-02 | 5.51E-01 | 3.32E-03 | 6.82E-02 | 3.94E-02 | 2.82E+02 | 3.60E-02 | 1.73E-03 | 1.14E-02 | 28.99 |
| LHD1 | GAS | LHD1GAS | 5.86E+00 | 7.03E-01 | 1.13E+00 | 1.00E-02 | 4.85E-02 | 2.12E-02 | 9.44E+02 | 7.56E-01 | 4.55E-02 | 4.70E-02 | 8.48 |
| LHD1 | DSL | LHD1DSL | 1.22E+00 | 2.23E-01 | 3.57E+00 | 5.02E-03 | 1.38E-01 | 8.12E-02 | 4.99E+02 | 2.54E-01 | 1.22E-02 | 1.73E-02 | 19.17 |
| LHD2 | GAS | LHD2GAS | 3.94E+00 | 5.03E-01 | 9.78E-01 | 9.99E-03 | 4.73E-02 | 2.01E-02 | 9.44E+02 | 5.43E-01 | 4.03E-02 | 4.07E-02 | 8.51 |
| LHD2 | DSL | LHD2DSL | 1.16E+00 | 2.07E-01 | 3.36E+00 | 5.02E-03 | 1.47E-01 | 8.38E-02 | 4.99E+02 | 2.36E-01 | 1.13E-02 | 1.73E-02 | 19.19 |
| MCY | GAS | MCYGAS | 2.85E+01 | 3.62E+00 | 1.35E+00 | 2.17E-03 | 4.55E-02 | 1.84E-02 | 1.55E+02 | 3.90E+00 | 2.41E-01 | 5.61E-02 | 39.15 |
| MDV | GAS | MDVGAS | 3.37E+00 | 2.87E-01 | 5.08E-01 | 5.66E-03 | 4.73E-02 | 2.01E-02 | 4.85E+02 | 3.20E-01 | 3.14E-02 | 2.11E-02 | 15.03 |
| MDV | DSL | MDVDSL | 1.47E-01 | 2.63E-02 | 4.04E-01 | 3.32E-03 | 6.53E-02 | 3.66E-02 | 2.94E+02 | 2.99E-02 | 1.43E-03 | 1.14E-02 | 29.00 |
| MH | GAS | MHGAS | 5.38E+00 | 2.11E-01 | 8.76E-01 | 6.86E-03 | 4.71E-02 | 1.99E-02 | 6.44E+02 | 2.48E-01 | 2.33E-02 | 3.64E-02 | 12.41 |
| MH | DSL | MHDSL | 7.31E-01 | 2.32E-01 | 7.05E+00 | 1.15E-02 | 3.36E-01 | 2.37E-01 | 1.14E+03 | 2.64E-01 | 1.27E-02 | 3.95E-02 | 8.40 |
| Motor Coach | DSL | Motor Coa | 1.31E+00 | 2.74E-01 | 6.55E+00 | 1.74E-02 | 2.16E-01 | 1.27E-01 | 1.73E+03 | 3.12E-01 | 1.50E-02 | 6.00E-02 | 5.52 |
| OBUS | GAS | OBUSGAS | 1.62E+01 | 1.21E+00 | 2.87E+00 | 7.40E-03 | 4.65E-02 | 1.93E-02 | 6.77E+02 | 1.29E+00 | 8.25E-02 | 1.19E-01 | 11.49 |
| PTO | DSL | PTODSL | 7.94E-01 | 2.26E-01 | 9.79E+00 | 2.05E-02 | 6.43E-02 | 5.92E-02 | 2.05E+03 | 2.58E-01 | 1.24E-02 | 7.08E-02 | 4.68 |
| SBUS | GAS | SBUSGAS | 7.34E+00 | 6.16E-01 | 1.05E+00 | 7.64E-03 | 4.68E-02 | 1.96E-02 | 7.14E+02 | 6.70E-01 | 1.01E-01 | 4.37E-02 | 11.14 |
| SBUS | DSL | SBUSDSL | 8.65E-01 | 2.48E-01 | 1.18E+01 | 1.34E-02 | 8.77E-01 | 4.33E-01 | 1.33E+03 | 2.82E-01 | 1.35E-02 | 4.61E-02 | 7.20 |
| T6 Ag | DSL | T6 AgDSL | 1.07E+00 | 3.24E-01 | 4.79E+00 | 1.15E-02 | 3.11E-01 | 2.14E-01 | 1.15E+03 | 3.69E-01 | 1.77E-02 | 3.97E-02 | 8.36 |
| T6 Public | DSL | T6 PublicD | 3.34E-01 | 8.46E-02 | 6.51E+00 | 1.18E-02 | 1.81E-01 | 9.45E-02 | 1.18E+03 | 9.63E-02 | 4.62E-03 | 4.07E-02 | 8.15 |
| T6 CAIRP heavy | DSL | T6 CAIRP | 4.46E-01 | 1.22E-01 | 3.30E+00 | 1.14E-02 | 1.85E-01 | 9.85E-02 | 1.13E+03 | 1.39E-01 | 6.69E-03 | 3.92E-02 | 8.45 |
| T6 CAIRP small | DSL | T6 CAIRP | 5.60E-01 | 1.54E-01 | 1.93E+00 | 1.13E-02 | 2.10E-01 | 1.22E-01 | 1.13E+03 | 1.76E-01 | 8.43E-03 | 3.90E-02 | 8.51 |
| T6 OOS heavy | DSL | T6 OOS he | 4.46E-01 | 1.22E-01 | 3.30E+00 | 1.14E-02 | 1.85E-01 | 9.85E-02 | 1.13E+03 | 1.39E-01 | 6.69E-03 | 3.92E-02 | 8.45 |
| T6 OOS small | DSL | T6 OOS sr | 5.60E-01 | 1.54E-01 | 1.93E+00 | 1.13E-02 | 2.10E-01 | 1.22E-01 | 1.13E+03 | 1.76E-01 | 8.43E-03 | 3.90E-02 | 8.51 |
| T6 instate construction heavy | DSL | T6 instate | 4.61E-01 | 1.31E-01 | 6.42E+00 | 1.15E-02 | 1.96E-01 | 1.09E-01 | 1.15E+03 | 1.49E-01 | 7.17E-03 | 3.97E-02 | 8.35 |
| T6 instate construction small | DSL | T6 instate | 8.12E-01 | 2.31E-01 | 3.47E+00 | 1.14E-02 | 2.70E-01 | 1.76E-01 | 1.13E+03 | 2.63E-01 | 1.26E-02 | 3.92E-02 | 8.47 |
| T6 instate heavy | DSL | T6 instate | 4.62E-01 | 1.30E-01 | 5.77E+00 | 1.15E-02 | 1.95E-01 | 1.07E-01 | 1.14E+03 | 1.48E-01 | 7.12E-03 | 3.96E-02 | 8.37 |
| T6 instate small | DSL | T6 instate | 7.62E-01 | 2.16E-01 | 3.16E+00 | 1.13E-02 | 2.59E-01 | 1.66E-01 | 1.13E+03 | 2.46E-01 | 1.18E-02 | 3.91E-02 | 8.48 |
| T6 utility | DSL | T6 utilityDS | 3.86E-01 | 9.17E-02 | 3.53E+00 | 1.17E-02 | 1.74E-01 | 8.79E-02 | 1.16E+03 | 1.04E-01 | 5.01E-03 | 4.03E-02 | 8.24 |
| T6TS | GAS | T6TSGAS | 1.29E+01 | 1.02E+00 | 1.95E+00 | 7.24E-03 | 4.70E-02 | 1.98E-02 | 6.67E+02 | 1.09E+00 | 5.04E-02 | 8.10E-02 | 11.76 |
| T7 Ag | DSL | T7 AgDSL | 1.86E+00 | 4.07E-01 | 8.81E+00 | 1.71E-02 | 2.86E-01 | 2.08E-01 | 1.71E+03 | 4.63E-01 | 2.22E-02 | 5.91E-02 | 5.61 |
| T7 CAIRP | DSL | T7 CAIRPI | 1.74E+00 | 3.60E-01 | 4.50E+00 | 1.76E-02 | 1.81E-01 | 1.12E-01 | 1.75E+03 | 4.10E-01 | 1.97E-02 | 6.06E-02 | 5.47 |
| T7 CAIRP construction | DSL | T7 CAIRP | 1.74E+00 | 3.60E-01 | 4.65E+00 | 1.76E-02 | 1.81E-01 | 1.12E-01 | 1.75E+03 | 4.10E-01 | 1.97E-02 | 6.06E-02 | 5.47 |
| T7 NNOOS | DSL | T7 NNOOS | 1.68E+00 | 3.39E-01 | 2.95E+00 | 1.77E-02 | 1.63E-01 | 9.53E-02 | 1.76E+03 | 3.86E-01 | 1.85E-02 | 6.10E-02 | 5.44 |
| T7 NOOS | DSL | T7 NOOSI | 1.89E+00 | 3.87E-01 | 4.66E+00 | 1.78E-02 | 1.82E-01 | 1.13E-01 | 1.78E+03 | 4.41E-01 | 2.12E-02 | 6.15E-02 | 5.39 |
| T7 other port | DSL | T7 other p | 2.45E+00 | 5.29E-01 | 7.87E+00 | 1.73E-02 | 2.09E-01 | 1.38E-01 | 1.72E+03 | 6.02E-01 | 2.89E-02 | 5.96E-02 | 5.56 |
| T7 POLA | DSL | T7 POLAD | 2.62E+00 | 5.58E-01 | 7.87E+00 | 1.76E-02 | 2.09E-01 | 1.38E-01 | 1.75E+03 | 6.36E-01 | 3.05E-02 | 6.07E-02 | 5.46 |
| T7 Public | DSL | T7 PublicD | 1.38E+00 | 2.76E-01 | 1.54E+01 | 2.01E-02 | 1.67E-01 | 9.92E-02 | 2.00E+03 | 3.14E-01 | 1.51E-02 | 6.93E-02 | 4.79 |
| T7 Single | DSL | T7 SingleD | 8.53E-01 | 1.83E-01 | 8.92E+00 | 1.71E-02 | 1.59E-01 | 9.17E-02 | 1.70E+03 | 2.08E-01 | 1.00E-02 | 5.90E-02 | 5.62 |
| T7 single construction | DSL | T7 single c | 8.46E-01 | 1.82E-01 | 9.18E+00 | 1.71E-02 | 1.59E-01 | 9.21E-02 | 1.70E+03 | 2.07E-01 | 9.93E-03 | 5.90E-02 | 5.62 |
| T7 SWCV | DSL | T7 SWCVI | 1.05E+00 | 2.13E-01 | 1.23E+01 | 1.84E-02 | 1.61E-01 | 9.40E-02 | 1.83E+03 | 2.43E-01 | 1.17E-02 | 6.33E-02 | 5.24 |
| T7 tractor | DSL | T7 tractorD | 1.16E+00 | 2.53E-01 | 6.95E+00 | 1.69E-02 | 1.80E-01 | 1.11E-01 | 1.68E+03 | 2.88E-01 | 1.38E-02 | 5.81E-02 | 5.71 |
| T7 tractor construction | DSL | T7 tractor | 1.25E+00 | 2.69E-01 | 7.90E+00 | 1.71E-02 | 1.81E-01 | 1.12E-01 | 1.70E+03 | 3.06E-01 | 1.47E-02 | 5.90E-02 | 5.62 |
| T7 utility | DSL | T7 utilityDS | 1.90E+00 | 3.60E-01 | 9.58E+00 | 1.99E-02 | 1.48E-01 | 8.14E-02 | 1.98E+03 | 4.10E-01 | 1.97E-02 | 6.86E-02 | 4.83 |
| T7IS | GAS | T7ISGAS | 4.33E+01 | 1.28E+00 | 5.91E+00 | 6.63E-03 | 4.58E-02 | 1.87E-02 | 5.63E+02 | 1.45E+00 | 1.01E-01 | 2.46E-01 | 12.82 |
| UBUS | GAS | UBUSGAS | 1.85E+01 | 3.27E+00 | 4.52E+00 | 7.86E-03 | 4.83E-02 | 2.11E-02 | 7.11E+02 | 3.48E+00 | 1.30E-01 | 1.88E-01 | 10.83 |
| UBUS | DSL | UBUSDSL | 2.17E+00 | 4.67E-01 | 1.26E+01 | 2.36E-02 | 1.08E+00 | 5.78E-01 | 2.35E+03 | 5.32E-01 | 2.55E-02 | 8.14E-02 | 4.07 |
| All Other Buses | DSL | All Other B | 5.08E-01 | 1.42E-01 | 5.35E+00 | 1.15E-02 | 1.98E-01 | 1.10E-01 | 1.14E+03 | 1.62E-01 | 7.78E-03 | 3.95E-02 | 8.39 |

[a] CO, ROC NOx, $SO_2$, PM10, PM2.5, TOG and $CO_2$ calculated by dividing total daily emissions in Santa Barbara County for 2017 by total miles, and mileage calculated by dividing total daily fuel use by total miles from EMFAC2011 online data (http://www.arb.ca.gov/emfac/). $CH_4$ for gasoline-fueled vehicles calculated by dividing total daily emissions in Santa Barbara County for 2017 by total miles calculated with EMFAC2011-LDV (http://www.arb.ca.gov/msei/emfac2011_ldv.htm). $CH_4$ for diesel-fueled vehciles calculated as 0.048 x TOG (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07). $N_2O$ for gasoline-fueled vehicles calculated as 0.046 x NOx, and $N_2O$ for diesel-fueled vehicles calculated as 0.3316 grams/gallon (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07)

# Attachment H

# Emission Calculations for Alternative D

**Table 1**
**Criteria Pollutant Daily Emissions Summary without CSSR**

| Source | Emissions (lb/day) | | | | | |
|---|---|---|---|---|---|---|
| | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| **Onsite** | | | | | | |
| **Engel and Gray Facility** | | | | | | |
| Onsite Equipment | N/A[a] | 1.40 | 7.59 | N/A[a] | N/A[a] | N/A[a] |
| Windrow ROC | | 5,101.34 | | | | |
| **Total** | **N/A[a]** | **5,102.74** | **7.59** | **N/A[a]** | **N/A[a]** | **N/A[a]** |
| **Tajiguas Landfill** | | | | | | |
| MRF Facility Equipment | 43.69 | 2.15 | 14.77 | 0.08 | 0.00 | 0.00 |
| Diesel Fuel Storage Tank | | 0.02 | | | | |
| Material Handling Fugitive PM | | | | | 0.00 | 0.00 |
| Motor Vehicle Fugitive PM | | | | | 7.23 | 0.72 |
| Motor Vehicle Exhaust | 0.09 | 0.03 | 0.07 | 0.00 | 0.00 | 0.00 |
| **Total** | **43.78** | **2.20** | **14.84** | **0.08** | **7.24** | **0.73** |
| **Onsite Total** | **43.78** | **5,104.93** | **22.42** | **0.08** | **7.24** | **0.73** |
| | | | | | | |
| **Offsite** | | | | | | |
| **Engel and Gray Facility** | | | | | | |
| Motor Vehicle Exhaust | N/A[a] | 0.32 | 0.90 | N/A[a] | N/A[a] | N/A[a] |
| Motor Vehicle Fugitive PM | | | | | N/A[a] | N/A[a] |
| **Total** | **N/A[a]** | **0.32** | **0.90** | **N/A[a]** | **N/A[a]** | **N/A[a]** |
| **Tajiguas Landfill** | | | | | | |
| Motor Vehicle Exhaust | 25.36 | 4.78 | 28.62 | 0.12 | 1.03 | 0.69 |
| Motor Vehicle Fugitive PM | | | | | 4.41 | 1.08 |
| **Total** | **25.36** | **4.78** | **28.62** | **0.12** | **5.44** | **1.77** |
| **Offsite Total** | **25.36** | **5.09** | **29.52** | **0.12** | **5.44** | **1.77** |
| | | | | | | |
| **Total** | **69.13** | **5,110.03** | **51.94** | **0.20** | **12.68** | **2.49** |

[a] Estimate is not available

**Table 2**
**Criteria Pollutant Annual Emissions Summary without CSSR**

| Source | Emissions (ton/year) | | | | | |
|---|---|---|---|---|---|---|
| | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** |
| **Onsite** | | | | | | |
| **Engel and Gray Facility** | | | | | | |
| Onsite Equipment | N/A[a] | 0.25 | 1.38 | N/A[a] | N/A[a] | N/A[a] |
| Windrow ROC | | 979.74 | | | | |
| **Total** | **N/A[a]** | **979.99** | **1.38** | **N/A[a]** | **N/A[a]** | **N/A[a]** |
| **Tajiguas Landfill** | | | | | | |
| MRF Facility Equipment | 6.79 | 0.33 | 2.30 | 0.01 | 0.00 | 0.00 |
| Diesel Fuel Storage Tank | | 0.00 | | | | |
| Material Handling Fugitive PM | | | | | 0.00 | 0.00 |
| Motor Vehicle Fugitive PM | | | | | 1.12 | 0.11 |
| Motor Vehicle Exhaust | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| **Total** | **6.81** | **0.34** | **2.31** | **0.01** | **1.13** | **0.11** |
| **Onsite Total** | **6.81** | **980.33** | **3.69** | **0.01** | **1.13** | **0.11** |
| | | | | | | |
| **Offsite** | | | | | | |
| **Engel and Gray Facility** | | | | | | |
| Motor Vehicle Exhaust | N/A[a] | 0.06 | 0.16 | N/A[a] | N/A[a] | N/A[a] |
| Motor Vehicle Fugitive PM | | | | | N/A[a] | N/A[a] |
| **Total** | **N/A[a]** | **0.06** | **0.16** | **N/A[a]** | **N/A[a]** | **N/A[a]** |
| **Tajiguas Landfill** | | | | | | |
| Motor Vehicle Exhaust | 3.94 | 0.74 | 4.45 | 0.02 | 0.16 | 0.11 |
| Motor Vehicle Fugitive PM | | | | | 0.69 | 0.17 |
| **Total** | **3.94** | **0.74** | **4.45** | **0.02** | **0.85** | **0.28** |
| **Offsite Total** | **3.94** | **0.80** | **4.61** | **0.02** | **0.85** | **0.28** |
| | | | | | | |
| **Total** | **10.75** | **981.13** | **8.31** | **0.03** | **1.97** | **0.39** |

[a] Estimate is not available

**Table 3**
**Criteria Pollutant Daily Emissions Summary with CSSR**

| Source | Emissions (lb/day) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| **Onsite** | | | | | | |
| **Engel and Gray Facility** | | | | | | |
| Onsite Equipment | N/A[a] | 1.40 | 7.59 | N/A[a] | N/A[a] | N/A[a] |
| Windrow ROC | | 5,101.34 | | | | |
| **Total** | **N/A[a]** | **5,102.74** | **7.59** | **N/A[a]** | **N/A[a]** | **N/A[a]** |
| **Tajiguas Landfill** | | | | | | |
| MRF Facility Equipment | 43.69 | 2.15 | 14.77 | 0.08 | 0.00 | 0.00 |
| Diesel Fuel Storage Tank | | 0.02 | | | | |
| Material Handling Fugitive PM | | | | | 0.00 | 0.00 |
| Motor Vehicle Fugitive PM | | | | | 10.93 | 1.09 |
| Motor Vehicle Exhaust | 0.13 | 0.04 | 0.13 | 0.00 | 0.00 | 0.00 |
| **Total** | **43.82** | **2.21** | **14.91** | **0.08** | **10.93** | **1.10** |
| **Onsite Total** | **43.82** | **5,104.95** | **22.49** | **0.08** | **10.93** | **1.10** |
| | | | | | | |
| **Offsite** | | | | | | |
| **Engel and Gray Facility** | | | | | | |
| Motor Vehicle Exhaust | N/A[a] | 0.32 | 0.90 | N/A[a] | N/A[a] | N/A[a] |
| Motor Vehicle Fugitive PM | | | | | N/A[a] | N/A[a] |
| **Total** | **N/A[a]** | **0.32** | **0.90** | **N/A[a]** | **N/A[a]** | **N/A[a]** |
| **Tajiguas Landfill** | | | | | | |
| Motor Vehicle Exhaust | 32.03 | 5.97 | 29.35 | 0.14 | 1.13 | 0.76 |
| Motor Vehicle Fugitive PM | | | | | 5.42 | 1.33 |
| **Total** | **32.03** | **5.97** | **29.35** | **0.14** | **6.54** | **2.09** |
| **Offsite Total** | **32.03** | **6.29** | **30.25** | **0.14** | **6.54** | **2.09** |
| | | | | | | |
| **Total** | **75.85** | **5,111.24** | **52.74** | **0.22** | **17.47** | **3.19** |

[a] Estimate is not available

**Table 4**
**Criteria Pollutant Annual Emissions Summary with CSSR**

| Source | Emissions (ton/year) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| **Onsite** | | | | | | |
| **Engel and Gray Facility** | | | | | | |
| Onsite Equipment | N/A[a] | 0.25 | 1.38 | N/A[a] | N/A[a] | N/A[a] |
| Windrow ROC | | 979.74 | | | | |
| **Total** | **N/A[a]** | **979.99** | **1.38** | **N/A[a]** | **N/A[a]** | **N/A[a]** |
| **Tajiguas Landfill** | | | | | | |
| MRF Facility Equipment | 6.79 | 0.33 | 2.30 | 0.01 | 0.00 | 0.00 |
| Diesel Fuel Storage Tank | | 0.00 | | | | |
| Material Handling Fugitive PM | | | | | 0.00 | 0.00 |
| Motor Vehicle Fugitive PM | | | | | 1.70 | 0.17 |
| Motor Vehicle Exhaust | 0.02 | 0.01 | 0.02 | 0.00 | 0.00 | 0.00 |
| **Total** | **6.81** | **0.34** | **2.32** | **0.01** | **1.70** | **0.17** |
| **Onsite Total** | **6.81** | **980.34** | **3.70** | **0.01** | **1.70** | **0.17** |
| | | | | | | |
| **Offsite** | | | | | | |
| **Engel and Gray Facility** | | | | | | |
| Motor Vehicle Exhaust | N/A[a] | 0.06 | 0.16 | N/A[a] | N/A[a] | N/A[a] |
| Motor Vehicle Fugitive PM | | | | | N/A[a] | N/A[a] |
| **Total** | **N/A[a]** | **0.06** | **0.16** | **N/A[a]** | **N/A[a]** | **N/A[a]** |
| **Tajiguas Landfill** | | | | | | |
| Motor Vehicle Exhaust | 4.98 | 0.93 | 4.56 | 0.02 | 0.17 | 0.12 |
| Motor Vehicle Fugitive PM | | | | | 0.84 | 0.21 |
| **Total** | **4.98** | **0.93** | **4.56** | **0.02** | **1.02** | **0.33** |
| **Offsite Total** | **4.98** | **0.99** | **4.73** | **0.02** | **1.02** | **0.33** |
| | | | | | | |
| **Total** | **11.79** | **981.32** | **8.43** | **0.03** | **2.72** | **0.50** |

[a] Estimate is not available

**Table 5**
**Greenhouse Gas Annual Emissions Summary without CSSR**

| Source | Emissions (MT/year)[a] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[b] |
| **Onsite** | | | | |
| **Engel and Gray Facility** | | | | |
| Onsite Equipment | N/A[c] | N/A[c] | N/A[c] | N/A[c] |
| **Total** | **N/A[c]** | **N/A[c]** | **N/A[c]** | **N/A[c]** |
| **Tajiguas Landfill** | | | | |
| MRF Facility Equipment | 1,229.48 | 0.07 | 0.03 | 1,240.56 |
| Motor Vehicle Exhaust | 15.74 | 0.02 | 0.00 | 16.73 |
| **Total** | **1,245.22** | **0.09** | **0.03** | **1,257.29** |
| **Onsite Total** | **1,245.22** | **0.09** | **0.03** | **1,257.29** |
| | | | | |
| **Offsite** | | | | |
| **Engel and Gray Facility** | | | | |
| Motor Vehicle Exhaust | N/A[c] | N/A[c] | N/A[c] | N/A[c] |
| **Total** | **N/A[c]** | **N/A[c]** | **N/A[c]** | **N/A[c]** |
| **Tajiguas Landfill** | | | | |
| Motor Vehicle Exhaust | 2,147.73 | 2.10 | 0.22 | 2,265.92 |
| **Total** | **2,147.73** | **2.10** | **0.22** | **2,265.92** |
| **Offsite Total** | **2,147.73** | **2.10** | **0.22** | **2,265.92** |
| | | | | |
| **Total** | **3,392.95** | **2.19** | **0.25** | **3,523.21** |

[a] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[b] $CO_2e$ = CO2-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

[c] Estimate is not available

**Table 6**
**Greenhouse Gas Annual Emissions Summary with CSSR**

| Source | Emissions (MT/year)[a] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[b] |
| **Onsite** | | | | |
| **Engel and Gray Facility** | | | | |
| Onsite Equipment | N/A[c] | N/A[c] | N/A[c] | N/A[c] |
| **Total** | **N/A[c]** | **N/A[c]** | **N/A[c]** | **N/A[c]** |
| **Tajiguas Landfill** | | | | |
| MRF Facility Equipment | 1,229.48 | 0.07 | 0.03 | 1,240.56 |
| Motor Vehicle Exhaust | 28.11 | 0.02 | 0.00 | 29.19 |
| **Total** | **1,257.59** | **0.09** | **0.03** | **1,269.74** |
| **Onsite Total** | **1,257.59** | **0.09** | **0.03** | **1,269.74** |
| | | | | |
| **Offsite** | | | | |
| **Engel and Gray Facility** | | | | |
| Motor Vehicle Exhaust | N/A[c] | N/A[c] | N/A[c] | N/A[c] |
| **Total** | **N/A[c]** | **N/A[c]** | **N/A[c]** | **N/A[c]** |
| **Tajiguas Landfill** | | | | |
| Motor Vehicle Exhaust | 2,563.11 | 2.76 | 0.28 | 2,715.77 |
| **Total** | **2,563.11** | **2.76** | **0.28** | **2,715.77** |
| **Offsite Total** | **2,563.11** | **2.76** | **0.28** | **2,715.77** |
| | | | | |
| **Total** | **3,820.71** | **2.85** | **0.31** | **3,985.51** |

[a] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[b] $CO_2e$ = CO2-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

[c] Estimate is not available

**Table 7**

**Onsite Equipment and Offsite Vehicle ROC and NOx Emissions at Engel and Gray Facility**

| Item | Value | Comment |
|---|---|---|
| Permitted facility capacity (tons/quarter) | 52,200 | |
| Permitted facility capacity (tons/year) | 208,800 | tons/year = tons/quarter x 4 |
| Organics input from MRF (tons/year) | 73,600 | |
| Input from MRF as fraction of permitted capacity | 0.352 | fraction = organics from MRF / permitted facility capacity |
| Facility onsite equipment ROC emissions at capacity (lb/day) | 3.96 | From City of Santa Maria Conditional Negative Declaration for facility (E:94-56) June 1995 |
| Facility onsite equipment NOx emissions at capacity (lb/day) | 21.52 | From City of Santa Maria Conditional Negative Declaration for facility (E:94-56) June 1995 |
| Facility offsite vehicle ROC emissions at capacity (lb/day) | 0.9 | From City of Santa Maria Conditional Negative Declaration for facility (E:94-56) June 1995 |
| Facility offsite vehicle NOx emissions at capacity (lb/day) | 2.54 | From Addendum to Conditional Negative Declaration for facility July 3, 2008 |
| Onsite equipment ROC emissions for MRF input (lb/day) | **1.40** | Emissions for MRF input = facility emissions at capacity x fraction of capacity from MRF input |
| Onsite equipment NOx emissions for MRF input (lb/day) | **7.59** | Emissions for MRF input = facility emissions at capacity x fraction of capacity from MRF input |
| Offsite vehicle ROC emissions for MRF input (lb/day) | **0.32** | Emissions for MRF input = facility emissions at capacity x fraction of capacity from MRF input |
| Offsite vehicle NOx emissions for MRF input (lb/day) | **0.90** | Emissions for MRF input = facility emissions at capacity x fraction of capacity from MRF input |
| | | |
| Onsite equipment ROC emissions for MRF input (lb/year) | **509.49** | Annual emissions [tons/year] = daily emissions [lb/day x 365 operating days/year |
| Onsite equipment NOx emissions for MRF input (lb/year) | **2,768.74** | Annual emissions [tons/year] = daily emissions [lb/day x 365 operating days/year |
| Offsite vehicle ROC emissions for MRF input (lb/year) | **115.79** | Annual emissions [tons/year] = daily emissions [lb/day x 365 operating days/year |
| Offsite vehicle NOx emissions for MRF input (lb/year) | **326.79** | Annual emissions [tons/year] = daily emissions [lb/day x 365 operating days/year |

**Table 8**
**Windrow ROC Emissions**

| Item | Value | Comment |
|---|---|---|
| Annual Amount Composted (tons) | 73,590 | Project design capacity |
| Daily Amount Composted (ton/day) | 201.62 | Annual / 365 days/year |
| Fraction food waste | 0.682 | Mustang estimate |
| Fraction green waste | 0.232 | Mustang estimate |
| Compost from food waste (ton/day) | 137.50 | |
| Compost from green waste (ton/day) | 46.78 | |
| Food waste EF (lb VOC/ton) | 37.1 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| Green waste EF (lb VOC/ton) | 5.71 | From SJVAPCD Compost VOC Emission Factors, Sept. 2010[a] |
| VOC from food waste (lb/day) | 5,101.34 | |
| VOC from green waste (lb/day) | 267.09 | |
| Total VOC (lb/day) | 5,368 | |
| Total VOC (lb/year) | 1,959,475.04 | |

[a] From Compost VOC Emission Factors, San Joaquin Valley Air Pollution Control District, September 2010. Available at:
http://valleyair.org/Workshops/postings/2010/9-22-10-rule4566/SJVAPCD%20Compost%20VOC%20EF%20Report%209-15-10.pdf
Food waste emission factor from Appendix A, Table 6.1 for AgBag windrow
Green waste emission factor from Table 1

**Table 9**
**Materials Recovery Facility Diesel Fuel Storage Tank Emissions**



## TANKS 4.0.9d
## Emissions Report - Detail Format
## Tank Indentification and Physical Characteristics

**Identification**

| | |
|---|---|
| User Identification: | MRF/AD Tank |
| City: | Santa Barbara |
| State: | California |
| Company: | Mustang |
| Type of Tank: | Horizontal Tank |
| Description: | Diesel Storage tank for MRF & AD equipment. |

**Tank Dimensions**

| | |
|---|---|
| Shell Length (ft): | 27.00 |
| Diameter (ft): | 8.00 |
| Volume (gallons): | 10,000.00 |
| Turnovers: | 24.00 |
| Net Throughput(gal/yr): | 240,000.00 |
| Is Tank Heated (y/n): | N |
| Is Tank Underground (y/n): | N |

**Paint Characteristics**

| | |
|---|---|
| Shell Color/Shade: | White/White |
| Shell Condition | Good |

**Breather Vent Settings**

| | |
|---|---|
| Vacuum Settings (psig): | -0.03 |
| Pressure Settings (psig) | 0.03 |

Meterological Data used in Emissions Calculations: Santa Barbara, California (Avg Atmospheric Pressure = 14.65 psia)

**Table 9**
**Materials Recovery Facility Diesel Fuel Storage Tank Emissions**



## TANKS 4.0.9d
## Emissions Report - Detail Format
## Liquid Contents of Storage Tank

**MRF/AD Tank - Horizontal Tank**
**Santa Barbara, California**

| Mixture/Component | Month | Daily Liquid Surf. Temperature (deg F) Avg. | Min. | Max. | Liquid Bulk Temp (deg F) | Vapor Pressure (psia) Avg. | Min. | Max. | Vapor Mol. Weight. | Liquid Mass Fract. | Vapor Mass Fract. | Mol. Weight | Basis for Vapor Pressure Calculations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diesel | All | 61.28 | 55.71 | 66.86 | 59.13 | 0.0068 | 0.0056 | 0.0082 | 130.0000 | | | 188.00 | Option 1: VP60 = .0065 VP70 = .009 |
| 1,2,4-Trimethylbenzene | | | | | | 0.0215 | 0.0172 | 0.0268 | 120.1900 | 0.0100 | 0.0456 | 120.19 | Option 2: A=7.04383, B=1573.267, C=208.56 |
| Benzene | | | | | | 1.2100 | 1.0356 | 1.4082 | 78.1100 | 0.0000 | 0.0021 | 78.11 | Option 2: A=6.905, B=1211.033, C=220.79 |
| Ethylbenzene | | | | | | 0.1135 | 0.0933 | 0.1372 | 106.1700 | 0.0001 | 0.0031 | 106.17 | Option 2: A=6.975, B=1424.255, C=213.21 |
| Hexane (-n) | | | | | | 1.9782 | 1.7095 | 2.2807 | 86.1700 | 0.0000 | 0.0004 | 86.17 | Option 2: A=6.876, B=1171.17, C=224.41 |
| Toluene | | | | | | 0.3436 | 0.2885 | 0.4073 | 92.1300 | 0.0003 | 0.0233 | 92.13 | Option 2: A=6.954, B=1344.8, C=219.48 |
| Unidentified Components | | | | | | 0.0058 | 0.0053 | 0.0056 | 134.4372 | 0.9866 | 0.8674 | 189.60 | |
| Xylene (-m) | | | | | | 0.0945 | 0.0776 | 0.1146 | 106.1700 | 0.0029 | 0.0581 | 106.17 | Option 2: A=7.009, B=1462.266, C=215.11 |

**Table 9**
**Materials Recovery Facility Diesel Fuel Storage Tank Emissions**



## TANKS 4.0.9d
## Emissions Report - Detail Format
## Detail Calculations (AP-42)

**MRF/AD Tank - Horizontal Tank**
**Santa Barbara, California**

| Annual Emission Calcaulations | |
|---|---|
| Standing Losses (lb): | 1.9420 |
| Vapor Space Volume (cu ft): | 864.4382 |
| Vapor Density (lb/cu ft): | 0.0002 |
| Vapor Space Expansion Factor: | 0.0389 |
| Vented Vapor Saturation Factor: | 0.9986 |
| | |
| Tank Vapor Space Volume: | |
| Vapor Space Volume (cu ft): | 864.4382 |
| Tank Diameter (ft): | 8.0000 |
| Effective Diameter (ft): | 16.5879 |
| Vapor Space Outage (ft): | 4.0000 |
| Tank Shell Length (ft): | 27.0000 |
| | |
| Vapor Density | |
| Vapor Density (lb/cu ft): | 0.0002 |
| Vapor Molecular Weight (lb/lb-mole): | 130.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0068 |
| Daily Avg. Liquid Surface Temp. (deg. R): | 520.9532 |
| Daily Average Ambient Temp. (deg. F): | 59.1125 |
| Ideal Gas Constant R (psia cuft / (lb-mol-deg R)): | 10.731 |
| Liquid Bulk Temperature (deg. R): | 518.8025 |
| Tank Paint Solar Absorptance (Shell): | 0.1700 |
| Daily Total Solar Insulation Factor (Btu/sqft day): | 1,608.0000 |
| | |
| Vapor Space Expansion Factor | |
| Vapor Space Expansion Factor: | 0.0389 |
| Daily Vapor Temperature Range (deg. R): | 22.2881 |
| Daily Vapor Pressure Range (psia): | 0.0026 |
| Breather Vent Press. Setting Range(psia): | 0.0600 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0068 |
| Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): | 0.0056 |
| Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): | 0.0082 |
| Daily Avg. Liquid Surface Temp. (deg R): | 520.9532 |
| Daily Min. Liquid Surface Temp. (deg R): | 515.3812 |
| Daily Max. Liquid Surface Temp. (deg R): | 526.5253 |
| Daily Ambient Temp. Range (deg. R): | 20.3250 |
| | |
| Vented Vapor Saturation Factor | |
| Vented Vapor Saturation Factor: | 0.9986 |
| Vapor Pressure at Daily Average Liquid: Surface Temperature (psia): | 0.0068 |
| Vapor Space Outage (ft): | 4.0000 |
| | |
| Working Losses (lb): | 5.0669 |
| Vapor Molecular Weight (lb/lb-mole): | 130.0000 |
| Vapor Pressure at Daily Average Liquid Surface Temperature (psia): | 0.0068 |
| Annual Net Throughput (gal/yr.): | 240,000.0000 |
| Annual Turnovers: | 24.0000 |
| Turnover Factor: | 1.0000 |
| Tank Diameter (ft): | 8.0000 |
| Working Loss Product Factor: | 1.0000 |
| | |
| Total Losses (lb): | 7.0089 |

**Table 9**
**Materials Recovery Facility Diesel Fuel Storage Tank Emissions**



**TANKS 4.0.9d**
**Emissions Report - Detail Format**
**Individual Tank Emission Totals**

**Emissions Report for: Annual**

**MRF/AD Tank - Horizontal Tank**
**Santa Barbara, California**

| | Losses(lbs) | | |
|---|---|---|---|
| Components | Working Loss | Breathing Loss | Total Emissions |
| Diesel | 5.07 | 1.94 | 7.01 |
| Benzene | 0.01 | 0.00 | 0.01 |
| Toluene | 0.12 | 0.05 | 0.16 |
| Ethylbenzene | 0.02 | 0.01 | 0.02 |
| Xylene (-m) | 0.29 | 0.11 | 0.41 |
| 1,2,4-Trimethylbenzene | 0.23 | 0.09 | 0.32 |
| Unidentified Components | 4.39 | 1.68 | 6.08 |
| Hexane (-n) | 0.00 | 0.00 | 0.00 |

**Table 10**
**Equipment Exhaust Emissions**

| Equipment | Horsepower | Number | Hours/Day | Fuel Use (gal/hr) | Emission Stds. | Emission Factors (g/bhp-hr)[a] | | | | | Emission Factor [g/gal] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | CO | ROC[b] | NOx[b] | PM10[c] | PM2.5[c] | $CO_2$[d] | $CH_4$[e] | $N_2O$[e] |
| **Materials Recovery Facility Building** | | | | | | | | | | | | | |
| Caterpillar M322D Material Handler | 173 | 1 | 16 | 2.7 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Volvo L110G Loader | 260 | 2 | 16 | 3.5 | Tier 4 | 2.2 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Volvo L90G Loader | 173 | 1 | 16 | 2.7 | Tier 4 | 3.7 | 0.14 | 0.3 | 0.015 | 0.015 | 10,210 | 0.58 | 0.26 |
| Volvo L20F Loader | 56 | 1 | 16 | 1.3 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |
| Toyota 6,000 lb Forklift | 57 | 3 | 16 | 1.5 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |
| Tennant 800 Sweeper | 63 | 1 | 24 | 4 | Tier 4 | 3.7 | 0.18 | 3.33 | 0.02 | 0.02 | 10,210 | 0.58 | 0.26 |

[a] Emission factors assumed the same as emission standards.

[b] Where standard is for NMHC+NOx (Volvo L20F, Toyota forklifts and Tennant sweeper), emissions assumed to be 5 percent ROC and 95 percent NOx, from Table D-25 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[c] PM10 and PM2.5 assumed to be same as PM emission standards.

[d] From Table C-1 of Title 40, Code of Federal Regulations, Subpart 98 for No. 2 distillate fuel oil.

[e] $CH_4$ and $N_2O$ from Table 13.7 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

| Equipment | Load Factor[c] | Emission Rates Each Unit (lb/hr) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO[a] | ROC[a] | NOx[a] | SOx[b] | PM10[a, d] | PM2.5[a, d] | $CO_2$[e] | $CH_4$[e] | $N_2O$[e] |
| **Materials Recovery Facility Building** | | | | | | | | | | |
| Caterpillar M322D Material Handler | 0.3618 | 0.511 | 0.019 | 0.041 | 0.00056 | 2.07E-06 | 2.07E-06 | 60.77 | 3.45E-03 | 1.55E-03 |
| Volvo L110G Loader | 0.3618 | 0.456 | 0.029 | 0.062 | 0.00073 | 3.11E-06 | 3.11E-06 | 78.78 | 4.48E-03 | 2.01E-03 |
| Volvo L90G Loader | 0.3618 | 0.511 | 0.019 | 0.041 | 0.00056 | 2.07E-06 | 2.07E-06 | 60.77 | 3.45E-03 | 1.55E-03 |
| Volvo L20F Loader | 0.3618 | 0.165 | 0.008 | 0.149 | 0.00027 | 8.93E-07 | 8.93E-07 | 29.26 | 1.66E-03 | 7.45E-04 |
| Toyota 6,000 lb Forklift | 0.201 | 0.093 | 0.004 | 0.084 | 0.00031 | 5.05E-07 | 5.05E-07 | 33.76 | 1.92E-03 | 8.60E-04 |
| Tennant 800 Sweeper | 0.4556 | 0.234 | 0.011 | 0.210 | 0.00083 | 1.27E-06 | 1.27E-06 | 90.04 | 5.11E-03 | 2.29E-03 |

Diesel Fuel Density = 6.943 lb/gal
Diesel Fuel Sulfur = 15 ppmw

[a] Emission Rate [lb/hr] = Emission Factor [g/bhp-hr] x Engine Horsepower [hp] x Load Factor [unitless] / 453.6 [g/lb]

[b] Emission Rate [lb/hr] = Fuel Use [gal/hr] x Fuel Density [lb/gal] x Fuel Sulfur [ppmw] x $10^{-6}$ x 2 [lb $SO_2$/lb S]

[c] From OFFROAD 2011 model

[d] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

[e] Emission rate [lb/hr] = Fuel use [gal/hr] x Emission factor [g/gal] / 453.6 [lb/gal]

**Table 10**
**Equipment Exhaust Emissions**

| Equipment | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| **Materials Recovery Facility Building** | | | | | | | | | |
| Caterpillar M322D Material Handler | 8.17 | 0.31 | 0.66 | 0.01 | 3.31E-05 | 3.31E-05 | 972.38 | 0.06 | 0.02 |
| Volvo L110G Loader | 14.60 | 0.93 | 1.99 | 0.02 | 9.95E-05 | 9.95E-05 | 2,520.99 | 0.14 | 0.06 |
| Volvo L90G Loader | 8.17 | 0.31 | 0.66 | 0.01 | 3.31E-05 | 3.31E-05 | 972.38 | 0.06 | 0.02 |
| Volvo L20F Loader | 2.64 | 0.13 | 2.38 | 0.00 | 1.43E-05 | 1.43E-05 | 468.18 | 0.03 | 0.01 |
| Toyota 6,000 lb Forklift | 4.49 | 0.21 | 4.03 | 0.01 | 2.42E-05 | 2.42E-05 | 1,620.63 | 0.09 | 0.04 |
| Tennant 800 Sweeper | 5.62 | 0.27 | 5.05 | 0.02 | 3.04E-05 | 3.04E-05 | 2,160.85 | 0.12 | 0.06 |
| **Total** | **43.69** | **2.15** | **14.77** | **0.08** | **0.00** | **0.00** | **8,715.41** | **0.50** | **0.22** |

[a] Daily Emissions [lb/day] = Hourly Emissions [lb/hr-unit] x Number Units x Operating Time [hr/day]

| Equipment | Days/Year | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| **Materials Recovery Facility Building** | | | | | | | | | | |
| Caterpillar M322D Material Handler | 311 | 2,540.53 | 96.13 | 205.99 | 2.80 | 0.01 | 0.01 | 3.02E+05 | 17.18 | 7.70 |
| Volvo L110G Loader | 311 | 4,540.48 | 288.94 | 619.16 | 7.26 | 0.03 | 0.03 | 7.84E+05 | 44.54 | 19.97 |
| Volvo L90G Loader | 311 | 2,540.53 | 96.13 | 205.99 | 2.80 | 0.01 | 0.01 | 3.02E+05 | 17.18 | 7.70 |
| Volvo L20F Loader | 311 | 822.37 | 38.90 | 739.02 | 1.35 | 0.00 | 0.00 | 1.46E+05 | 8.27 | 3.71 |
| Toyota 6,000 lb Forklift | 311 | 1,395.09 | 65.98 | 1,253.69 | 4.66 | 0.01 | 0.01 | 5.04E+05 | 28.63 | 12.83 |
| Tennant 800 Sweeper | 311 | 1,747.53 | 82.65 | 1,570.42 | 6.22 | 0.01 | 0.01 | 6.72E+05 | 38.18 | 17.11 |
| **Total** | | **13,586.52** | **668.73** | **4,594.26** | **25.08** | **0.07** | **0.07** | **2.71E+06** | **153.98** | **69.02** |

[a] Annual Emissions [lb/year] = Daily Emissions [lb/day] x Operating Days [days/year]

**Table 11**
**On-Site Motor Vehicle Exhaust Emissions at Tajiguas Landfill - No CSSR**

| Vehicle | Use | Fuel | Number | Mileage (mpg) | Round-Trip Dist. (mi) | Round-Trips/Day | Miles/ Day |
|---|---|---|---|---|---|---|---|
| Freightliner Tractors | Recycleables to POLA[a] | CNG | 1 | 6 | 2.23 | 13 | 29 |
| Ford F350 XL | Utility truck and trailer | Diesel | 1 | 14 | 6 | 6 | 36 |

[a] Round trips/day are Mustang estimates

| Vehicle | Use | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO[a] | ROC[b] | NOx[b] | SOx[c] | PM10[b] | PM2.5[b] | $CO_2$[d] | $CH_4$[e] | $N_2O$[e,f] |
| Freightliner Tractors | Recycleables to POLA | 1.23E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Ford F350 XL | Utility truck and trailer | 1.71E-01 | 2.63E-02 | 4.69E-01 | 6.75E-03 | 4.90E-03 | 4.90E-03 | 4.93E+02 | 1.00E-03 | 2.37E-02 |

Diesel Fuel HV = 128,450 Btu/gal
Natural Gas HV = 1,020 Btu/scf
Natural Gas S = 0.5 grains/100 scf
Diesel Fuel Density = 6.943 lb/gal
Diesel Fuel Sulfur = 15 ppmw
Natural Gas $CO_2$ EF = 0.054 Kg/scf from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Freightliner tractor is 2010 and later model year standard in g/bhp-hr converted to g/mi using conversion factor from Table D-28 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[b] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[c] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g $SO_2$/g S)
Ford F350 XL calculated from (1/diesel mpg) x diesel fuel density (lb/gal) x diesel fuel sulfur (ppmw) x $10^{-6}$ x 453.6 (g/lb) x 2 (g $SO_2$/g S)

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (kg/scf) x 1,000 (g/kg)
CO2 emission factor from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[e] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[f] Emission factor for Ford F350 XL calculated as 0.3316 [g/gal] / mileage [mpg]; see: http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 11**
**On-Site Motor Vehicle Exhaust Emissions at Tajiguas Landfill - No CSSR**

| Vehicle | Use | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractors | Recycleables to POLA | 0.08 | 0.02 | 0.03 | 4.35E-04 | 1.85E-03 | 1.85E-03 | 7.24E+01 | 1.26E-01 | 1.12E-02 |
| Ford F350 XL | Utility truck and trailer | 0.01 | 0.00 | 0.04 | 5.36E-04 | 3.89E-04 | 3.89E-04 | 3.91E+01 | 7.94E-05 | 1.88E-03 |
| **Total** | | **0.09** | **0.03** | **0.07** | **0.00** | **0.00** | **0.00** | **111.57** | **0.13** | **0.01** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Days/Year | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Freightliner Tractors | Recycleables to POLA | 311 | 24.38 | 7.35 | 9.14 | 0.14 | 0.58 | 0.58 | 22,527.45 | 39.08 | 3.48 |
| Ford F350 XL | Utility truck and trailer | 311 | 4.21 | 0.65 | 11.58 | 0.17 | 0.12 | 0.12 | 12,169.66 | 0.02 | 0.58 |
| **Total** | | | **28.60** | **8.00** | **20.72** | **0.30** | **0.70** | **0.70** | **34,697.11** | **39.10** | **4.06** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 12**
**On-Site Motor Vehicle Exhaust Emissions at Tajiguas Landfill with CSSR**

| Vehicle | Use | Fuel | Number | Mileage (mpg) | Round-Trip Dist. (mi) | Round-Trips/Day | Miles/ Day |
|---|---|---|---|---|---|---|---|
| Tractor/Trailer | CSSR Import[a] | Diesel | 7 | 6 | 2.23 | 7 | 15.61 |
| Freightliner Tractors | Recycleables to POLA[b] | CNG | 1 | 6 | 2.23 | 13 | 29 |
| Ford F350 XL | Utility truck and trailer | Diesel | 1 | 14 | 6 | 6 | 36 |

[a] Trips/day are from Project Traffic Study.
[b] Round trips/day are Mustang estimates

| Vehicle | Use | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO[a] | ROC[b] | NOx[b] | SOx[c] | PM10[b] | PM2.5[b] | $CO_2$[d] | $CH_4$[e] | $N_2O$[e,f] |
| Tractor/Trailer | CSSR Import | 1.23E+00 | 5.04E-01 | 1.91E+00 | 1.57E-02 | 3.68E-02 | 3.39E-02 | 2.55E+03 | 1.00E-03 | 5.53E-02 |
| Freightliner Tractors | Recycleables to POLA | 1.23E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Ford F350 XL | Utility truck and trailer | 1.71E-01 | 2.63E-02 | 4.69E-01 | 6.75E-03 | 4.90E-03 | 4.90E-03 | 4.93E+02 | 1.00E-03 | 2.37E-02 |

| | | |
|---|---|---|
| Diesel Fuel HV = | 128,450 | Btu/gal |
| Natural Gas HV = | 1,020 | Btu/scf |
| Natural Gas S = | 0.5 | grains/100 scf |
| Diesel Fuel Density = | 6.943 | lb/gal |
| Diesel Fuel Sulfur = | 15 | ppmw |
| Natural Gas $CO_2$ EF = | 0.054 | Kg/scf |

from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Freightliner tractor is 2010 and later model year standard in g/bhp-hr converted to g/mi using conversion factor from Table D-28 of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[b] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines - http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[c] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x 2 (g $SO_2$/g S)
Ford F350 XL and tractor/trailer calculated from (1/diesel mpg) x diesel fuel density (lb/gal) x diesel fuel sulfur (ppmw) x $10^{-6}$ x 453.6 (g/lb) x 2 (g $SO_2$/g S)

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) / natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (kg/scf) x 1,000 (g/kg)
CO2 emission factor from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County

**Table 12**
**On-Site Motor Vehicle Exhaust Emissions at Tajiguas Landfill with CSSR**

at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County
at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[e] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf
Ford F350 XL is from EMFAC2011 emission rates for 2017 model year light heavy-duty truck 2 in Santa Barbara County
at 45 mph in calendar year 2017 http://www.arb.ca.gov/emfac/
Tractor/trailer is from EMFAC2011 emission rates for T7 trucks in Santa Barbara County
at 15 mph in calendar year 2017 http://www.arb.ca.gov/emfac/

[f] Emission factor for Ford F350 XL and tractor/trailer calculated as 0.3316 [g/gal] / mileage [mpg]; see:
http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

| | | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Vehicle** | **Use** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **$CO_2$** | **$CH_4$** | **$N_2O$** |
| Tractor/Trailer | CSSR Import | 0.04 | 0.02 | 0.07 | 5.42E-04 | 1.27E-03 | 1.17E-03 | 8.77E+01 | 3.44E-05 | 1.90E-03 |
| Freightliner Tractors | Recycleables to POLA | 0.08 | 0.02 | 0.03 | 4.35E-04 | 1.85E-03 | 1.85E-03 | 7.24E+01 | 1.26E-01 | 1.12E-02 |
| Ford F350 XL | Utility truck and trailer | 0.01 | 0.00 | 0.04 | 5.36E-04 | 3.89E-04 | 3.89E-04 | 3.91E+01 | 7.94E-05 | 1.88E-03 |
| **Total** | | **0.13** | **0.04** | **0.13** | **0.00** | **0.00** | **0.00** | **199.30** | **0.13** | **0.01** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| | | | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Vehicle** | **Use** | **Days/Year** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **$CO_2$** | **$CH_4$** | **$N_2O$** |
| Tractor/Trailer | CSSR Import | 311 | 13.13 | 5.39 | 20.49 | 0.17 | 0.39 | 0.36 | 27,284.63 | 0.01 | 0.59 |
| Freightliner Tractors | Recycleables to POLA | 311 | 24.38 | 7.35 | 9.14 | 0.14 | 0.58 | 0.58 | 22,527.45 | 39.08 | 3.48 |
| Ford F350 XL | Utility truck and trailer | 311 | 4.21 | 0.65 | 11.58 | 0.17 | 0.12 | 0.12 | 12,169.66 | 0.02 | 0.58 |
| **Total** | | | **41.72** | **13.39** | **41.21** | **0.47** | **1.09** | **1.06** | **61,981.74** | **39.11** | **4.65** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 13**
**Off-Site Motor Vehicle Exhaust Emissions without CSSR**

| Vehicle | Use | Fuel | One-Way Trips/Day | Mileage (mpg)[c] | One-Way Trip Dist. (mi) | Miles/ Day |
|---|---|---|---|---|---|---|
| Tractor/Trailer | Organics to Engel and Gray[a] | Diesel | 26 | 6 | 56 | 1,456 |
| Freightliner Tractors | Recycleables to POLA[b] | CNG | 26 | 6 | 131 | 3,406 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous[b] | Diesel | 8 | 19 | 25 | 200 |
| Worker Commuting | From the North[d] | Gasoline | 42 | 22 | 37 | 1,554 |
| Worker Commuting | From the South[d] | Gasoline | 4 | 22 | 15 | 60 |

[a] One-way trips/day = 90,000 tons/yr / 311 op. days/yr / 22 tons/trip x 2 = 26.3 trips/day rounded to 26 trips/day

[b] One-way trips/day are Mustang estimates

[c] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2017 by total miles in Santa Barbara County
Mileage for Freightliner Tractor is diesel-equivalent, Mustang estimate

[d] Trips/day are from Project Traffic Study

| Vehicle | Use | EMFAC Vehicle Class | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $CO^{a,b}$ | $ROC^{a,c}$ | $NOx^{a,c}$ | $SOx^{a,d}$ | $PM10^{a,c}$ | $PM2.5^{a,c}$ | $CO_2{}^{a,e}$ | $CH_4{}^{a,f}$ | $N_2O^{f,g}$ |
| Tractor/Trailer | Organics to Engel and Gray | T7 tractor | 1.16E+00 | 2.53E-01 | 6.95E+00 | 1.69E-02 | 1.80E-01 | 1.11E-01 | 1.68E+03 | 1.38E-02 | 5.81E-02 |
| Freightliner Tractors | Recycleables to POLA | N/A | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | LHD1 | 1.22E+00 | 2.23E-01 | 3.57E+00 | 5.02E-03 | 1.38E-01 | 8.12E-02 | 4.99E+02 | 1.22E-02 | 1.73E-02 |
| Worker Commuting | From the North | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |
| Worker Commuting | From the South | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |

| | | | |
|---|---|---|---|
| Diesel Fuel HV = | 128,450 | Btu/gal | |
| Natural Gas HV = | 1,020 | Btu/scf | |
| Natural Gas S = | 0.5 | grains/100 scf | |
| Diesel Fuel Density = | 6.943 | lb/gal | |
| Diesel Fuel Sulfur = | 15 | ppmw | |
| Natural Gas $CO_2$ EF = | 0.054 | Kg/scf | from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from |

http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2017 by total miles in Santa Barbara County

[b] Freightliner tractor calculated by dividing EMFAC2011 calculated total daily CO emissions from 2017 model year T7 tractors in Santa Barbara County in 2017
by total miles in Santa Barbara County

[c] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines -
http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) /
natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x
2 (g $SO_2$/g S)

[e] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) /
natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (Kg/scf) x 1,000 (g/Kg)

[f] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[g] Emission factor for gasoline calculated from 0.0416 x NOx emission factor; emission factor for diesel calculated as 0.3316 g/gal; see:
http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 13**
**Off-Site Motor Vehicle Exhaust Emissions without CSSR**

| Vehicle | Use | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Tractor/Trailer | Organics to Engel and Gray | 3.73 | 0.81 | 22.32 | 0.05 | 0.58 | 0.36 | 5,386.39 | 0.04 | 0.19 |
| Freightliner Tractors | Recycleables to POLA | 8.76 | 2.78 | 3.45 | 0.05 | 0.22 | 0.22 | 8,510.36 | 14.76 | 1.31 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 0.54 | 0.10 | 1.57 | 0.00 | 0.06 | 0.04 | 220.21 | 0.01 | 0.01 |
| Worker Commuting | From the North | 11.87 | 1.05 | 1.23 | 0.01 | 0.17 | 0.07 | 1,066.49 | 0.09 | 0.05 |
| Worker Commuting | From the South | 0.46 | 0.04 | 0.05 | 0.00 | 0.01 | 0.00 | 41.18 | 0.00 | 0.00 |
| **Total** | | **25.36** | **4.78** | **28.62** | **0.12** | **1.03** | **0.69** | **15,224.62** | **14.90** | **1.56** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Op. Days/yr | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| Tractor/Trailer | Organics to Engel and Gray | 311 | 1,160.37 | 252.37 | 6,940.22 | 16.82 | 179.77 | 111.02 | 1,675,167.24 | 13.79 | 58.01 |
| Freightliner Tractors | Recycleables to POLA | 311 | 2,723.97 | 864.04 | 1,074.21 | 15.88 | 67.72 | 67.72 | 2,646,722.64 | 4,591.09 | 408.67 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 311 | 167.22 | 30.62 | 489.43 | 0.69 | 18.90 | 11.14 | 68,483.80 | 1.67 | 2.37 |
| Worker Commuting | From the North | 311 | 3,691.76 | 326.19 | 382.14 | 4.06 | 51.49 | 22.38 | 331,677.77 | 26.85 | 15.90 |
| Worker Commuting | From the South | 311 | 142.54 | 12.59 | 14.75 | 0.16 | 1.99 | 0.86 | 12,806.09 | 1.04 | 0.61 |
| **Total** | | | **7,885.86** | **1,485.82** | **8,900.77** | **37.61** | **319.88** | **213.12** | **4,734,857.54** | **4,634.44** | **485.56** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Off-Site Motor Vehicle Fugitive PM Emissions**

**Emission Factors for Vehicles on Off-Site Paved Roads**

| Parameter | Value | Comments |
|---|---|---|
| Road silt loading ($g/m^2$) | 0.1 | CalEEMod default |
| Onroad vehicles average weight (tons) | 2.4 | CalEEMod Default for Santa Barbara County |
| PM10 emission factor (lb/mile) | 6.61E-04 | 0.0022 x (silt loading $[g/m^2])^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |
| PM2.5 emission factor (lb/mile) | 1.62E-04 | 0.00054 x (silt loading $[g/m^2])^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |

| Vehicle | Use | Miles/ Day | Op. Days/yr | Daily Emissions (lb/day)[a] | | Annual Emissions (lb/year)[b] | |
|---|---|---|---|---|---|---|---|
| | | | | PM10 | PM2.5 | PM10 | PM2.5 |
| Tractor/Trailer | Organics to Engel and Gray | 1,456 | 311 | 0.96 | 0.24 | 299.34 | 73.47 |
| Freightliner Tractors | Recycleables to POLA | 3,406 | 311 | 2.25 | 0.55 | 700.23 | 171.88 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 200 | 311 | 0.13 | 0.03 | 41.12 | 10.09 |
| Worker Commuting | From the North | 1,554 | 311 | 1.03 | 0.25 | 319.48 | 78.42 |
| Worker Commuting | From the South | 60 | 311 | 0.04 | 0.01 | 12.34 | 3.03 |
| **Total** | | | | **4.41** | **1.08** | **1,372.51** | **336.89** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]
[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 14**
**Off-Site Motor Vehicle Exhaust Emissions with CSSR**

| Vehicle | Use | Fuel | Round-Trips/Day | Mileage (mpg)[c] | Round-Trip Dist. (mi) | Miles/Day |
|---|---|---|---|---|---|---|
| Tractor/Trailer | Organics to Engel and Gray[b] | Diesel | 26 | 6 | 56 | 1,456 |
| Freightliner Tractors | Recycleables to POLA[a] | CNG | 36 | 6 | 131 | 4,716 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast[e] | Diesel | 14 | 6 | -17 | -238 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous[b] | Diesel | 4 | 19 | 25 | 100 |
| Worker Commuting | From the North[d] | Gasoline | 56 | 22 | 37 | 2,072 |
| Worker Commuting | From the South[d] | Gasoline | 6 | 22 | 15 | 90 |

[a] Round trips/day = 126,000 tons/yr / 311 op. days/yr / 22 tons/trip = 18.4 one-way trips/day x 2 = 36.8 one-way trips/day rounded to 36

[b] Round trips/day are Mustang estimates

[c] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2017 by total miles in Santa Barbara County
Mileage for Freightliner Tractor is diesel-equivalent, Mustang estimate

[d] Trips/day are from Project Traffic Study

[e] Round trips are from Project Traffic Study. Mileage is difference between SCRTS to Tajiguas (22 mi.) and SCRTS to Gold Coast (39 mi.)

| Vehicle | Use | EMFAC Vehicle Class | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO[a,b] | ROC[a,c] | NOx[a,c] | SOx[a,d] | PM10[a,c] | PM2.5[a,c] | $CO_2$[a,e] | $CH_4$[a,f] | $N_2O$[f,g] |
| Tractor/Trailer | Organics to Engel and Gray | T7 tractor | 1.16E+00 | 2.53E-01 | 6.95E+00 | 1.69E-02 | 1.80E-01 | 1.11E-01 | 1.68E+03 | 1.38E-02 | 5.81E-02 |
| Freightliner Tractors | Recycleables to POLA | N/A | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast | T7 tractor | 1.17E+00 | 3.70E-01 | 4.60E-01 | 6.80E-03 | 2.90E-02 | 2.90E-02 | 1.13E+03 | 1.97E+00 | 1.75E-01 |
| Pick-up Trucks (Ford F250 XL) | Miscellaneous | LHD1 | 1.22E+00 | 2.23E-01 | 3.57E+00 | 5.02E-03 | 1.38E-01 | 8.12E-02 | 4.99E+02 | 1.22E-02 | 1.73E-02 |
| Worker Commuting | From the North | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |
| Worker Commuting | From the South | LDT1 | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 2.52E-02 | 1.49E-02 |

| | | |
|---|---|---|
| Diesel Fuel HV = | 128,450 | Btu/gal |
| Natural Gas HV = | 1,020 | Btu/scf |
| Natural Gas S = | 0.5 | grains/100 scf |
| Diesel Fuel Density = | 6.943 | lb/gal |
| Diesel Fuel Sulfur = | 15 | ppmw |
| Natural Gas $CO_2$ EF = | 0.054 | Kg/scf from Table 13.1 of 2013 Climate Action Registry Default Emission Factors, downloaded from |

http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[a] Except for Frieghtliner Tractor, calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2017 by total miles in Santa Barbara County

[b] Freightliner tractor calculated by dividing EMFAC2011 calculated total daily CO emissions from 2017 model year T7 tractors in Santa Barbara County in 2017
by total miles in Santa Barbara County

[c] Freightliner tractor is 2010 and later model year standard from Table D-1a of 2011 Carl Moyer Program Guidelines -
http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm

[d] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) /
natural gas heating value (Btu/scf) x natural gas sulfur content (grains/100 scf) / 100 / 7,000 (grains/lb) x 453.6 (g/lb) x
2 (g $SO_2$/g S)

[e] Freightliner tractor calculated from (1/diesel-equivalent mpg) x diesel fuel heating value (Btu/gal) /
natural gas heating value (Btu/scf) x natural gas $CO_2$ EF (kg/scf) x 1,000 (g/kg)

[f] Freightliner Tractor from Table 13.6 of 2013 Climate Action Registry Default Emission Factors, downloaded from
http://www.theclimateregistry.org/downloads/2013/01/2013-Climate-Registry-Default-Emissions-Factors.pdf

[g] Emission factor for gasoline calculated from 0.0416 x NOx emission factor; emission factor for diesel calculated as 0.3316 [g/gal] / mileage [mpg]; see:
http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 14**
**Off-Site Motor Vehicle Exhaust Emissions with CSSR**

| Vehicle | Use | Daily Emissions (lb/day)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Tractor/Trailer | Organics to Engel and Gray | 3.73 | 0.81 | 22.32 | 0.05 | 0.58 | 0.36 | 5,386.39 | 0.04 | 0.19 |
| Freightliner Tractors | Recycleables to POLA | 12.13 | 3.85 | 4.78 | 0.07 | 0.30 | 0.30 | 11,783.58 | 20.44 | 1.82 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast | -0.61 | -0.19 | -0.24 | 0.00 | -0.02 | -0.02 | -594.68 | -1.03 | -0.09 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 0.27 | 0.05 | 0.79 | 0.00 | 0.03 | 0.02 | 110.10 | 0.00 | 0.00 |
| Worker Commuting | From the North | 15.83 | 1.40 | 1.64 | 0.02 | 0.22 | 0.10 | 1,421.98 | 0.12 | 0.07 |
| Worker Commuting | From the South | 0.69 | 0.06 | 0.07 | 0.00 | 0.01 | 0.00 | 61.77 | 0.01 | 0.00 |
| **Total** | | **32.03** | **5.97** | **29.35** | **0.14** | **1.13** | **0.76** | **18,169.14** | **19.58** | **1.99** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Op. Days/yr | Annual Emissions (lb/year)[a] CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tractor/Trailer | Organics to Engel and Gray | 311 | 1,160.37 | 252.37 | 6,940.22 | 16.82 | 179.77 | 111.02 | 1,675,167.24 | 13.79 | 58.01 |
| Freightliner Tractors | Recycleables to POLA | 311 | 3,771.65 | 1,196.36 | 1,487.37 | 21.99 | 93.77 | 93.77 | 3,664,692.89 | 6,356.89 | 565.85 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast | 311 | -190.34 | -60.38 | -75.06 | -1.11 | -4.73 | -4.73 | -184,944.21 | -320.81 | -28.56 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 311 | 83.61 | 15.31 | 244.72 | 0.34 | 9.45 | 5.57 | 34,241.90 | 0.84 | 1.19 |
| Worker Commuting | From the North | 311 | 4,922.35 | 434.92 | 509.53 | 5.41 | 68.65 | 29.84 | 442,237.03 | 35.80 | 21.20 |
| Worker Commuting | From the South | 311 | 213.81 | 18.89 | 22.13 | 0.24 | 2.98 | 1.30 | 19,209.14 | 1.56 | 0.92 |
| **Total** | | | **9,961.44** | **1,857.48** | **9,128.91** | **43.69** | **349.90** | **236.76** | **5,650,603.98** | **6,088.06** | **618.60** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Off-Site Motor Vehicle Fugitive PM Emissions**

**Emission Factors for Vehicles on Off-Site Paved Roads**

| Parameter | Value | Comments |
|---|---|---|
| Road silt loading ($g/m^2$) | 0.1 | CalEEMod default |
| Onroad vehicles average weight (tons) | 2.4 | CalEEMod Default for Santa Barbara County |
| PM10 emission factor (lb/mile) | 6.61E-04 | 0.0022 x (silt loading $[g/m^2])^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |
| PM2.5 emission factor (lb/mile) | 1.62E-04 | 0.00054 x (silt loading $[g/m^2])^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |

| Vehicle | Use | Miles/ Day | Op. Days/yr | Daily Emissions (lb/day)[a] PM10 | PM2.5 | Annual Emissions (lb/year)[b] PM10 | PM2.5 |
|---|---|---|---|---|---|---|---|
| Tractor/Trailer | Organics to Engel and Gray | 1,456 | 311 | 0.96 | 0.24 | 299.34 | 73.47 |
| Freightliner Tractors | Recycleables to POLA | 4,716 | 311 | 3.12 | 0.77 | 969.55 | 237.98 |
| Tractor/Trailer | CSSR from SCRTS to Tajiguas instead of Gold Coast | -238 | 311 | -0.16 | -0.04 | -48.93 | -12.01 |
| Pick-up Trucks (Ford 250 XL) | Miscellaneous | 100 | 311 | 0.07 | 0.02 | 20.56 | 5.05 |
| Worker Commuting | From the North | 2,072 | 311 | 1.37 | 0.34 | 425.98 | 104.56 |
| Worker Commuting | From the South | 90 | 311 | 0.06 | 0.01 | 18.50 | 4.54 |
| **Total** | | | | **5.42** | **1.33** | **1,685.00** | **413.59** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]
[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 15**
**On-Site Fugitive PM Emissions without CSSR**

**On-Site Motor Vehicle Fugitive PM Emissions without CSSR**

| Vehicle | Use | Weight (tons)[a] | Miles/Day | Annual Op. (Days/year) | Emission Factors (lb/mi)[b] | | Control Efficiency (%)[c] | Emissions (lb/day)[d] | | Emissions (lb/year)[e] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PM10 | PM2.5 | | PM10 | PM2.5 | PM10 | PM2.5 |
| Freightliner Tractor | Recycleables to POLA | 13.75 | 4.00 | 311 | 1.69 | 0.17 | 86 | 0.95 | 0.09 | 294.35 | 29.44 |
| Ford F350 XL | Utility truck and trailer | 7 | 36 | 311 | 1.25 | 0.12 | 86 | 6.29 | 0.63 | 1,955.11 | 195.51 |

[a] Freightliner tractor + trailer = average of 40,000 lbs loaded and 15,000 lbs empty.
Ford F350 XL based on specification of 14,000 lbs gross vehicle weight rating

[b] Emission factor [lb/mi] = k x (silt content [%] / 12)$^{0.9}$ (weight [tons] / 3)$^{0.45}$
from AP-42, Section 13.2.2 (Unpaved Roads), Equation 1a (11/06)
k = 1.5 for PM10
0.15 for PM2.5
silt content = 6.4 % from AP-42, Section 13.2.2 (Unpaved Roads), Table 13.2.2-1 (11/06)

[c] Based on hourly watering at 0.18 gal/sq. yd. and 15 mph speed limit, from Appendix E.7, page 3, of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5.

[d] Emissions [lb/day] = Emission factor [lb/mi] x Miles/day x (1- control efficiency [%] / 100)

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

**Material Transfers without CSSR**

| Material | Transfer | Moisture (%)[a] | Daily Amount (tons) | Annual Op. (Days/year) | Emission Factors (lb/ton)[b] | | Emissions (lb/day)[c,e] | | Emissions (lb/year)[f] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| MSW | Into MRF Facility | 28 | 800 | 311 | 3.84E-04 | 5.82E-05 | 3.08E-04 | 4.66E-05 | 0.10 | 0.01 |

[a] Value for MSW from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[b] Emission factor [lb/ton] = k x 0.0032 x (wind speed [mph] / 5)$^{1.3}$ / (material moisture [%] /2 )$^{1.4}$
from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06)
k = 0.35 for PM10
0.053 for PM2.5
Wind speed = 5.47 mph, from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[c] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

[e] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

**Table 16**
**On-Site Fugitive PM Emissions with CSSR**

**On-Site Motor Vehicle Fugitive PM Emissions with CSSR**

| Vehicle | Use | Weight (tons)[a] | Miles/Day | Annual Op. (Days/year) | Emission Factors (lb/mi)[b] | | Control Efficiency (%)[c] | Emissions (lb/day)[d] | | Emissions (lb/year)[e] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PM10 | PM2.5 | | PM10 | PM2.5 | PM10 | PM2.5 |
| Tractor/Trailer | CSSR Import | 13.75 | 15.61 | 311 | 1.69 | 0.17 | 86 | 3.69 | 0.37 | 1,148.72 | 114.87 |
| Freightliner Tractor | Recycleables to POLA | 13.75 | 4.00 | 311 | 1.69 | 0.17 | 86 | 0.95 | 0.09 | 294.35 | 29.44 |
| Ford F350 XL | Utility truck and trailer | 7 | 36 | 311 | 1.25 | 0.12 | 86 | 6.29 | 0.63 | 1,955.11 | 195.51 |

[a] Freightliner tractor + trailerand tractor/trailer = average of 40,000 lbs loaded and 15,000 lbs empty.
Ford F350 XL based on specification of 14,000 lbs gross vehicle weight rating

[b] Emission factor [lb/mi] = k x (silt content [%] / 12)$^{0.9}$ (weight [tons] / 3)$^{0.45}$
from AP-42, Section 13.2.2 (Unpaved Roads), Equation 1a (11/06)

k = 1.5 for PM10
0.15 for PM2.5
silt content = 6.4 % from AP-42, Section 13.2.2 (Unpaved Roads), Table 13.2.2-1 (11/06)

[c] Based on hourly watering at 0.18 gal/sq. yd. and 15 mph speed limit, from Appendix E.7, page 3, of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5.

[d] Emissions [lb/day] = Emission factor [lb/mi] x Miles/day x (1- control efficiency [%] / 100)

[e] Emissions [lb/year] = Emissions [lb/day] x Days/year

**Material Transfers with CSSR**

| Material | Transfer | Moisture (%)[a] | Daily Amount (tons) | Annual Op. (Days/year) | Emission Factors (lb/ton)[b] | | Emissions (lb/day)[c,e] | | Emissions (lb/year)[d] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | PM10 | PM2.5 | PM10 | PM2.5 | PM10 | PM2.5 |
| MSW | Into MRF Facility | 28 | 930 | 311 | 3.84E-04 | 5.82E-05 | 3.57E-04 | 5.41E-05 | 0.11 | 0.02 |

[a] Value for MSW from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[b] Emission factor [lb/ton] = k x 0.0032 x (wind speed [mph] / 5)$^{1.3}$ / (material moisture [%] /2 )$^{1.4}$
from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles (11/06)

k = 0.35 for PM10
0.053 for PM2.5
Wind speed = 5.47 mph, from Table 9, Appendix E.8 of the Draft EIR for the Tajiguas Landfill Expansion Project, Santa Barbara County No. 01-EIR-5

[c] Emissions [lb/day] = Emission factor [lb/ton] x Daily amount [tons]

[d] Emissions [lb/year] = Emissions [lb/day] x Days/year

[e] PM10 and PM2.5 emissions from buildings controlled by dust collectors with 99.9 percent control efficiency

**Table 17**
**Motor Vehicle Emission Factors in Santa Barbara County for 2017**

| Vehicle Class | Fuel | | Emission Factors (g/mi)[a] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROG | NOx | SOx | PM10 | PM2.5 | $CO_2$ | TOG | $CH_4$ | $N_2O$ | Mileage (mpg) |
| LDA | GAS | LDAGAS | 1.48E+00 | 1.31E-01 | 1.48E-01 | 3.26E-03 | 4.68E-02 | 1.97E-02 | 2.51E+02 | 1.45E-01 | 1.31E-02 | 6.14E-03 | 26.09 |
| LDA | DSL | LDADSL | 1.55E-01 | 2.65E-02 | 4.71E-01 | 3.31E-03 | 6.34E-02 | 3.49E-02 | 2.71E+02 | 3.01E-02 | 1.45E-03 | 1.14E-02 | 29.10 |
| LDT1 | GAS | LDT1GAS | 3.46E+00 | 3.06E-01 | 3.59E-01 | 3.81E-03 | 4.83E-02 | 2.10E-02 | 3.11E+02 | 3.33E-01 | 2.52E-02 | 1.49E-02 | 22.32 |
| LDT1 | DSL | LDT1DSL | 2.53E-01 | 5.47E-02 | 6.14E-01 | 3.38E-03 | 8.97E-02 | 5.91E-02 | 2.78E+02 | 6.23E-02 | 2.99E-03 | 1.16E-02 | 28.49 |
| LDT2 | GAS | LDT2GAS | 2.46E+00 | 2.27E-01 | 3.47E-01 | 4.46E-03 | 4.73E-02 | 2.01E-02 | 3.69E+02 | 2.49E-01 | 2.11E-02 | 1.44E-02 | 19.08 |
| LDT2 | DSL | LDT2DSL | 1.81E-01 | 3.17E-02 | 5.51E-01 | 3.32E-03 | 6.82E-02 | 3.94E-02 | 2.82E+02 | 3.60E-02 | 1.73E-03 | 1.14E-02 | 28.99 |
| LHD1 | GAS | LHD1GAS | 5.86E+00 | 7.03E-01 | 1.13E+00 | 1.00E-02 | 4.85E-02 | 2.12E-02 | 9.44E+02 | 7.56E-01 | 4.55E-02 | 4.70E-02 | 8.48 |
| LHD1 | DSL | LHD1DSL | 1.22E+00 | 2.23E-01 | 3.57E+00 | 5.02E-03 | 1.38E-01 | 8.12E-02 | 4.99E+02 | 2.54E-01 | 1.22E-02 | 1.73E-02 | 19.17 |
| LHD2 | GAS | LHD2GAS | 3.94E+00 | 5.03E-01 | 9.78E-01 | 9.99E-03 | 4.73E-02 | 2.01E-02 | 9.44E+02 | 5.43E-01 | 4.03E-02 | 4.07E-02 | 8.51 |
| LHD2 | DSL | LHD2DSL | 1.16E+00 | 2.07E-01 | 3.36E+00 | 5.02E-03 | 1.47E-01 | 8.38E-02 | 4.99E+02 | 2.36E-01 | 1.13E-02 | 1.73E-02 | 19.19 |
| MCY | GAS | MCYGAS | 2.85E+01 | 3.62E+00 | 1.35E+00 | 2.17E-03 | 4.55E-02 | 1.84E-02 | 1.55E+02 | 3.90E+00 | 2.41E-01 | 5.61E-02 | 39.15 |
| MDV | GAS | MDVGAS | 3.37E+00 | 2.87E-01 | 5.08E-01 | 5.66E-03 | 4.73E-02 | 2.01E-02 | 4.85E+02 | 3.20E-01 | 3.14E-02 | 2.11E-02 | 15.03 |
| MDV | DSL | MDVDSL | 1.47E-01 | 2.63E-02 | 4.04E-01 | 3.32E-03 | 6.53E-02 | 3.66E-02 | 2.94E+02 | 2.99E-02 | 1.43E-03 | 1.14E-02 | 29.00 |
| MH | GAS | MHGAS | 5.38E+00 | 2.11E-01 | 8.76E-01 | 6.86E-03 | 4.71E-02 | 1.99E-02 | 6.44E+02 | 2.48E-01 | 2.33E-02 | 3.64E-02 | 12.41 |
| MH | DSL | MHDSL | 7.31E-01 | 2.32E-01 | 7.05E+00 | 1.15E-02 | 3.36E-01 | 2.37E-01 | 1.14E+03 | 2.64E-01 | 1.27E-02 | 3.95E-02 | 8.40 |
| Motor Coach | DSL | Motor Coa | 1.31E+00 | 2.74E-01 | 6.55E+00 | 1.74E-02 | 2.16E-01 | 1.27E-01 | 1.73E+03 | 3.12E-01 | 1.50E-02 | 6.00E-02 | 5.52 |
| OBUS | GAS | OBUSGAS | 1.62E+01 | 1.21E+00 | 2.87E+00 | 7.40E-03 | 4.65E-02 | 1.93E-02 | 6.77E+02 | 1.29E+00 | 8.25E-02 | 1.19E-01 | 11.49 |
| PTO | DSL | PTODSL | 7.94E-01 | 2.26E-01 | 9.79E+00 | 2.05E-02 | 6.43E-02 | 5.92E-02 | 2.05E+03 | 2.58E-01 | 1.24E-02 | 7.08E-02 | 4.68 |
| SBUS | GAS | SBUSGAS | 7.34E+00 | 6.16E-01 | 1.05E+00 | 7.64E-03 | 4.68E-02 | 1.96E-02 | 7.14E+02 | 6.70E-01 | 1.01E-01 | 4.37E-02 | 11.14 |
| SBUS | DSL | SBUSDSL | 8.65E-01 | 2.48E-01 | 1.18E+01 | 1.34E-02 | 8.77E-01 | 4.33E-01 | 1.33E+03 | 2.82E-01 | 1.35E-02 | 4.61E-02 | 7.20 |
| T6 Ag | DSL | T6 AgDSL | 1.07E+00 | 3.24E-01 | 4.79E+00 | 1.15E-02 | 3.11E-01 | 2.14E-01 | 1.15E+03 | 3.69E-01 | 1.77E-02 | 3.97E-02 | 8.36 |
| T6 Public | DSL | T6 PublicD | 3.34E-01 | 8.46E-02 | 6.51E+00 | 1.18E-02 | 1.81E-01 | 9.45E-02 | 1.18E+03 | 9.63E-02 | 4.62E-03 | 4.07E-02 | 8.15 |
| T6 CAIRP heavy | DSL | T6 CAIRP | 4.46E-01 | 1.22E-01 | 3.30E+00 | 1.14E-02 | 1.85E-01 | 9.85E-02 | 1.13E+03 | 1.39E-01 | 6.69E-03 | 3.92E-02 | 8.45 |
| T6 CAIRP small | DSL | T6 CAIRP | 5.60E-01 | 1.54E-01 | 1.93E+00 | 1.13E-02 | 2.10E-01 | 1.22E-01 | 1.13E+03 | 1.76E-01 | 8.43E-03 | 3.90E-02 | 8.51 |
| T6 OOS heavy | DSL | T6 OOS he | 4.46E-01 | 1.22E-01 | 3.30E+00 | 1.14E-02 | 1.85E-01 | 9.85E-02 | 1.13E+03 | 1.39E-01 | 6.69E-03 | 3.92E-02 | 8.45 |
| T6 OOS small | DSL | T6 OOS sr | 5.60E-01 | 1.54E-01 | 1.93E+00 | 1.13E-02 | 2.10E-01 | 1.22E-01 | 1.13E+03 | 1.76E-01 | 8.43E-03 | 3.90E-02 | 8.51 |
| T6 instate construction heavy | DSL | T6 instate | 4.61E-01 | 1.31E-01 | 6.42E+00 | 1.15E-02 | 1.96E-01 | 1.09E-01 | 1.15E+03 | 1.49E-01 | 7.17E-03 | 3.97E-02 | 8.35 |
| T6 instate construction small | DSL | T6 instate | 8.12E-01 | 2.31E-01 | 3.47E+00 | 1.14E-02 | 2.70E-01 | 1.76E-01 | 1.13E+03 | 2.63E-01 | 1.26E-02 | 3.92E-02 | 8.47 |
| T6 instate heavy | DSL | T6 instate | 4.62E-01 | 1.30E-01 | 5.77E+00 | 1.15E-02 | 1.95E-01 | 1.07E-01 | 1.14E+03 | 1.48E-01 | 7.12E-03 | 3.96E-02 | 8.37 |
| T6 instate small | DSL | T6 instate | 7.62E-01 | 2.16E-01 | 3.16E+00 | 1.13E-02 | 2.59E-01 | 1.66E-01 | 1.13E+03 | 2.46E-01 | 1.18E-02 | 3.91E-02 | 8.48 |
| T6 utility | DSL | T6 utilityDS | 3.86E-01 | 9.17E-02 | 3.53E+00 | 1.17E-02 | 1.74E-01 | 8.79E-02 | 1.16E+03 | 1.04E-01 | 5.01E-03 | 4.03E-02 | 8.24 |
| T6TS | GAS | T6TSGAS | 1.29E+01 | 1.02E+00 | 1.95E+00 | 7.24E-03 | 4.70E-02 | 1.98E-02 | 6.67E+02 | 1.09E+00 | 5.04E-02 | 8.10E-02 | 11.76 |
| T7 Ag | DSL | T7 AgDSL | 1.86E+00 | 4.07E-01 | 8.81E+00 | 1.71E-02 | 2.86E-01 | 2.08E-01 | 1.71E+03 | 4.63E-01 | 2.22E-02 | 5.91E-02 | 5.61 |
| T7 CAIRP | DSL | T7 CAIRP | 1.74E+00 | 3.60E-01 | 4.50E+00 | 1.76E-02 | 1.81E-01 | 1.12E-01 | 1.75E+03 | 4.10E-01 | 1.97E-02 | 6.06E-02 | 5.47 |
| T7 CAIRP construction | DSL | T7 CAIRP | 1.74E+00 | 3.60E-01 | 4.65E+00 | 1.76E-02 | 1.81E-01 | 1.12E-01 | 1.75E+03 | 4.10E-01 | 1.97E-02 | 6.06E-02 | 5.47 |
| T7 NNOOS | DSL | T7 NNOOS | 1.68E+00 | 3.39E-01 | 2.95E+00 | 1.77E-02 | 1.63E-01 | 9.53E-02 | 1.76E+03 | 3.86E-01 | 1.85E-02 | 6.10E-02 | 5.44 |
| T7 NOOS | DSL | T7 NOOSD | 1.89E+00 | 3.87E-01 | 4.66E+00 | 1.78E-02 | 1.82E-01 | 1.13E-01 | 1.78E+03 | 4.41E-01 | 2.12E-02 | 6.15E-02 | 5.39 |
| T7 other port | DSL | T7 other po | 2.45E+00 | 5.29E-01 | 7.87E+00 | 1.73E-02 | 2.09E-01 | 1.38E-01 | 1.72E+03 | 6.02E-01 | 2.89E-02 | 5.96E-02 | 5.56 |
| T7 POLA | DSL | T7 POLAD | 2.62E+00 | 5.58E-01 | 7.87E+00 | 1.76E-02 | 2.09E-01 | 1.38E-01 | 1.75E+03 | 6.36E-01 | 3.05E-02 | 6.07E-02 | 5.46 |
| T7 Public | DSL | T7 PublicD | 1.38E+00 | 2.76E-01 | 1.54E+01 | 2.01E-02 | 1.67E-01 | 9.92E-02 | 2.00E+03 | 3.14E-01 | 1.51E-02 | 6.93E-02 | 4.79 |
| T7 Single | DSL | T7 SingleD | 8.53E-01 | 1.83E-01 | 8.92E+00 | 1.71E-02 | 1.59E-01 | 9.17E-02 | 1.70E+03 | 2.08E-01 | 1.00E-02 | 5.90E-02 | 5.62 |

**Table 17**
**Motor Vehicle Emission Factors in Santa Barbara County for 2017**

| Vehicle Class | Fuel | | Emission Factors (g/mi)[a] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROG | NOx | SOx | PM10 | PM2.5 | $CO_2$ | TOG | $CH_4$ | $N_2O$ | Mileage (mpg) |
| T7 single construction | DSL | T7 single c | 8.46E-01 | 1.82E-01 | 9.18E+00 | 1.71E-02 | 1.59E-01 | 9.21E-02 | 1.70E+03 | 2.07E-01 | 9.93E-03 | 5.90E-02 | 5.62 |
| T7 SWCV | DSL | T7 SWCVI | 1.05E+00 | 2.13E-01 | 1.23E+01 | 1.84E-02 | 1.61E-01 | 9.40E-02 | 1.83E+03 | 2.43E-01 | 1.17E-02 | 6.33E-02 | 5.24 |
| T7 tractor | DSL | T7 tractorD | 1.16E+00 | 2.53E-01 | 6.95E+00 | 1.69E-02 | 1.80E-01 | 1.11E-01 | 1.68E+03 | 2.88E-01 | 1.38E-02 | 5.81E-02 | 5.71 |
| T7 tractor construction | DSL | T7 tractor c | 1.25E+00 | 2.69E-01 | 7.90E+00 | 1.71E-02 | 1.81E-01 | 1.12E-01 | 1.70E+03 | 3.06E-01 | 1.47E-02 | 5.90E-02 | 5.62 |
| T7 utility | DSL | T7 utilityDS | 1.90E+00 | 3.60E-01 | 9.58E+00 | 1.99E-02 | 1.48E-01 | 8.14E-02 | 1.98E+03 | 4.10E-01 | 1.97E-02 | 6.86E-02 | 4.83 |
| T7IS | GAS | T7ISGAS | 4.33E+01 | 1.28E+00 | 5.91E+00 | 6.63E-03 | 4.58E-02 | 1.87E-02 | 5.63E+02 | 1.45E+00 | 1.01E-01 | 2.46E-01 | 12.82 |
| UBUS | GAS | UBUSGAS | 1.85E+01 | 3.27E+00 | 4.52E+00 | 7.86E-03 | 4.83E-02 | 2.11E-02 | 7.11E+02 | 3.48E+00 | 1.30E-01 | 1.88E-01 | 10.83 |
| UBUS | DSL | UBUSDSL | 2.17E+00 | 4.67E-01 | 1.26E+01 | 2.36E-02 | 1.08E+00 | 5.78E-01 | 2.35E+03 | 5.32E-01 | 2.55E-02 | 8.14E-02 | 4.07 |
| All Other Buses | DSL | All Other B | 5.08E-01 | 1.42E-01 | 5.35E+00 | 1.15E-02 | 1.98E-01 | 1.10E-01 | 1.14E+03 | 1.62E-01 | 7.78E-03 | 3.95E-02 | 8.39 |

[a] CO, ROC NOx, $SO_2$, PM10, PM2.5, TOG and $CO_2$ calculated by dividing total daily emissions in Santa Barbara County for 2017 by total miles, and mileage calculated by dividing total daily fuel use by total miles from EMFAC2011 online data (http://www.arb.ca.gov/emfac/). $CH_4$ for gasoline-fueled vehicles calculated by dividing total daily emissions in Santa Barbara County for 2017 by total miles calculated with EMFAC2011-LDV (http://www.arb.ca.gov/msei/emfac2011_ldv.htm). $CH_4$ for diesel-fueled vehciles calculated as 0.048 x TOG (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07). $N_2O$ for gasoline-fueled vehicles calculated as 0.046 x NOx, and $N_2O$ for diesel-fueled vehicles calculated as 0.3316 grams/gallon (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07)

# Attachment I

# Emission Calculations for Alternatives F and G

**Table 1**
**Export Vehicle Criteria Pollutant Daily Emissions Summary - Alternative F, Waste Export to SVLRC**

| Source | Emissions (lb/day) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| Motor Vehicle Exhaust | 15.44 | 2.70 | 9.28 | 0.00 | 2.35 | 1.38 |
| Motor Vehicle Fugitive PM | | | | | 4.57 | 1.12 |
| **Total** | **15.44** | **2.70** | **9.28** | **0.00** | **6.92** | **2.50** |

**Table 2**
**Export Vehicle Criteria Pollutant Annual Emissions Summary - Alternative F, Waste Export to SVLRC**

| Source | Emissions (ton/year) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| Motor Vehicle Exhaust | 2.40 | 0.42 | 1.44 | 0.00 | 0.37 | 0.21 |
| Motor Vehicle Fugitive PM | | | | | 0.71 | 0.17 |
| **Total** | **2.40** | **0.42** | **1.44** | **0.00** | **1.08** | **0.39** |

**Table 3**
**Export Vehicle Greenhouse Gas Annual Emissions Summary - Alternative F, Waste Export to SVLRC**

| Source | Emissions (MT/year)[a] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[b] |
| Motor Vehicle Exhaust | 2,025.94 | 0.02 | 0.07 | 2,048.44 |
| **Total** | **2,025.94** | **0.02** | **0.07** | **2,048.44** |

[a] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT

[b] $CO_2e$ = CO2-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

**Table 4**

**Export Vehicle Criteria Pollutant Daily Emissions Summary - Alternative G, Waste Export to SMIWMF**

| Source | Emissions (lb/day) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| Motor Vehicle Exhaust | 12.20 | 2.10 | 3.07 | 0.00 | 1.90 | 1.12 |
| Motor Vehicle Fugitive PM | | | | | 3.73 | 0.91 |
| **Total** | **12.20** | **2.10** | **3.07** | **0.00** | **5.63** | **2.04** |

**Table 5**

**Export Vehicle Criteria Pollutant Annual Emissions Summary - Alternative G, Waste Export to SMIWMF**

| Source | Emissions (ton/year) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROC | NOx | SOx | PM10 | PM2.5 |
| **In Santa Barbara County** | | | | | | |
| Motor Vehicle Exhaust | 1.90 | 0.33 | 0.48 | 0.00 | 0.30 | 0.17 |
| Motor Vehicle Fugitive PM | | | | | 0.58 | 0.14 |
| **Total** | **1.90** | **0.33** | **0.48** | **0.00** | **0.88** | **0.32** |

**Table 6**
**Export Vehicle Greenhouse Gas Annual Emissions Summary - Alternative G, Waste Export to SMIWMF**

| Source | Emissions (MT/year)[a] | | | |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$[b] |
| Motor Vehicle Exhaust | 1,555.56 | 0.02 | 0.06 | 1,572.82 |
| **Total** | **1,555.56** | **0.02** | **0.06** | **1,572.82** |

[a] Metric ton = 1,000 kilograms = pounds x 453.6 g/lb / 1,000,000 g/MT
[b] $CO_2e$ = CO2-equivalent = $CO_2$ + 25 x $CH_4$ + 298 x $N_2O$

**Table 7**
**Off-Site Motor Vehicle Exhaust Emissions - Alternative F, Waste Export to Simi Valley Landfill and Recycling Center**

| Vehicle | Use | Fuel | Round-Trips/Day | Round-Trip Dist. (mi) | Miles/ Day |
|---|---|---|---|---|---|
| MSW Collection Vehicle | Waste Import to SCRTS instead of to Tajiguas | Diesel | 49 | -40 | -1,960 |
| MSW Collection Vehicle | Waste Import to MarBorg instead of to Tajiguas | Diesel | 21 | -38 | -798 |
| Worker Commute | New SCRTS Truck Driver Commuting | Gasoline | 10 | 50 | 500 |
| Tractor/Trailer | New from SCRTS to SVLRC | Diesel | 21 | 144 | 3,024 |
| Tractor/Trailer | Existing from SCRTS to SVLRC Instead of Tajiguas | Diesel | 7 | 104 | 728 |
| Tractor/Trailer | New from MarBorg to SVLRC | Diesel | 9 | 132 | 1,188 |
| Tractor/Trailer | Existing from MarBorg to SVLRC Instead of Tajiguas | Diesel | 15 | 80 | 1,200 |
| Pick-up Truck/Trailer | Direct Haul to SVLRC instead of Tajiguas | Diesel | 33 | 92 | 3,036 |

[a] Round trips per day are County estimates.

[b] Calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2026 by total miles in Santa Barbara County

**Travel Distances**

| Trip | One-Way Distance (mi) | Round Trip Distance (mi) |
|---|---|---|
| (a) SCRTS to Tajiguas Landfill | 20 | 40 |
| (b) MarBorg to Tajiguas Landfill | 26 | 52 |
| (c) SCRTS to SVLRC | 72 | 144 |
| (d) MarBorg to SVLRC | 66 | 132 |
| (e) Wasteshed Centroid to Tajiguas | 23 | 46 |
| (f) Wasteshed Centroid to SVLRC | 69 | 138 |
| (g) Wasteshed Centroid to SCRTS | 3 | 6 |
| (h) Wasteshed Centroid to MarBorg | 4 | 8 |
| | | |
| Waste Import to SCRTS | (g)-(e) | -40 |
| Waste Import to MarBorg | (h)-(e) | -38 |
| New SCRTS to SVLRC | (c) | 144 |
| Existing SCRTS to SVLRC | (c)-(a) | 104 |
| New MarBorg to SVLRC | (d) | 132 |
| Existing MarBorg to SVLRC | (d)-(b) | 80 |
| Direct Haul to SVLRC | (f)-(e) | 92 |

| Vehicle | Use | EMFAC Vehicle Class | Emission Factors (g/mi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO[a] | ROC[a] | NOx[a] | SOx[a] | PM10[a] | PM2.5[a] | $CO_2$[a] | $CH_4$[a] | $N_2O$[b] |
| MSW Collection Vehicle | Waste Import to SCRTS instead of to Tajiguas | T7 SWCV | 1.53E+00 | 3.03E-01 | 5.53E+00 | 9.07E-06 | 1.53E-01 | 8.59E-02 | 1.71E+03 | 1.65E-02 | 6.25E-02 |
| MSW Collection Vehicle | Waste Import to MarBorg instead of to Tajiguas | T7 SWCV | 1.53E+00 | 3.03E-01 | 5.53E+00 | 9.07E-06 | 1.53E-01 | 8.59E-02 | 1.71E+03 | 1.65E-02 | 6.25E-02 |
| Worker Commute | New SCRTS Truck Driver Commuting | LDT1 | 1.50E+00 | 1.61E-01 | 1.69E-01 | 1.88E-06 | 4.73E-02 | 2.01E-02 | 2.53E+02 | 1.36E-02 | 7.03E-03 |
| Tractor/Trailer | New from SCRTS to SVLRC | T7 tractor | 1.21E+00 | 2.57E-01 | 2.29E+00 | 8.35E-06 | 1.72E-01 | 1.04E-01 | 1.58E+03 | 1.40E-02 | 5.76E-02 |
| Tractor/Trailer | Existing from SCRTS to SVLRC Instead of Tajiguas | T7 tractor | 1.21E+00 | 2.57E-01 | 2.29E+00 | 8.35E-06 | 1.72E-01 | 1.04E-01 | 1.58E+03 | 1.40E-02 | 5.76E-02 |
| Tractor/Trailer | New from MarBorg to SVLRC | T7 tractor | 1.21E+00 | 2.57E-01 | 2.29E+00 | 8.35E-06 | 1.72E-01 | 1.04E-01 | 1.58E+03 | 1.40E-02 | 5.76E-02 |
| Tractor/Trailer | Existing from MarBorg to SVLRC Instead of Tajiguas | T7 tractor | 1.21E+00 | 2.57E-01 | 2.29E+00 | 8.35E-06 | 1.72E-01 | 1.04E-01 | 1.58E+03 | 1.40E-02 | 5.76E-02 |
| Pick-up Truck/Trailer | Direct Haul to SVLRC instead of Tajiguas | LHD2 | 1.01E+00 | 1.33E-01 | 1.75E+00 | 2.50E-06 | 1.34E-01 | 7.13E-02 | 4.71E+02 | 7.27E-03 | 1.72E-02 |

[a] Calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2026 by total miles in Santa Barbara County

[b] Emission factor for diesel calculated as 0.3316 g/gal; see:
http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 7**
**Off-Site Motor Vehicle Exhaust Emissions - Alternative F, Waste Export to Simi Valley Landfill and Recycling Center**

| Vehicle | Use | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| MSW Collection Vehicle | Waste Import to SCRTS instead of to Tajiguas | -6.62 | -1.31 | -23.91 | 0.00 | -0.66 | -0.37 | -7,393.73 | -0.07 | -0.27 |
| MSW Collection Vehicle | Waste Import to MarBorg instead of to Tajiguas | -2.70 | -0.53 | -9.73 | 0.00 | -0.27 | -0.15 | -3,010.30 | -0.03 | -0.11 |
| Worker Commute | New SCRTS Truck Driver Commuting | 1.65 | 0.18 | 0.19 | 0.00 | 0.05 | 0.02 | 279.22 | 0.02 | 0.01 |
| Tractor/Trailer | New from SCRTS to SVLRC | 8.06 | 1.71 | 15.28 | 0.00 | 1.15 | 0.69 | 10,507.55 | 0.09 | 0.38 |
| Tractor/Trailer | Existing from SCRTS to SVLRC Instead of Tajiguas | 1.94 | 0.41 | 3.68 | 0.00 | 0.28 | 0.17 | 2,529.60 | 0.02 | 0.09 |
| Tractor/Trailer | New from MarBorg to SVLRC | 3.16 | 0.67 | 6.00 | 0.00 | 0.45 | 0.27 | 4,127.97 | 0.04 | 0.15 |
| Tractor/Trailer | Existing from MarBorg to SVLRC Instead of Tajiguas | 3.20 | 0.68 | 6.06 | 0.00 | 0.46 | 0.27 | 4,169.66 | 0.04 | 0.15 |
| Pick-up Truck/Trailer | Direct Haul to SVLRC instead of Tajiguas | 6.74 | 0.89 | 11.72 | 0.00 | 0.90 | 0.48 | 3,151.28 | 0.05 | 0.12 |
| **Total** | | **15.44** | **2.70** | **9.28** | **0.00** | **2.35** | **1.38** | **14,361.25** | **0.15** | **0.52** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| Vehicle | Use | Op. Days/yr | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO | ROC | NOx | SOx | PM10 | PM2.5 | $CO_2$ | $CH_4$ | $N_2O$ |
| MSW Collection Vehicle | Waste Import to SCRTS instead of to Tajiguas | 311 | -2,058.88 | -406.90 | -7,435.24 | -0.01 | -205.09 | -115.50 | -2,299,448.91 | -22.23 | -84.05 |
| MSW Collection Vehicle | Waste Import to MarBorg instead of to Tajiguas | 311 | -838.26 | -165.66 | -3,027.20 | 0.00 | -83.50 | -47.02 | -936,204.20 | -9.05 | -34.22 |
| Worker Commute | New SCRTS Truck Driver Commuting | 311 | 514.06 | 55.30 | 57.94 | 0.00 | 16.22 | 6.90 | 86,838.70 | 4.67 | 2.41 |
| Tractor/Trailer | New from SCRTS to SVLRC | 311 | 2,505.36 | 532.41 | 4,750.81 | 0.02 | 356.62 | 215.17 | 3,267,848.39 | 29.09 | 119.45 |
| Tractor/Trailer | Existing from SCRTS to SVLRC Instead of Tajiguas | 311 | 603.14 | 128.17 | 1,143.71 | 0.00 | 85.85 | 51.80 | 786,704.24 | 7.00 | 28.76 |
| Tractor/Trailer | New from MarBorg to SVLRC | 311 | 984.25 | 209.16 | 1,866.39 | 0.01 | 140.10 | 84.53 | 1,283,797.58 | 11.43 | 46.93 |
| Tractor/Trailer | Existing from MarBorg to SVLRC Instead of Tajiguas | 311 | 994.19 | 211.27 | 1,885.24 | 0.01 | 141.51 | 85.38 | 1,296,765.23 | 11.54 | 47.40 |
| Pick-up Truck/Trailer | Direct Haul to SVLRC instead of Tajiguas | 311 | 2,096.92 | 276.79 | 3,645.77 | 0.01 | 278.62 | 148.37 | 980,048.11 | 15.13 | 35.82 |
| **Total** | | | **4,800.78** | **840.54** | **2,887.42** | **0.02** | **730.33** | **429.63** | **4,466,349.14** | **47.58** | **162.49** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 7**
**Off-Site Motor Vehicle Exhaust Emissions - Alternative F, Waste Export to Simi Valley Landfill and Recycling Center**
**Off-Site Motor Vehicle Fugitive PM Emissions**

**Emission Factors for Vehicles on Off-Site Paved Roads**

| Parameter | Value | Comments |
|---|---|---|
| Road silt loading ($g/m^2$) | 0.1 | CalEEMod default |
| Onroad vehicles average weight (tons) | 2.4 | CalEEMod Default for Santa Barbara County |
| PM10 emission factor (lb/mile) | 6.61E-04 | 0.0022 x (silt loading $[g/m^2])^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |
| PM2.5 emission factor (lb/mile) | 1.62E-04 | 0.00054 x (silt loading $[g/m^2])^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |

| Vehicle | Use | Miles/ Day | Op. Days/yr | Daily Emissions (lb/day)[a] | | Annual Emissions (lb/year)[b] | |
|---|---|---|---|---|---|---|---|
| | | | | PM10 | PM2.5 | PM10 | PM2.5 |
| MSW Collection Vehicle | Waste Import to SCRTS instead of to Tajiguas | -1,960 | 311 | -1.30 | -0.32 | -402.95 | -98.91 |
| MSW Collection Vehicle | Waste Import to MarBorg instead of to Tajiguas | -798 | 311 | -0.53 | -0.13 | -164.06 | -40.27 |
| Worker Commute | New SCRTS Truck Driver Commuting | 500 | 311 | 0.33 | 0.08 | 102.79 | 25.23 |
| Tractor/Trailer | New from SCRTS to SVLRC | 3,024 | 311 | 2.00 | 0.49 | 621.70 | 152.60 |
| Tractor/Trailer | Existing from SCRTS to SVLRC Instead of Tajiguas | 728 | 311 | 0.48 | 0.12 | 149.67 | 36.74 |
| Tractor/Trailer | New from MarBorg to SVLRC | 1,188 | 311 | 0.79 | 0.19 | 244.24 | 59.95 |
| Tractor/Trailer | Existing from MarBorg to SVLRC Instead of Tajiguas | 1,200 | 311 | 0.79 | 0.19 | 246.71 | 60.56 |
| Pick-up Truck/Trailer | Direct Haul to SVLRC instead of Tajiguas | 3,036 | 311 | 2.01 | 0.49 | 624.17 | 153.20 |
| **Total** | | | | **4.57** | **1.12** | **1,422.26** | **349.10** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]

[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 8**
**Off-Site Motor Vehicle Exhaust Emissions - Alternative G, Waste Export to Santa Maria Integrated Waste Management Facility**

| Vehicle | Use | Fuel | Round-Trips/Day | Round-Trip Dist. (mi) | Miles/ Day |
|---|---|---|---|---|---|
| MSW Collection Vehicle | Waste Import to SCRTS instead of to Tajiguas | Diesel | 49 | -40 | -1,960 |
| MSW Collection Vehicle | Waste Import to MarBorg instead of to Tajiguas | Diesel | 21 | -40 | -840 |
| Worker Commute | New SCRTS Truck Driver Commuting | Gasoline | 10 | 50 | 500 |
| Tractor/Trailer | New from SCRTS to SMIWMF | Diesel | 21 | 118 | 2,478 |
| Tractor/Trailer | Existing from SCRTS to SMIWMF Instead of Tajiguas | Diesel | 7 | 78 | 546 |
| Tractor/Trailer | New from MarBorg to SMIWMF | Diesel | 9 | 130 | 1,170 |
| Tractor/Trailer | Existing from MarBorg to SMIWMF Instead of Tajiguas | Diesel | 15 | 78 | 1,170 |
| Pick-up Truck/Trailer | Direct Haul to SMIWMF instead of Tajiguas | Diesel | 33 | 78 | 2,574 |

[a] Round trips per day are County estimates.
[b] Calculated by dividing EMFAC2011 calculated total daily fuel use in Santa Barbara County in 2026 by total miles in Santa Barbara County

**Travel Distances**

| Trip | One-Way Distance (mi) | Round Trip Distance (mi) |
|---|---|---|
| (a) SCRTS to Tajiguas Landfill | 20 | 40 |
| (b) MarBorg to Tajiguas Landfill | 26 | 52 |
| (c) SCRTS to SMIWMF | 59 | 118 |
| (d) MarBorg to SMIWMF | 65 | 130 |
| (e) Wasteshed Centroid to Tajiguas | 23 | 46 |
| (f) Wasteshed Centroid to SMIWMF | 62 | 124 |
| (g) Wasteshed Centroid to SCRTS | 3 | 6 |
| (h) Wasteshed Centroid to MarBorg | 3 | 6 |
| | | |
| Waste Import to SCRTS | (g)-(e) | -40 |
| Waste Import to MarBorg | (h)-(e) | -40 |
| New SCRTS to SMIWMF | (c) | 118 |
| Existing SCRTS to SMIWMF | (c)-(a) | 78 |
| New MarBorg to SMIWMF | (d) | 130 |
| Existing MarBorg to SMIWMF | (d)-(b) | 78 |
| Direct Haul to SMIWMF | (f)-(e) | 78 |

| Vehicle | Use | EMFAC Vehicle Class | Emission Factors (g/mi) CO[a] | ROC[a] | NOx[a] | SOx[a] | PM10[a] | PM2.5[a] | $CO_2$[a] | $CH_4$[a] | $N_2O$[b] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MSW Collection Vehicle | Waste Import to SCRTS instead of to Tajiguas | T7 SWCV | 1.53E+00 | 3.03E-01 | 5.53E+00 | 9.07E-06 | 1.53E-01 | 8.59E-02 | 1.71E+03 | 1.65E-02 | 6.25E-02 |
| MSW Collection Vehicle | Waste Import to MarBorg instead of to Tajiguas | T7 SWCV | 1.53E+00 | 3.03E-01 | 5.53E+00 | 9.07E-06 | 1.53E-01 | 8.59E-02 | 1.71E+03 | 1.65E-02 | 6.25E-02 |
| Worker Commute | New SCRTS Truck Driver Commuting | LDT1 | 1.50E+00 | 1.61E-01 | 1.69E-01 | 1.88E-06 | 4.73E-02 | 2.01E-02 | 2.53E+02 | 1.36E-02 | 7.03E-03 |
| Tractor/Trailer | New from SCRTS to SMIWMF | T7 tractor | 1.21E+00 | 2.57E-01 | 2.29E+00 | 8.35E-06 | 1.72E-01 | 1.04E-01 | 1.58E+03 | 1.40E-02 | 5.76E-02 |
| Tractor/Trailer | Existing from SCRTS to SMIWMF Instead of Tajiguas | T7 tractor | 1.21E+00 | 2.57E-01 | 2.29E+00 | 8.35E-06 | 1.72E-01 | 1.04E-01 | 1.58E+03 | 1.40E-02 | 5.76E-02 |
| Tractor/Trailer | New from MarBorg to SMIWMF | T7 tractor | 1.21E+00 | 2.57E-01 | 2.29E+00 | 8.35E-06 | 1.72E-01 | 1.04E-01 | 1.58E+03 | 1.40E-02 | 5.76E-02 |
| Tractor/Trailer | Existing from MarBorg to SMIWMF Instead of Tajiguas | T7 tractor | 1.21E+00 | 2.57E-01 | 2.29E+00 | 8.35E-06 | 1.72E-01 | 1.04E-01 | 1.58E+03 | 1.40E-02 | 5.76E-02 |
| Pick-up Truck/Trailer | Direct Haul to SMIWMF instead of Tajiguas | LHD2 | 1.01E+00 | 1.33E-01 | 1.75E+00 | 2.50E-06 | 1.34E-01 | 7.13E-02 | 4.71E+02 | 7.27E-03 | 1.72E-02 |

[a] Calculated by dividing EMFAC2011 calculated total daily emissions in Santa Barbara County in 2026 by total miles in Santa Barbara County
[b] Emission factor for diesel calculated as 0.3316 g/gal; see:
http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07

**Table 8**

**Off-Site Motor Vehicle Exhaust Emissions - Alternative G, Waste Export to Santa Maria Integrated Waste Management Facility**

| | | Daily Emissions (lb/day)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Vehicle** | **Use** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **$CO_2$** | **$CH_4$** | **$N_2O$** |
| MSW Collection Vehicle | Waste Import to SCRTS instead of to Tajiguas | -6.62 | -1.31 | -23.91 | 0.00 | -0.66 | -0.37 | -7,393.73 | -0.07 | -0.27 |
| MSW Collection Vehicle | Waste Import to MarBorg instead of to Tajiguas | -2.84 | -0.56 | -10.25 | 0.00 | -0.28 | -0.16 | -3,168.74 | -0.03 | -0.12 |
| Worker Commute | New SCRTS Truck Driver Commuting | 1.65 | 0.18 | 0.19 | 0.00 | 0.05 | 0.02 | 279.22 | 0.02 | 0.01 |
| Tractor/Trailer | New from SCRTS to SMIWMF | 6.60 | 1.40 | 12.52 | 0.00 | 0.94 | 0.57 | 8,610.35 | 0.08 | 0.31 |
| Tractor/Trailer | Existing from SCRTS to SMIWMF Instead of Tajiguas | 1.45 | 0.31 | 2.76 | 0.00 | 0.21 | 0.12 | 1,897.20 | 0.02 | 0.07 |
| Tractor/Trailer | New from MarBorg to SMIWMF | 3.12 | 0.66 | 5.91 | 0.00 | 0.44 | 0.27 | 4,065.42 | 0.04 | 0.15 |
| Tractor/Trailer | Existing from MarBorg to SMIWMF Instead of Tajiguas | 3.12 | 0.66 | 5.91 | 0.00 | 0.44 | 0.27 | 4,065.42 | 0.04 | 0.15 |
| Pick-up Truck/Trailer | Direct Haul to SMIWMF instead of Tajiguas | 5.72 | 0.75 | 9.94 | 0.00 | 0.76 | 0.40 | 2,671.74 | 0.04 | 0.10 |
| **Total** | | **12.20** | **2.10** | **3.07** | **0.00** | **1.90** | **1.12** | **11,026.89** | **0.12** | **0.40** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [g/mi] / 453.6 [g/lb]

| | | | Annual Emissions (lb/year)[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Vehicle** | **Use** | **Op. Days/yr** | **CO** | **ROC** | **NOx** | **SOx** | **PM10** | **PM2.5** | **$CO_2$** | **$CH_4$** | **$N_2O$** |
| MSW Collection Vehicle | Waste Import to SCRTS instead of to Tajiguas | 311 | -2,058.88 | -406.90 | -7,435.24 | -0.01 | -205.09 | -115.50 | -2,299,448.91 | -22.23 | -84.05 |
| MSW Collection Vehicle | Waste Import to MarBorg instead of to Tajiguas | 311 | -882.38 | -174.38 | -3,186.53 | -0.01 | -87.90 | -49.50 | -985,478.10 | -9.53 | -36.02 |
| Worker Commute | New SCRTS Truck Driver Commuting | 311 | 514.06 | 55.30 | 57.94 | 0.00 | 16.22 | 6.90 | 86,838.70 | 4.67 | 2.41 |
| Tractor/Trailer | New from SCRTS to SMIWMF | 311 | 2,053.01 | 436.28 | 3,893.03 | 0.01 | 292.23 | 176.32 | 2,677,820.21 | 23.84 | 97.88 |
| Tractor/Trailer | Existing from SCRTS to SMIWMF Instead of Tajiguas | 311 | 452.36 | 96.13 | 857.79 | 0.00 | 64.39 | 38.85 | 590,028.18 | 5.25 | 21.57 |
| Tractor/Trailer | New from MarBorg to SMIWMF | 311 | 969.34 | 205.99 | 1,838.11 | 0.01 | 137.98 | 83.25 | 1,264,346.10 | 11.26 | 46.21 |
| Tractor/Trailer | Existing from MarBorg to SMIWMF Instead of Tajiguas | 311 | 969.34 | 205.99 | 1,838.11 | 0.01 | 137.98 | 83.25 | 1,264,346.10 | 11.26 | 46.21 |
| Pick-up Truck/Trailer | Direct Haul to SMIWMF instead of Tajiguas | 311 | 1,777.82 | 234.67 | 3,090.98 | 0.00 | 236.23 | 125.79 | 830,910.35 | 12.82 | 30.37 |
| **Total** | | | **3,794.66** | **653.08** | **954.18** | **0.02** | **592.02** | **349.36** | **3,429,362.63** | **37.33** | **124.59** |

[a] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Off-Site Motor Vehicle Fugitive PM Emissions**

**Emission Factors for Vehicles on Off-Site Paved Roads**

| Parameter | Value | Comments |
|---|---|---|
| Road silt loading ($g/m^2$) | 0.1 | CalEEMod default |
| Onroad vehicles average weight (tons) | 2.4 | CalEEMod Default for Santa Barbara County |
| PM10 emission factor (lb/mile) | 6.61E-04 | 0.0022 x (silt loading $[g/m^2])^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |
| PM2.5 emission factor (lb/mile) | 1.62E-04 | 0.00054 x (silt loading $[g/m^2])^{0.91}$ x (average vehicle weight)$^{1.02}$ from AP-42 Section 13.2.1, Paved Roads(01/11) |

| | | | | Daily Emissions (lb/day)[a] | | Annual Emissions (lb/year)[b] | |
|---|---|---|---|---|---|---|---|
| **Vehicle** | **Use** | **Miles/ Day** | **Op. Days/yr** | **PM10** | **PM2.5** | **PM10** | **PM2.5** |
| MSW Collection Vehicle | Waste Import to SCRTS instead of to Tajiguas | -1,960 | 311 | -1.30 | -0.32 | -402.95 | -98.91 |
| MSW Collection Vehicle | Waste Import to MarBorg instead of to Tajiguas | -840 | 311 | -0.56 | -0.14 | -172.69 | -42.39 |
| Worker Commute | New SCRTS Truck Driver Commuting | 500 | 311 | 0.33 | 0.08 | 102.79 | 25.23 |
| Tractor/Trailer | New from SCRTS to SMIWMF | 2,478 | 311 | 1.64 | 0.40 | 509.45 | 125.05 |
| Tractor/Trailer | Existing from SCRTS to SMIWMF Instead of Tajiguas | 546 | 311 | 0.36 | 0.09 | 112.25 | 27.55 |
| Tractor/Trailer | New from MarBorg to SMIWMF | 1,170 | 311 | 0.77 | 0.19 | 240.54 | 59.04 |
| Tractor/Trailer | Existing from MarBorg to SMIWMF Instead of Tajiguas | 1,170 | 311 | 0.77 | 0.19 | 240.54 | 59.04 |
| Pick-up Truck/Trailer | Direct Haul to SMIWMF instead of Tajiguas | 2,574 | 311 | 1.70 | 0.42 | 529.18 | 129.89 |
| **Total** | | | | **3.73** | **0.91** | **1,159.11** | **284.51** |

[a] Daily emissions [lb/day] = Miles/day x Emission factor [lb/mi]

[b] Annual emissions [lb/year] = Daily emissions [lb/day] x Operating days/year

**Table 9**
**Motor Vehicle Emission Factors in Santa Barbara County for 2026**

| Vehicle Class | Fuel | Emission Factors (g/mi)[a] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROG | NOx | SOx | PM10 | PM2.5 | CO2 | TOG | CH4 | N2O | Mileage (mpg) |
| LDA | GAS | 8.39E-01 | 7.04E-02 | 8.84E-02 | 1.62E-06 | 4.71E-02 | 1.99E-02 | 2.01E+02 | 7.93E-02 | 8.57E-03 | 3.68E-03 | 2.63E+01 |
| LDA | DSL | 8.13E-02 | 1.10E-02 | 3.11E-01 | 1.68E-06 | 5.16E-02 | 2.41E-02 | 2.29E+02 | 1.25E-02 | 5.99E-04 | 1.16E-02 | 2.86E+01 |
| LDT1 | GAS | 1.50E+00 | 1.61E-01 | 1.69E-01 | 1.88E-06 | 4.73E-02 | 2.01E-02 | 2.53E+02 | 1.75E-01 | 1.36E-02 | 7.03E-03 | 2.26E+01 |
| LDT1 | DSL | 1.28E-01 | 2.34E-02 | 3.97E-01 | 1.69E-06 | 6.18E-02 | 3.35E-02 | 2.30E+02 | 2.67E-02 | 1.28E-03 | 1.17E-02 | 2.84E+01 |
| LDT2 | GAS | 1.21E+00 | 1.34E-01 | 1.59E-01 | 2.20E-06 | 4.72E-02 | 2.00E-02 | 3.12E+02 | 1.46E-01 | 1.19E-02 | 6.63E-03 | 1.93E+01 |
| LDT2 | DSL | 1.15E-01 | 1.68E-02 | 4.29E-01 | 1.68E-06 | 5.56E-02 | 2.77E-02 | 2.54E+02 | 1.91E-02 | 9.16E-04 | 1.16E-02 | 2.86E+01 |
| LHD1 | GAS | 2.85E+00 | 4.14E-01 | 7.55E-01 | 4.99E-06 | 4.64E-02 | 1.93E-02 | 8.95E+02 | 4.43E-01 | 2.54E-02 | 3.14E-02 | 8.52E+00 |
| LHD1 | DSL | 1.07E+00 | 1.48E-01 | 1.94E+00 | 2.50E-06 | 1.23E-01 | 6.80E-02 | 4.71E+02 | 1.68E-01 | 8.08E-03 | 1.72E-02 | 1.93E+01 |
| LHD2 | GAS | 1.80E+00 | 2.81E-01 | 6.46E-01 | 4.98E-06 | 4.56E-02 | 1.86E-02 | 8.95E+02 | 3.01E-01 | 1.93E-02 | 2.69E-02 | 8.54E+00 |
| LHD2 | DSL | 1.01E+00 | 1.33E-01 | 1.75E+00 | 2.50E-06 | 1.34E-01 | 7.13E-02 | 4.71E+02 | 1.51E-01 | 7.27E-03 | 1.72E-02 | 1.93E+01 |
| MCY | GAS | 2.63E+01 | 3.47E+00 | 1.33E+00 | 1.11E-06 | 4.51E-02 | 1.81E-02 | 1.54E+02 | 3.75E+00 | 2.38E-01 | 5.53E-02 | 3.83E+01 |
| MDV | GAS | 1.81E+00 | 2.02E-01 | 2.64E-01 | 2.81E-06 | 4.71E-02 | 1.99E-02 | 4.13E+02 | 2.21E-01 | 1.81E-02 | 1.10E-02 | 1.51E+01 |
| MDV | DSL | 8.00E-02 | 1.17E-02 | 2.96E-01 | 1.68E-06 | 5.25E-02 | 2.49E-02 | 2.58E+02 | 1.33E-02 | 6.40E-04 | 1.16E-02 | 2.86E+01 |
| MH | GAS | 7.68E-01 | 4.50E-02 | 3.11E-01 | 3.39E-06 | 4.53E-02 | 1.83E-02 | 6.10E+02 | 5.90E-02 | 2.21E-02 | 1.29E-02 | 1.25E+01 |
| MH | DSL | 6.18E-01 | 1.84E-01 | 5.29E+00 | 5.75E-06 | 2.64E-01 | 1.70E-01 | 1.08E+03 | 2.10E-01 | 1.01E-02 | 3.96E-02 | 8.37E+00 |
| Motor Coach | DSL | 1.39E+00 | 2.85E-01 | 2.26E+00 | 8.57E-06 | 2.09E-01 | 1.20E-01 | 1.62E+03 | 3.25E-01 | 1.56E-02 | 5.91E-02 | 5.61E+00 |
| OBUS | GAS | 8.36E+00 | 7.41E-01 | 1.36E+00 | 3.64E-06 | 4.54E-02 | 1.84E-02 | 6.42E+02 | 7.86E-01 | 7.56E-02 | 5.66E-02 | 1.17E+01 |
| PTO | DSL | 8.16E-01 | 2.65E-01 | 2.10E+00 | 1.01E-05 | 4.41E-02 | 4.06E-02 | 1.91E+03 | 3.02E-01 | 1.45E-02 | 6.97E-02 | 4.76E+00 |
| SBUS | GAS | 3.49E+00 | 3.13E-01 | 7.10E-01 | 3.78E-06 | 4.57E-02 | 1.86E-02 | 6.76E+02 | 3.43E-01 | 0.00E+00 | 2.95E-02 | 1.12E+01 |
| SBUS | DSL | 8.43E-01 | 2.20E-01 | 8.87E+00 | 6.68E-06 | 8.14E-01 | 3.75E-01 | 1.26E+03 | 2.51E-01 | 1.20E-02 | 4.61E-02 | 7.20E+00 |
| T6 Ag | DSL | 5.40E-01 | 1.39E-01 | 1.38E+00 | 5.69E-06 | 1.88E-01 | 1.01E-01 | 1.07E+03 | 1.58E-01 | 7.58E-03 | 3.92E-02 | 8.46E+00 |
| T6 Public | DSL | 4.59E-01 | 1.07E-01 | 2.12E+00 | 5.81E-06 | 1.75E-01 | 8.89E-02 | 1.10E+03 | 1.22E-01 | 5.86E-03 | 4.00E-02 | 8.28E+00 |
| T6 CAIRP heavy | DSL | 4.38E-01 | 1.17E-01 | 1.08E+00 | 5.63E-06 | 1.80E-01 | 9.33E-02 | 1.06E+03 | 1.33E-01 | 6.38E-03 | 3.89E-02 | 8.54E+00 |
| T6 CAIRP small | DSL | 4.16E-01 | 1.11E-01 | 9.99E-01 | 5.63E-06 | 1.77E-01 | 9.12E-02 | 1.06E+03 | 1.26E-01 | 6.07E-03 | 3.88E-02 | 8.54E+00 |
| T6 OOS heavy | DSL | 4.38E-01 | 1.17E-01 | 1.08E+00 | 5.63E-06 | 1.80E-01 | 9.33E-02 | 1.06E+03 | 1.33E-01 | 6.38E-03 | 3.89E-02 | 8.54E+00 |
| T6 OOS small | DSL | 4.16E-01 | 1.11E-01 | 9.99E-01 | 5.63E-06 | 1.77E-01 | 9.12E-02 | 1.06E+03 | 1.26E-01 | 6.07E-03 | 3.88E-02 | 8.54E+00 |
| T6 instate construction heavy | DSL | 4.94E-01 | 1.31E-01 | 1.28E+00 | 5.65E-06 | 1.86E-01 | 9.86E-02 | 1.07E+03 | 1.49E-01 | 7.14E-03 | 3.89E-02 | 8.52E+00 |
| T6 instate construction small | DSL | 4.42E-01 | 1.18E-01 | 1.09E+00 | 5.63E-06 | 1.80E-01 | 9.37E-02 | 1.06E+03 | 1.34E-01 | 6.43E-03 | 3.89E-02 | 8.54E+00 |
| T6 instate heavy | DSL | 4.91E-01 | 1.30E-01 | 1.27E+00 | 5.65E-06 | 1.85E-01 | 9.84E-02 | 1.07E+03 | 1.48E-01 | 7.11E-03 | 3.89E-02 | 8.52E+00 |
| T6 instate small | DSL | 4.42E-01 | 1.18E-01 | 1.10E+00 | 5.63E-06 | 1.80E-01 | 9.38E-02 | 1.06E+03 | 1.34E-01 | 6.43E-03 | 3.88E-02 | 8.54E+00 |
| T6 utility | DSL | 4.46E-01 | 1.02E-01 | 8.88E-01 | 5.76E-06 | 1.70E-01 | 8.46E-02 | 1.09E+03 | 1.16E-01 | 5.56E-03 | 3.97E-02 | 8.35E+00 |
| T6TS | GAS | 5.44E+00 | 4.72E-01 | 8.07E-01 | 3.55E-06 | 4.54E-02 | 1.84E-02 | 6.31E+02 | 5.04E-01 | 3.13E-02 | 3.36E-02 | 1.20E+01 |
| T7 Ag | DSL | 1.45E+00 | 2.99E-01 | 2.42E+00 | 8.58E-06 | 1.69E-01 | 1.01E-01 | 1.62E+03 | 3.40E-01 | 1.63E-02 | 5.92E-02 | 5.60E+00 |
| T7 CAIRP | DSL | 1.75E+00 | 3.53E-01 | 2.78E+00 | 8.80E-06 | 1.73E-01 | 1.04E-01 | 1.66E+03 | 4.01E-01 | 1.93E-02 | 6.07E-02 | 5.46E+00 |
| T7 CAIRP construction | DSL | 1.75E+00 | 3.53E-01 | 2.78E+00 | 8.80E-06 | 1.73E-01 | 1.05E-01 | 1.66E+03 | 4.02E-01 | 1.93E-02 | 6.07E-02 | 5.46E+00 |
| T7 NNOOS | DSL | 1.69E+00 | 3.36E-01 | 2.43E+00 | 8.86E-06 | 1.60E-01 | 9.31E-02 | 1.67E+03 | 3.83E-01 | 1.84E-02 | 6.11E-02 | 5.43E+00 |
| T7 NOOS | DSL | 1.93E+00 | 3.85E-01 | 2.95E+00 | 8.94E-06 | 1.73E-01 | 1.05E-01 | 1.69E+03 | 4.38E-01 | 2.10E-02 | 6.17E-02 | 5.38E+00 |
| T7 other port | DSL | 1.51E+00 | 3.20E-01 | 3.07E+00 | 8.41E-06 | 1.93E-01 | 1.24E-01 | 1.59E+03 | 3.64E-01 | 1.75E-02 | 5.80E-02 | 5.71E+00 |
| T7 POLA | DSL | 1.69E+00 | 3.52E-01 | 3.24E+00 | 8.55E-06 | 1.94E-01 | 1.24E-01 | 1.61E+03 | 4.01E-01 | 1.92E-02 | 5.90E-02 | 5.62E+00 |

**Table 9**
**Motor Vehicle Emission Factors in Santa Barbara County for 2026**

| Vehicle Class | Fuel | Emission Factors (g/mi)[a] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CO | ROG | NOx | SOx | PM10 | PM2.5 | CO2 | TOG | CH4 | N2O | Mileage (mpg) |
| T7 Public | DSL | 2.23E+00 | 4.26E-01 | 7.56E+00 | 9.90E-06 | 1.53E-01 | 8.62E-02 | 1.87E+03 | 4.85E-01 | 2.33E-02 | 6.83E-02 | 4.86E+00 |
| T7 Single | DSL | 1.23E+00 | 2.53E-01 | 1.88E+00 | 8.54E-06 | 1.54E-01 | 8.68E-02 | 1.61E+03 | 2.88E-01 | 1.38E-02 | 5.89E-02 | 5.63E+00 |
| T7 single construction | DSL | 1.23E+00 | 2.53E-01 | 1.88E+00 | 8.54E-06 | 1.54E-01 | 8.68E-02 | 1.61E+03 | 2.88E-01 | 1.38E-02 | 5.89E-02 | 5.63E+00 |
| T7 SWCV | DSL | 1.53E+00 | 3.03E-01 | 5.53E+00 | 9.07E-06 | 1.53E-01 | 8.59E-02 | 1.71E+03 | 3.45E-01 | 1.65E-02 | 6.25E-02 | 5.30E+00 |
| T7 tractor | DSL | 1.21E+00 | 2.57E-01 | 2.29E+00 | 8.35E-06 | 1.72E-01 | 1.04E-01 | 1.58E+03 | 2.92E-01 | 1.40E-02 | 5.76E-02 | 5.76E+00 |
| T7 tractor construction | DSL | 1.43E+00 | 2.96E-01 | 2.50E+00 | 8.53E-06 | 1.73E-01 | 1.05E-01 | 1.61E+03 | 3.36E-01 | 1.62E-02 | 5.88E-02 | 5.64E+00 |
| T7 utility | DSL | 2.66E+00 | 5.00E-01 | 2.87E+00 | 9.81E-06 | 1.43E-01 | 7.74E-02 | 1.85E+03 | 5.69E-01 | 2.73E-02 | 6.77E-02 | 4.90E+00 |
| T7IS | GAS | 3.97E+01 | 7.57E-01 | 5.63E+00 | 3.28E-06 | 4.50E-02 | 1.80E-02 | 5.33E+02 | 8.89E-01 | 1.13E-01 | 2.34E-01 | 1.30E+01 |
| UBUS | GAS | 9.74E+00 | 1.10E+00 | 2.93E+00 | 3.83E-06 | 4.63E-02 | 1.92E-02 | 6.73E+02 | 1.18E+00 | 1.13E-01 | 1.22E-01 | 1.11E+01 |
| UBUS | DSL | 1.88E+00 | 3.89E-01 | 1.02E+01 | 1.15E-05 | 1.05E+00 | 5.44E-01 | 2.17E+03 | 4.43E-01 | 2.12E-02 | 7.93E-02 | 4.18E+00 |
| All Other Buses | DSL | 5.09E-01 | 1.35E-01 | 1.36E+00 | 5.64E-06 | 1.88E-01 | 1.01E-01 | 1.06E+03 | 1.54E-01 | 7.40E-03 | 3.89E-02 | 8.52E+00 |

[a] CO, ROC NOx, $SO_2$, PM10, PM2.5, TOG and $CO_2$ calculated by dividing total daily emissions in Santa Barbara County for 2017 by total miles, and mileage calculated by dividing total daily fuel use by total miles from EMFAC2011 online data (http://www.arb.ca.gov/emfac/). $CH_4$ for gasoline-fueled vehicles calculated by dividing total daily emissions in Santa Barbara County for 2017 by total miles calculated with EMFAC2011-LDV (http://www.arb.ca.gov/msei/emfac2011_ldv.htm). $CH_4$ for diesel-fueled vehciles calculated as 0.048 x TOG (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07). $N_2O$ for gasoline-fueled vehicles calculated as 0.046 x NOx, and $N_2O$ for diesel-fueled vehicles calculated as 0.3316 grams/gallon (see http://www.arb.ca.gov/msei/emfac2011-faq.htm#emfac2011_web_db_qstn07)

# Attachment J

# Odor Emission Calculations for Alternatives B and C

**Table 1**
**Alternative B Odor Emissions**

| Source Data | | | | | | | | | Emission Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ID | Description | Volumetric Flow Rate | Stack Exit Gas Temperature | Area Source Length | Area Source Width | Height Above Grade | Height Above Roof | Source Coordinates (x,y) | Contaminant | CAS Number | Concentration | Maximum Emission Rate | Flux Chamber Emission Rate | Averaging Period | Initial Upwards Velocity | Emission Rate Estimating Technique | Data Quality | % of Overall Emissions |
| | | ($m^3/s$) | (ºC) | (m) | (m) | (m) | (m) | (m,m) | | | g/m3 | (g/s) | (ou/s/m2) | (hr) | m/s | | | |
| 1 | Sort Area Exhuasts | 10.8 | | | | | | | Odor | | 100 | 1079 | | | | | | |
| 2 | Sort Area Exhuasts | 10.8 | | | | | | | Odor | | 100 | 1079 | | | | | | |
| 3 | Sort Area Exhuasts | 10.8 | | | | | | | Odor | | 100 | 1079 | | | | | | |
| 4 | Remainder of MRF Exhausts | 11.6 | | | | | | | Odor | | 250 | 2890 | | | | | | |
| 5 | Remainder of MRF Exhausts | 11.6 | | | | | | | Odor | | 250 | 2890 | | | | | | |
| 6 | Remainder of MRF Exhausts | 11.6 | | | | | | | Odor | | 250 | 2890 | | | | | | |
| 7 | Remainder of MRF Exhausts | 11.6 | | | | | | | Odor | | 250 | 2890 | | | | | | |
| 8 | Remainder of MRF Exhausts | 11.6 | | | | | | | Odor | | 250 | 2890 | | | | | | |
| x | Biofilter - AD | SAME AS BASE PROJECT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| x | Turned Windtrow (max) | SAME AS BASE PROJECT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| x | Turned Windtrow (avg) | SAME AS BASE PROJECT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| x | Undisturbed Windtrow | SAME AS BASE PROJECT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| x | Cured Pile & Screening | SAME AS BASE PROJECT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |

| Marborg Facility | Sq. Ft. | Height | Volume | ACH | Ventilation | Odor | Treatment | |
|---|---|---|---|---|---|---|---|---|
| | Ft^2 | Ft. | Ft.^3 | | Ft.^3/min | | | |
| Sort Area | 36700 | 28 | 1,027,600 | 4 | 68,507 | 2000 | 95% | 100 |
| Remainder of MRF | 75300 | 32.5 | 2,447,250 | 3 | 122,363 | 5000 | 95% | 250 |
| | | | | | 0 | | | |
| | | | | | 0 | | | |
| | 112000 | | 3,474,850 | | 190,869 | | | |
| Values taken from consultants calculations | | | | | 90.14943224 | $m^3/s$ | | |
| | | | | | 18 | m/s | | |
| | | | | | 2.525226305 | | | |

**Table 2**
**Alternative C Odor Emissions**

| Source Data | | | | | | | | | Emission Data | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ID | Description | Volumetric Flow Rate | Stack Exit Gas Temperature | Area Source Length | Area Source Width | Height Above Grade | Height Above Roof | Source Coordinates (x,y) | Contaminant | Area | Concentration | Maximum Emission Rate | Flux Chamber Emission Rate | Averaging Period | Initial Upwards Velocity | Emission Rate Estimating Technique | Data Quality | % of Overall Emissions |
| | | ($m^3/s$) | (ºC) | (m) | (m) | (m) | (m) | (m,m) | | | | (g/s) | (ou/s/m2) | (hr) | m/s | | | |
| 1 | Tipping Floor Biofilter | 36.1 | Ambient | | | 18.60 | | | Odor | 10000 | 500 | 18028 | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 2 | Load Out Biofilter | 40.9 | Ambient | | | 18.60 | | | Odor | 10900 | 300 | 12259 | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 3 | Biofilter - AD Tajiguas | SAME AS BASE PROJECT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 4 | Turned Windtrow (max) | SAME AS BASE PROJECT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 4 | Turned Windtrow (avg) | SAME AS BASE PROJECT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 5 | Undisturbed Windtrow | SAME AS BASE PROJECT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 6 | Cured Pile & Screening | SAME AS BASE PROJECT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |

A Windrow surface factor of 1.345 is applied to the Flux odour emission rate to convert to flat area source

Grade is "MRF Finished Floor" 0-0"

| SCRTS Facility | Sq. Ft. | Height | Volume | ACH | Ventilation |
|---|---|---|---|---|---|
| | Ft^2 | Ft. | Ft.^3 | | Ft.^3/min |
| Tipping floow/waste delivery | 29460 | 49 | 1,443,540 | 4 | 96,236 |
| MRF waste processing | 35510 | 49 | 1,739,990 | 4 | 115,999 |
| Bale Storage | 11350 | 49 | 556,150 | 4 | 37,077 |
| Load-out waste transfer | 8390 | 49 | 411,110 | 4 | 27,407 |
| | 84710 | | 4,150,790 | | 276,719 |

130.6973317 $m^3/s$
18 m/s
3.040550125

# ~~Attachment K~~

# ~~RRWMD/TRRP Vendor WARM Model Inputs and Output~~ [Please see Appendix P of the EIR]

`

AECOM (NYSE: ACM) is a global provider of professional technical and management support services to a broad range of markets, including transportation, facilities, environmental, energy, water and government. With approximately 95,000 employees around the world, AECOM is a leader in all of the key markets that it serves. AECOM provides a blend of global reach, local knowledge, innovation and technical excellence in delivering solutions that create, enhance and sustain the world's built, natural and social environments. A Fortune 500 company, AECOM serves clients in more than 150 countries and has annual revenue in excess of $19 billion.

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